# The pre-farrowing opportunity to reduce piglet mortality

The survival of piglets through weaning has long been a key measure of sow reproductive performance. Mortality losses include both stillborn piglets and piglets dying prior to weaning. Published literature shows piglet stillbirth rates vary between 5-10%. However, in high prolific herds, stillbirth rates can be as high as 14%. Adding pre-weaning mortality to perinatal mortality rates, total losses to weaning can be 15-25% in high prolific herds. Most pre-weaning mortality among piglets occurs in the first few days of life.

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Collectively, four parameters determine a piglet's preweaning mortality and lifetime performance: being born alive, adequate birth weight, adequate colostrum intake and vitality. These factors are interrelated and have informed Trouw Nutrition's research on piglet mortality and ways to address this production challenge. By focusing on these four parameters, swine producers can address the disturbing reality that while litter sizes have increased, the number of stillborn piglets has also kept pace.

Naturally, the sow plays a critical role in supporting piglets' survivability, including reducing stillbirths and improving neonate vitality. Sow nutrition during gestation should be focused at optimising birth weight in all piglets, in order to deliver piglets with good neonatal survival and performance. But optimising birth weight is just one objective.

Other interventions can facilitate the farrowing process to reduce stillbirth, optimise piglets' condition at birth, and support the supply of colostrum to the neonate.

In this article, we address the first parameter – being born alive. We also introduce an innovation using the maternal sow as a carrier to achieve between one and two extra piglets weaned per sow per year and stronger, more consistent litters.

## Parturition process presents risks

While perinatal and postnatal mortality are sometimes viewed as outcomes sharing underlying causes (body weight), there are actually distinct challenges that occur during the parturition process which contribute to stillborn piglets.

A series of over 800 caesarian sections revealed just 1.9% of the piglets were delivered dead. This finding suggests only around 2% of piglet stillbirths are inevitable, resulting from immature or otherwise non-viable piglets.

Researcher G.C.B. Randall of the Animal Pathology division of the

Animal Diseases Research Institute in Quebec has noted it is the parturition process, not so much the nature of the piglets, that poses the risk of stillbirth.

Remarking on the relationship of arterial blood pH and $pCO_2$ to the viability of the newborn piglet, Randall noted, "some mortality occurs before the onset of parturition, including mummies and non-fresh stillborn, however, the majority (>75%) of stillborn die intrapartum, due to oxygen insufficiency."

While neonatal mortality is greatly affected by birth weight, for stillbirth this may not be true. Both piglets with heavy and light birth weights may be equally at risk of being stillborn.

Fig. 1 shows the distribution of birth weight for stillborn piglets, piglets that died between birth and weaning, and piglets that survived to weaning. Stillborn piglets seem to be a cross section of the whole population regardless of birth weight, whereas piglets that die after birth are predominantly small piglets.

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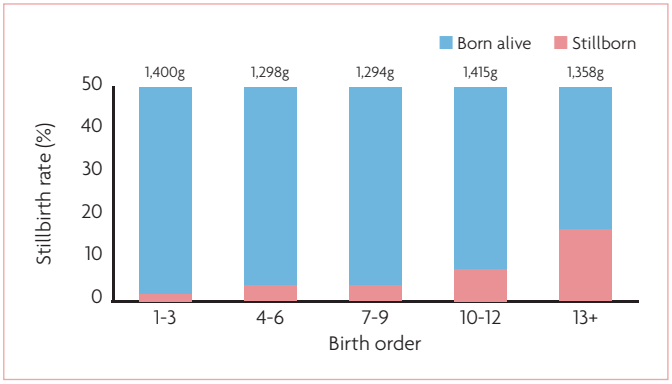
**Fig. 1. Birth weight distribution of piglets that survived to weaning and piglets that were stillborn or piglets that died after birth (NEO).**


**Fig. 2. Stillbirth rate and average birth weight in relation to birth order. Average birth weight for each birth order group is given above the bars.**



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## Oxygen: a critical factor in reducing mortality

Oxygen deficiency during farrowing causes the majority of stillbirths and is a cumulative effect of uterine contractions reducing or inhibiting blood flow to the foetus. When passing the implantation site of a particular foetus, contractions constrict the placenta for a period of 2-3 minutes causing a drop in oxygenation.

Although transient and not necessarily harmful, the cumulative effect may lead to asphyxia, permanent damage to the piglet, and even stillbirth. Piglets born early in the farrowing process suffer less from these cumulative effects, whereas piglets born later or from a sow with a prolonged farrowing are at more risk of being stillborn.

The stillbirth rate is about 2% among the first three piglets but rises to more than 17% in piglets born at the end of the farrowing process. These stillborn rates are observed regardless of birth weight (Fig. 2).

The hormone oxytocin stimulates uterine contractions and impaired oxytocin secretion can occur when sows are disturbed during farrowing, or when sows are uncomfortable. Placing sows in farrowing crates is known to reduce oxytocin secretion, and extend the farrowing process, presenting negative consequences for oxygenation of piglets and stillbirth.

Beyond impaired oxygenation, other stillbirth contributors may include breech position and obstructions of the birth canal. A broken umbilical cord, or a detaching placenta increases the risk of stillbirth considerably.

Poor oxygenation also affects neonatal survival and performance. Table 1 shows piglets with varying levels of lactate in blood samples taken from the umbilical cord immediately at birth. Lactate is produced when piglets are forced to switch from aerobic to anaerobic metabolism, and therefore offers an indication of degree of asphyxia.

Piglets suffering from severe asphyxia have a higher risk of neonatal mortality, are slower to drink their first colostrum and have a lower colostrum intake in the first 24 hours of life, reflecting the carry-over effect of poor oxygenation to the neonatal piglet.

## Leveraging the maternal sow as carrier to improve oxygenation

Research on the factors affecting both piglet mortality and vitality prompted Trouw Nutrition to develop an innovation that focuses on increasing oxygenation to piglets pre-farrowing. Gestawean OxiLiv is a complementary feed solution.

Included in the sow's water line five days pre-farrowing, it requires no added labour and is available to the sow when she is still drinking water but may not be eating. Gestawean OxiLiv improves the oxygen supply to neonates and increases the chances of survival and strength of the litter. While conventional approaches to address the stillbirth challenge have largely focused on interventions at the end of farrowing or adapting diets, such approaches present inherent weaknesses. For example, a dietary approach is not always effective because sows stop eating 8-12 hours before farrowing. Another consideration is the on-site intervention required of farm staff. Other interventions available during the end of farrowing to improve labour and muscle contractions inherently require staff input. In contrast, Gestawean OxiLiv does not require staff intervention.

From conception throughout every stage of a pig's life, an integrated approach combining feed, farm and health management can help swine producers support pigs' performance and producers' economics.

This feed-farm-health approach continues to drive Trouw Nutrition's research in the laboratory and on commercial farms around the globe. ■

| | Blood lactate concentration (mmol/L) | | | | |
|---|---|---|---|---|---|
| | ‹3.36 | 3.36-4.45 | 4.46-6.40 | ›6.40 | P value |
| Birth to first suckling (min) | 34.3±3.2 | 29.7±3.2 | 38.8±3.2 | 39.9±3.3 | 0.10 |
| Colostrum intake (g) | $463^{a}$±13 | $441^{ab}$±13 | $416^{bc}$±13 | $377^{c}$±13 | ‹0.01 |
| Post-natal mortality | 5.5% | 5.4% | 8.5% | 10.9% | ‹0.01 |
| ADG to weaning (g/day) | $259^{a}$±4 | $259^{a}$±4 | $256^{a}$±5 | $245^{b}$±5 | 0.03 |
| Weaning weight (kg) | $8.47^{a}$±0.13 | $8.41^{a}$±0.13 | $8.13^{ab}$±0.14 | $7.93^{b}$±0.14 | 0.02 |
| ADG after weaning (g/day) | $721^{b}$±15 | $710^{b}$±14 | $717^{b}$±14 | $664^{a}$±14 | 0.02 |

**Table 1. Neonatal performance up to six weeks after weaning (four weeks), for piglets with varying levels of umbilical cord blood lactate. Lactate was measured in 516 piglets, to serve as indication of asphyxia. Piglets were distributed equally across lactate categories. A lactate concentration ›4.8mmol/L is indicative of acidosis.**