



Importance of Colostrum on Survival of Newborn Piglets

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Colostrum is the first milk produced by the sow and is essential for piglet survival and growth.

Light birthweight, weak piglets and piglets born later in the birth order require additional management to ensure adequate colostrum intake.

What is colostrum?

Colostrum is the first milk produced by the sow. Colostrum is synthesized by the sow during the end of gestation so that when piglets are born, colostrum is present in the dam's mammary glands for them to consume. Colostrum is composed of all of the nutrients the piglet needs to survive such as fat, protein, carbohydrates, vitamins and minerals. It also contains immunoglobulins (also known as antibodies) such as IgG and IgA which are required by the piglet to provide immunity from disease until their own immune system matures. Colostrum also contains hormones and growth factors that function in the neonate in the final maturation of organs such as the intestines and reproductive tract, as well as many other factors and functions that research has yet to elucidate.

Colostrum is only produced for the first 24-36 hours after birth, after which the sow transitions to producing whole milk. However, the composition of the colostrum begins to change following the birth of the first piglet where the quality of the colostrum decreases rapidly over time. In fact, protein content (immunoglobulins) are reduced by 50% by 12 hours after the birth of the first piglet.

Why is colostrum important?

The two most common causes of death the first 48-hours after birth of piglets are starvation and hypothermia. Colostrum is essential for newborn piglet survival. At birth, a wet newborn piglet transitions from approximately a 101°F environment (the body temperature of a sow) to the farrowing crate, resulting in a decrease of 4-10°F in body temperature of the piglet. Therefore, the piglet must use energy to warm their body temperature back up. Piglets are born with very little energy reserves as they have less than 2% of body weight as fat. Therefore, newborn piglets rely on consumption of fat from colostrum to provide the energy needed to regulate their body temperature (Figure 1).

Piglets are also highly vulnerable to disease, but they are not capable of making their own antibodies at birth. It takes about 4 weeks for the piglet's immune system to become mature enough to synthesize enough antibodies to launch an immune response against disease causing pathogens. Until

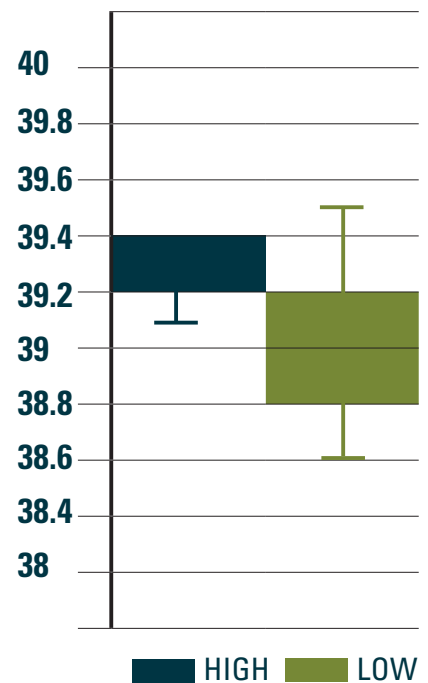


Figure 1. Rectal temperature at 24 hours of age after high (20% of birth weight) and low (10% of birth weight) colostrum intake.

that time, piglets depend on obtaining immunoglobulins made by the sow and transferred to the piglets through colostrum (passive immunity). The ability of piglets to absorb large immune molecules from colostrum decreases starting about 12 hours after birth and is nearly negligible by 24 hours postnatal.

How much colostrum does a piglet need to survive?

Piglets that consume <200g of colostrum in the first 24 hours of life have a mortality rate of 30-43% compared to 3-7% mortality in piglets that consume >200g. Colostrum consumption increases by 26-37g for every 100g increase in birthweight, as heavier piglets tend to compete for space at the udder and more aggressively nurse the teat to extract more colostrum. The relationship between colostrum intake, birth weight and mortality has been researched and found that piglets weighing less than 1.3kg at birth that consumed <200g of colostrum had the highest mortality rates. However, <1.3kg piglets that received adequate colostrum had similar mortality rates to the larger birthweight piglets. Therefore, the light birthweight piglets are typically the pigs most susceptible to low colostrum consumption and resulting increased mortality, but this can be partially mitigated by increased colostrum intake. Management practices such as drying piglets at birth to increase body temperature, split suckling, and assisted nursing have been adopted to attempt to increase colostrum intake in piglets.

What limits colostrum intake by piglets?

Piglet colostrum intake is limited by the amount of colostrum produced by the sow, among other factors. Colostrum production is highly variable among sows and is not associated with litter characteristics. This means that the more piglets the sow is having does not equate to more colostrum produced. In fact, it is estimated that colostrum consumption is decreased by 22-40 g per piglet for each additional piglet born in the litter. The great variation in the amount and quality of colostrum produced is likely due to differences in genetics, feed intake/diet composition during pregnancy, changes in management during puberty when mammary glands are rapidly developing, or hormonal differences around the time of farrowing.

Other factors that can limit colostrum intake are the number and location of teats on the sow's underline. A sow may have 16 or 18 teats on her underline, but it is not guaranteed that all of them are functional and producing colostrum. Data from a limited number of animals suggested that an increase of one functional teat can decrease piglet mortality by 3.25%. Piglets consume about 30% of their total colostrum intake within the first few nursing bouts following birth and then a subset of piglets request milk about every 25-30 minutes for the first 24 hours. A sow must make milk available to her young by listening to her piglet's calls, grunting to

call additional piglets to her udder, and then lie flat on her side to provide access to her teats. Challenges arise when sows are not responsive to calls from their young or are too fat for all of their teats to be exposed when they lay down.

Piglets that are considered disadvantaged for colostrum intake are:

1. Piglets born late in the birth order – colostrum quality decreases from the birth of the first piglet, so those born late in the birthing order will have less access to the highest quality colostrum.
2. Small, light birth-weight piglets – these piglets are unable to compete for space at the udder with larger siblings in the litter. Additionally their suckling stimulus is weak so they cannot extract as much colostrum from the teat. They are also more susceptible to being chilled.
3. Piglets that are cold or chilled – chilled piglets tend to seek warmth under a heat lamp or other supplemental heating in the farrowing crate and avoid the udder.
4. Piglets from large litters – if there are more piglets than there are teats, then some piglets will not get enough time and space at the udder to consume large amounts of colostrum.

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