HOT TOPIC

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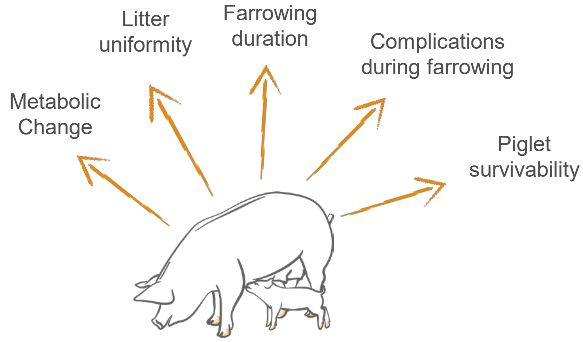
Active D : Effect of Active D on sow's productivity during farrowing and lactation

Challenges of Farrowing and Lactation: Nutritional Demands and the Role of Calcium for Sow and Piglet Health

Farrowing is a demanding phase in a sow's life, closely followed by the equally challenging period of lactation, both of which place significant strain on the metabolism. Around farrowing, the sow undergoes a rapid metabolic shift from a "resting" to a "high-performance" state, driven by hormonal changes and a sudden increase in energy and nutrient needs, including calcium, phosphorus, and vitamin D_3. This heightened demand supports the onset of colostrum and milk production, often requiring the sow to draw on its own calcium and fat reserves. Multiparous sows may experience exhaustion after difficult farrowing, often linked to calcium deficiency, which is critical for uterine muscle contractions. The longer the farrowing process, the higher the likelihood of stillborn piglets.



Challenges during farrowing and lactation

Illustration 1: Challenges and risks occurring around farrowing/lactation

A lack of calcium can reduce muscle contractions, slowing the passage through the birth canal and increasing the number of stillborn piglets. Additionally, the farrowing process can present various challenges for sows, such as stress, health complications, or dystocia. Therefore, providing proper care for the sow during farrowing and lactation is crucial for successful piglet production. This article focuses on the importance of vitamin D and calcium supplementation before and after farrowing

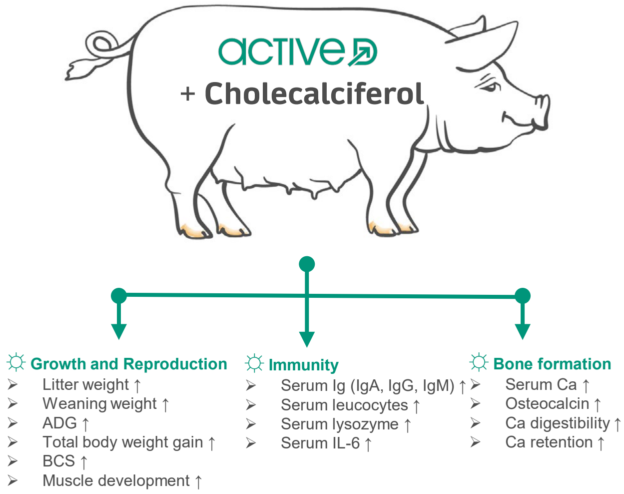


Illustration 2: Assumed and proven effects of additional supplementation with activated vitamin D on sow's performance

Powering Health: Why Active Vitamin D3, Calcium, and Phosphorus Matter

Vitamin D is an essential fat-soluble vitamin that plays a crucial role in calcium and phosphorus metabolism and supports the immune system. Cholecalciferol, the primary dietary source of vitamin D, is biologically inactive in animals and must undergo sequential hydroxylation. First, it is converted to 25-hydroxycholecalciferol (Calcidiol) in the liver and then to 1,25-dihydroxycholecalciferol (Calcitriol) in the kidneys. Calcitriol, the active hormonal form of vitamin D_3, exerts its effects through a nuclear receptor, enabling a range of functions in the sow (see Illustration 2). Active D has a unique feature: it contains calcitriol-glycosides, meaning calcitriol is not available in its free form and must be released by endogenous enzymes for metabolic use.

This provides a slow release and high stability against degradation, heat, and storage, making it ideal for targeted application in animal feeding. This is particularly beneficial for animals with impaired vitamin D metabolism or damage to organs involved in metabolic processing, as it ensures a consistent vitamin D supply during periods of stress or high demand.

- Multiparous sows often experience exhaustion from challenging farrowing, with calcium deficiency frequently contributing to the issue, as calcium is essential for uterine muscle contractions
- Active D, containing calcitriol-glycosides, provides a stable source of calcitriol that is gradually released by endogenous enzymes, making it readily available for metabolism

(Continued Page 1) Calcitriol glycosides can be used in addition to or as a partial replacement for cholecalciferol in premixes, offering a high safety margin and practical advantages for animal feeding. Unlike cholecalciferol and calcidiol, calcitriol does not accumulate in soft tissues such as fat and muscle and has a shorter half-life of only 16–24 hours. Additionally, calcitriol has natural inactivation mechanisms, as it is excreted as calcitroic acid when not needed.

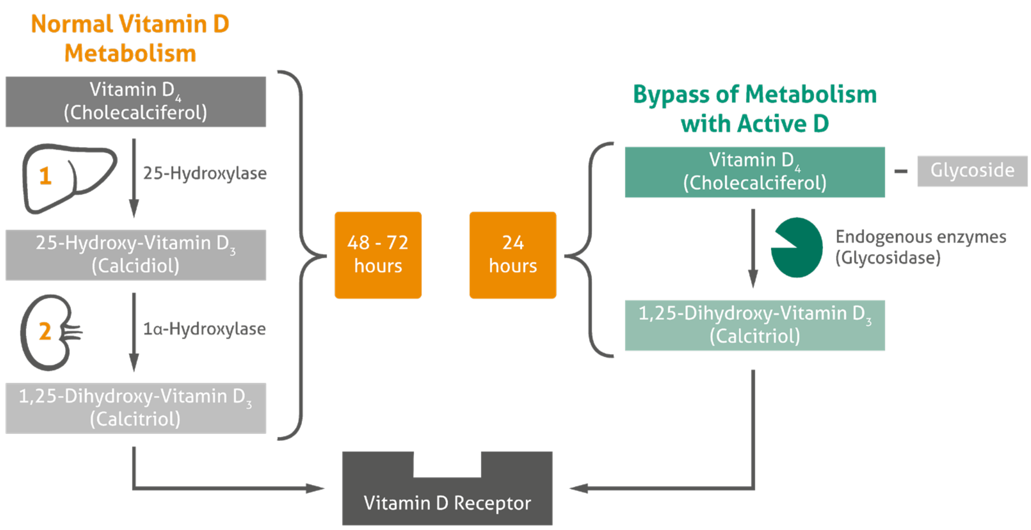


Illustration 3: Comparison of the metabolism of standard vitamin D and glycosidic 1,25-Dihydroxy-Vitamin D3 in the body. The diagram shows that standard vitamin D metabolism is slower and requires involvement of the kidneys, liver, and specific enzymes.

Boosting Lactation Success with Active D

Multiparous sows often experience exhaustion due to challenging farrowing, with calcium deficiency frequently contributing to the problem, as calcium is essential for uterine muscle contractions. The rule of thumb is that the longer the farrowing process, the higher the likelihood of stillborn piglets. Reduced muscle contractions from calcium deficiency slow movement through the birth canal, increasing the risk of stillbirths. Calcitriol glycosides enhance calcium mobilization, helping to support muscle function. Additionally, fatigued sows may experience delayed colostrum and milk let-down as well as reduced appetite.

When it comes to milk production, the estimated calcium and phosphorus requirements for lactating sows are largely driven by their milk output (NRC, 2012). High-producing sows with large, fast-growing litters experience a significant increase in calcium and phosphorus needs. Since calcium is a limiting factor for milk and colostrum production, adding calcitriol glycosides can help maintain consistent milk production. Active D in lactation feed has proven to be particularly effective in addressing these increased demands. Lactation feed is typically introduced 4–7 days before farrowing and continues until the piglets are weaned, around 21–28 days after farrowing. A supplementation concept is illustrated below.

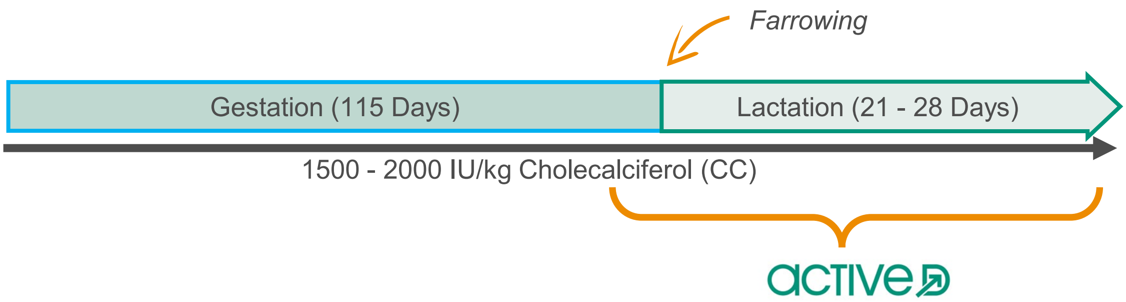


Illustration 4: Recommended use of Active D in sows during high-demand metabolic phases (transition and lactation). Cholecalciferol is administered throughout gestation and lactation. Starting 4–7 days before farrowing, when the need for nutrients like calcium and phosphorus rises sharply, Active D supplementation is advised and should continue until the piglets are weaned.

- Active D helps maintain a steady supply of vitamin D during periods of stress or high demand
- Incorporating Active D into lactation feed has proven highly effective as a targeted approach to meet increased nutritional requirements

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The successful use of Active D in lactation feed - A trial at the University of Milan

In 2024, a trial was conducted on lactating sows at the University of Milan, where Active D (at 400 mg/kg and 600 mg/kg) was added to cholecalciferol (1,800 IU D3/kg) in two treatment groups, while the control group received only cholecalciferol (1,800 IU D3/kg) (Table 1). Active D was included in the lactation feed starting a few days before farrowing. The treatment groups showed a significant positive effect, with a shorter farrowing period and improved production parameters for both sows and piglets.

Treatments	Last week of gestation	Lactation
Control (CTR)	Basal diet (vitamin D3 1800 IU)	Basal diet (vitamin D3 1800 IU)
Treatment 1 (T1)	Basal diet + Active D 400 mg/kg	Basal diet + Active D 400 mg/kg
Treatment 2 (T2)	Basal diet + Active D 600 mg/kg	Basal diet + Active D 600 mg/kg

Table 1: Active D - trial design in lactating sows

Results

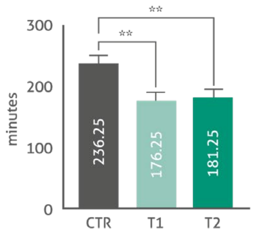

Figure 1: Farrowing duration (*= p<0.05; **=p<0.01)

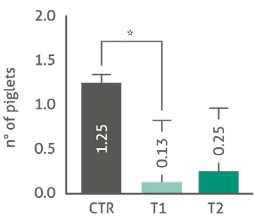

Figure 2: Mortality from fostering to weaning (*=p<0.05)

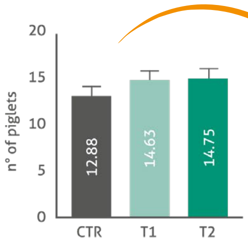

Figure 3: Number of piglets alive after farrowing

The shorter farrowing duration resulted in lower piglet mortality, more weaned piglets, and higher individual piglet weights. One possible explanation for the faster birthing process and healthier piglets is the positive effect of Active D on uterine muscle contractions, as muscle function relies on the movement of calcium ions in and out of muscle cells, facilitating contraction and relaxation.

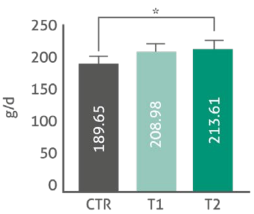

Figure 4: Piglets ADG from farrowing to weaning (*=p<0.05)

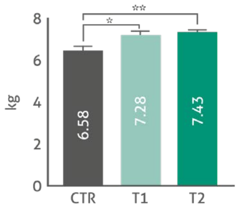

Figure 5: Ind. piglets' weight at weaning (*=p<0.05; **=p<0.01)

Piglets' average daily gain and weaning weight were improved, when sows received Active D prior and during lactation

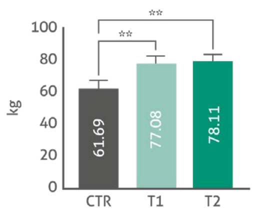

Figure 6: Litter weight at weaning (*=p<0.05; **=p<.0.01)

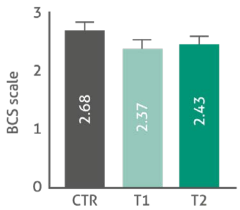

Figure 7: BCS at the end of lactation

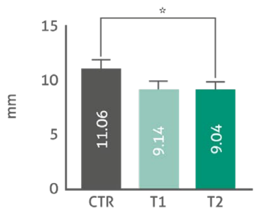

Figure 8: Backfat thickness at the end of lactation (*=p<0.05)

Figure 6 shows a significant increase in litter weight in the treatment groups. This aligns with the findings of greater body mass loss (Figure 7) and reduced backfat thickness in treated groups (Figure 8). It can be hypothesized that additional supplementation with Active D enhanced adipogenesis, leading to higher milk production (with calcium as a limiting factor) and increased fat content in the milk.

Active D supplementation boosted overall performance, with notable benefits such as a shorter farrowing duration, fewer stillborn piglets, and higher individual piglet weight gain. While backfat thickness decreased due to likely increased fat mobilization, there were no negative impacts on body condition score (BCS). These findings suggest that the use of activated vitamin D metabolites enhances sow productivity and improve piglet growth. Further research will explore blood and colostrum parameters in sows to deepen our understanding of these benefits.