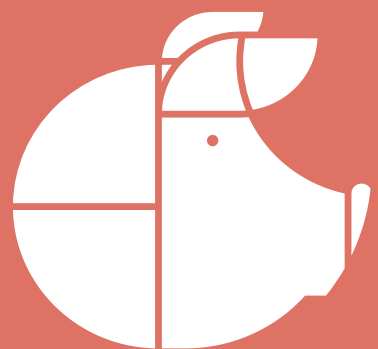
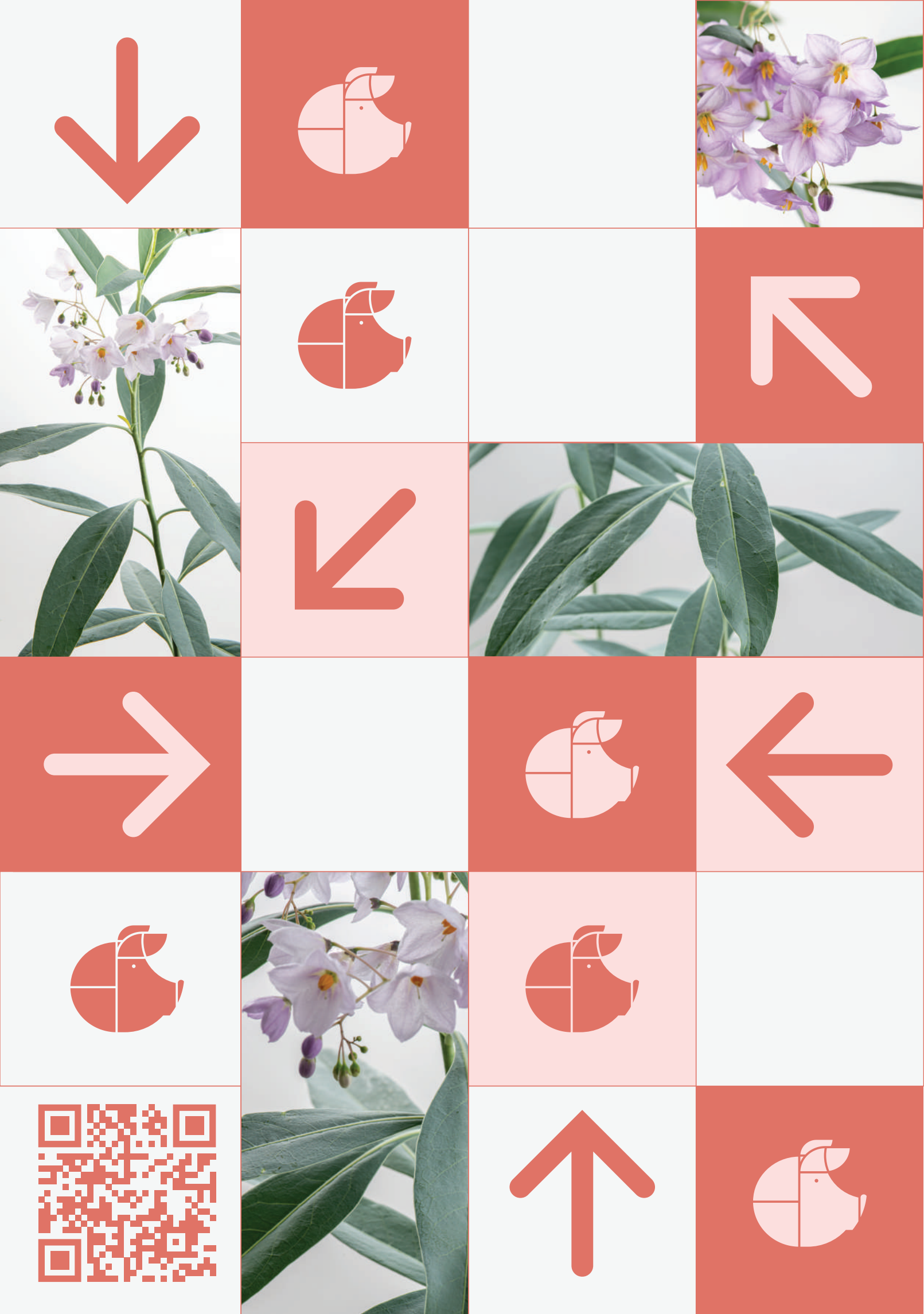




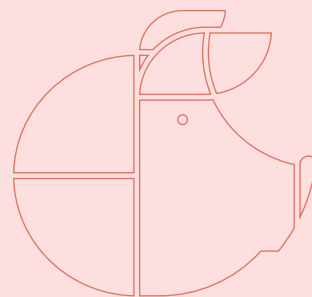
Panbonis[®] for swine

Supporting Vitamin D
metabolism





Panbonis® from the plant *Solanum glaucophyllum*



- + 100% *Solanum glaucophyllum* based
- + Dried and ground *Solanum glaucophyllum* leaves
- + Standardized products to guarantee consistent quality
- + Complementary feed in the EU
- + Full ownership from plant to final product
- + > 20 years of classical plant breeding and deep knowledge of *Solanum glaucophyllum* production
- + Protected plant variety specifically selected to meet the needs of the industry
- + Available for organic production



Panbonis® is a specialty feed ingredient that contains a variety of secondary plant metabolites such as a standardized level of $1,25(\text{OH})_2\text{D}_3$ protected by glycosides from the plant *Solanum glaucophyllum* (waxy-leaf nightshade). The bio-active ingredient in Panbonis® interact with the vitamin D receptor in body cells, enabling animals to reach their full genetic potential.

$1,25(\text{OH})_2\text{D}_3$ is an essential micronutrient involved in a wide range of physiological processes. It is an integral part of the calcium and phosphorus metabolism resulting in, for example, improved bone mineralization. $1,25(\text{OH})_2\text{D}_3$ is in addition connected to fertility, immunity, intestinal integrity, and muscular functions. As vitamin D (as its parent form) alone may not be sufficient in certain phases of production, under challenging conditions or when its activation is compromised, additional dietary supplementation with $1,25(\text{OH})_2\text{D}_3$ -glycosides supports vitamin D metabolism.

Effects on mineral metabolism

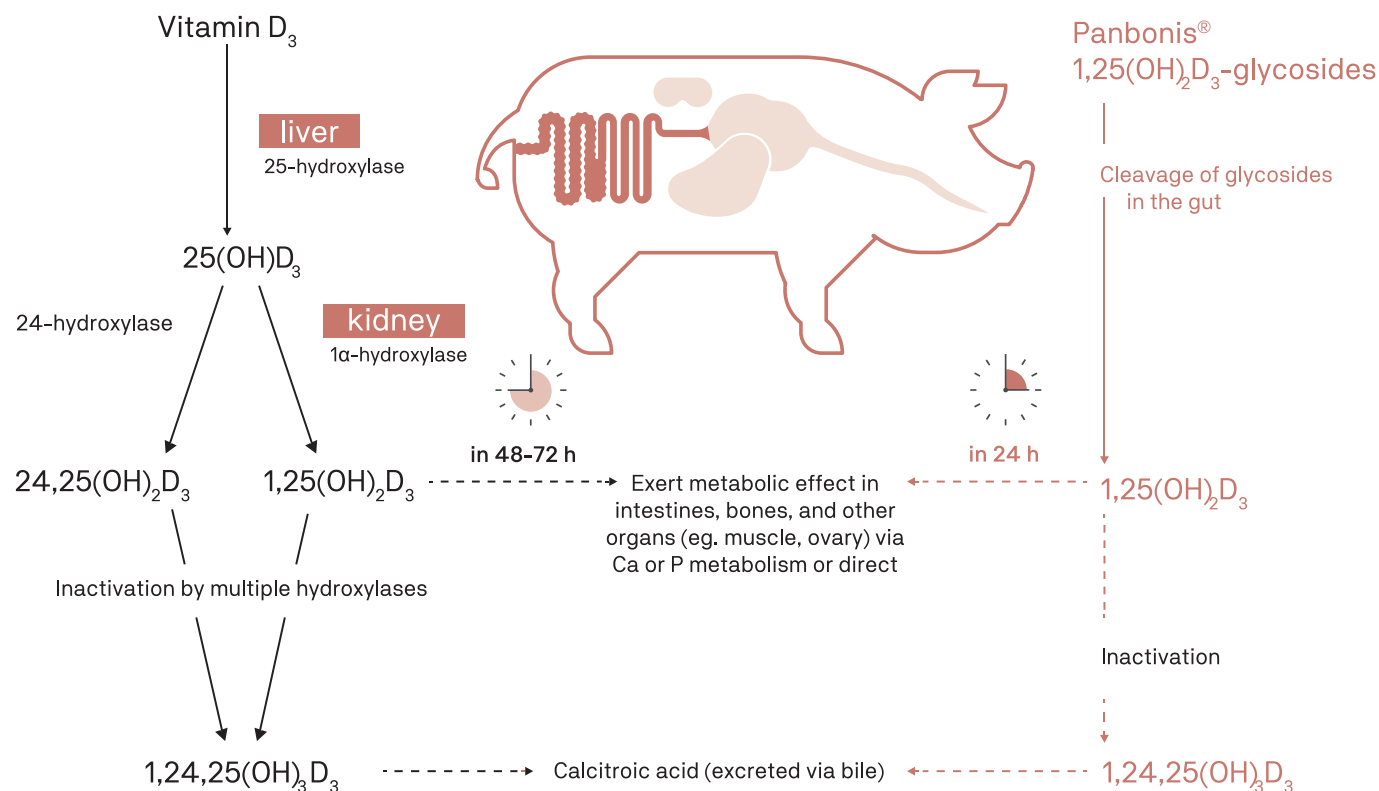
- + Supporting Ca and P homeostasis, improving bone strength and muscle contractions (uterus, heart, lungs)

Effects not directly related to mineral metabolism

- + Vitamin D receptor (VDR) is present in almost all tissues. Therefore, there is a response to $1,25(\text{OH})_2\text{D}_3$ affecting over 200 genes involved in different physiological functions like fertility, immunity, epithelial barrier and muscle functions

Figure 1

Pathways



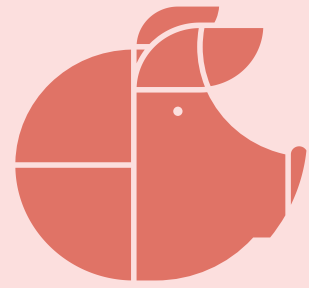
- + 1,25(OH)₂D₃- glycosides are a natural metabolite of *Solanum glaucophyllum*
- + Glycosides are cleaved by gut enzymes, followed by absorption of the bioactive molecule
- + Cleavage is a gradual process that ensures a slow release of 1,25(OH)₂D₃
- + Panbonis® directly supports mineral metabolism in the animal
- + Excess of 1,25(OH)₂D₃ is inactivated and excreted via bile

The synthesis and inactivation of 1,25(OH)₂D₃ are regulated by feedback mechanisms affecting the activity of 1α-hydroxylase. These mechanisms are controlled by various hormones, 1,25(OH)₂D₃ itself, and the levels of Ca and P in the blood, to maintain calcium homeostasis.

Because 1,25(OH)₂D₃ content in blood is regulated by enzymatical inactivation, Panbonis® is safe up to 10x the recommended dose.

Sows

The main causes for sow replacement are poor reproductive performance, low milk production and lameness.



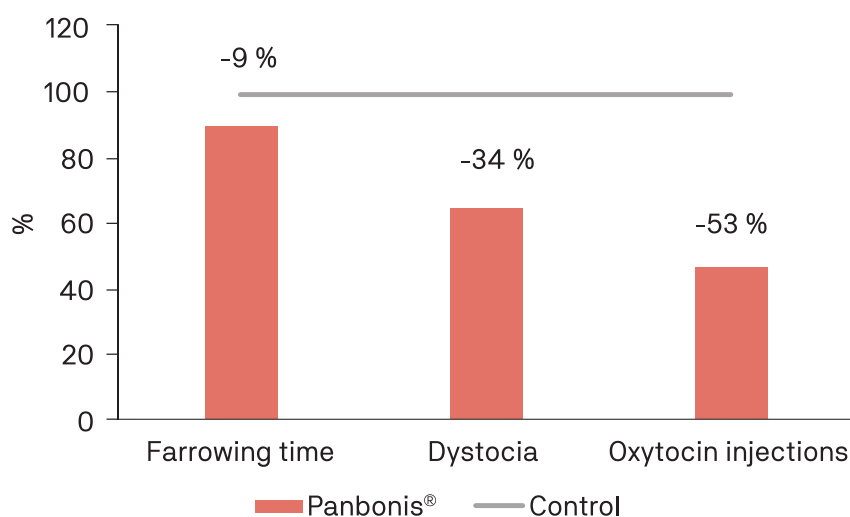
Insemination and Gestation

Since VDR is present in many reproductive organs (placenta, ovary, endometrium and mammary gland), vitamin D plays a role in reproductive processes, like fertility and gestation. It is known to influence reproductive hormones and immune function, both of which are critical for successful reproduction.

Farrowing

SMOOTH FARROWING PROCESS

Easy farrowing and healthy litters have a direct impact on financial returns. The shorter the farrowing time and the expulsion of the placenta, the more vital the piglets and lower the risk of post-farrowing issues for the sow. Calcium stimulates muscle contractions, especially of smooth uterine and pelvic muscles. Stronger and more persistent contractions of these muscles reduce farrowing time and time needed to expulse the placentas.



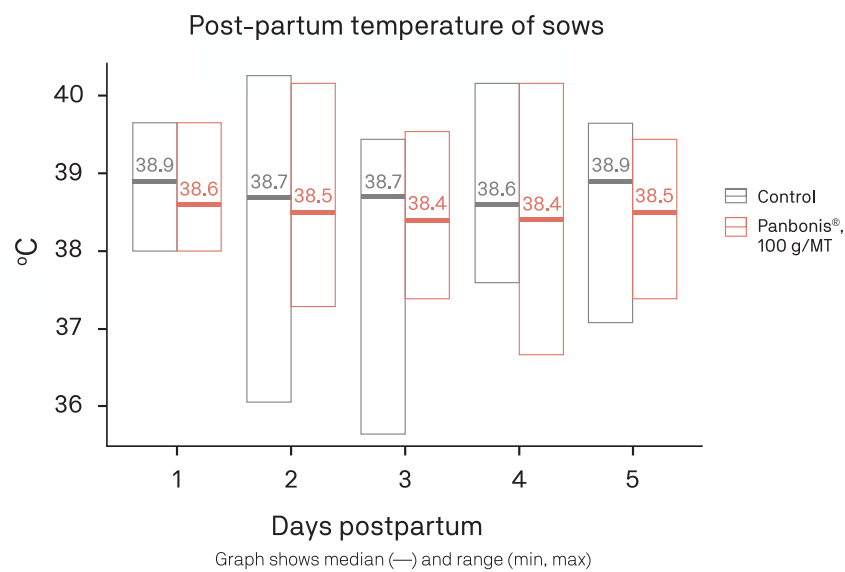
Control groups contain commercial vitamin D levels according to breeder recommendations. Panbonis® is added on top.

Average values of 3 to 8 trials (depending on response parameter)

Sow recovery after farrowing

Farrowing causes a physiological inflammatory reaction, due to the parturition process and the subsequent uterine clearance. This inflammation is visible by an increase in body temperature and vaginal discharge after farrowing. Therefore, these parameters can be used for post-partum health monitoring of sows.

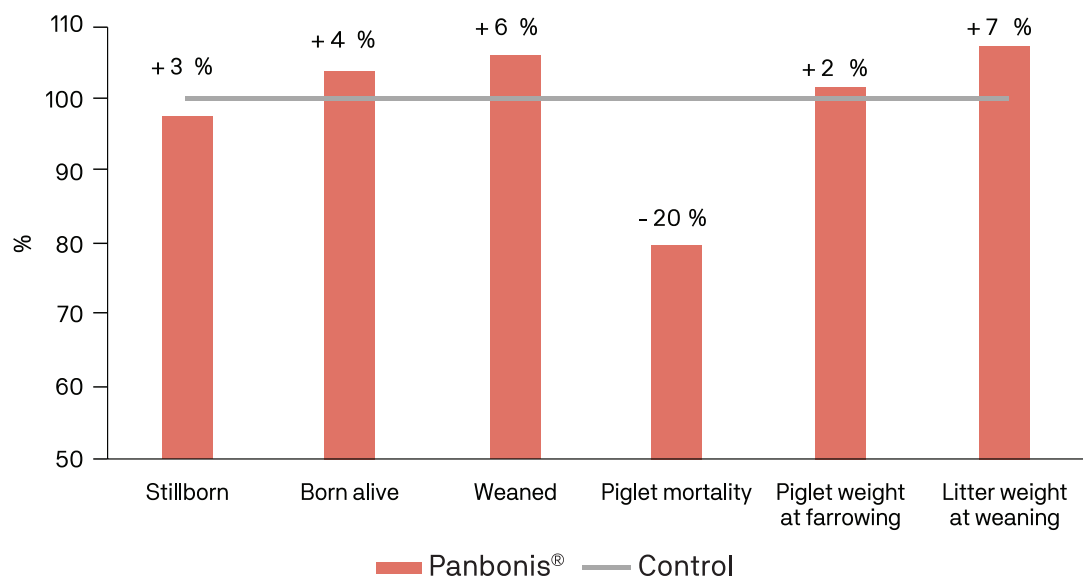
University Bern, Switzerland



Rectal temperature of the sows supplemented with Panbonis® was significantly lower than that of control sows on each of the five days post-partum. This indicates a lower and/or faster resolving post-partum inflammatory reaction.

Reproductive issues and lameness are the main reasons why sows are culled and replaced in commercial operations.

Panbonis® improves reproductive performance by facilitating the farrowing process and improving fertility and milk production.



Average values of 8 to 10 trials (depending on response parameter)



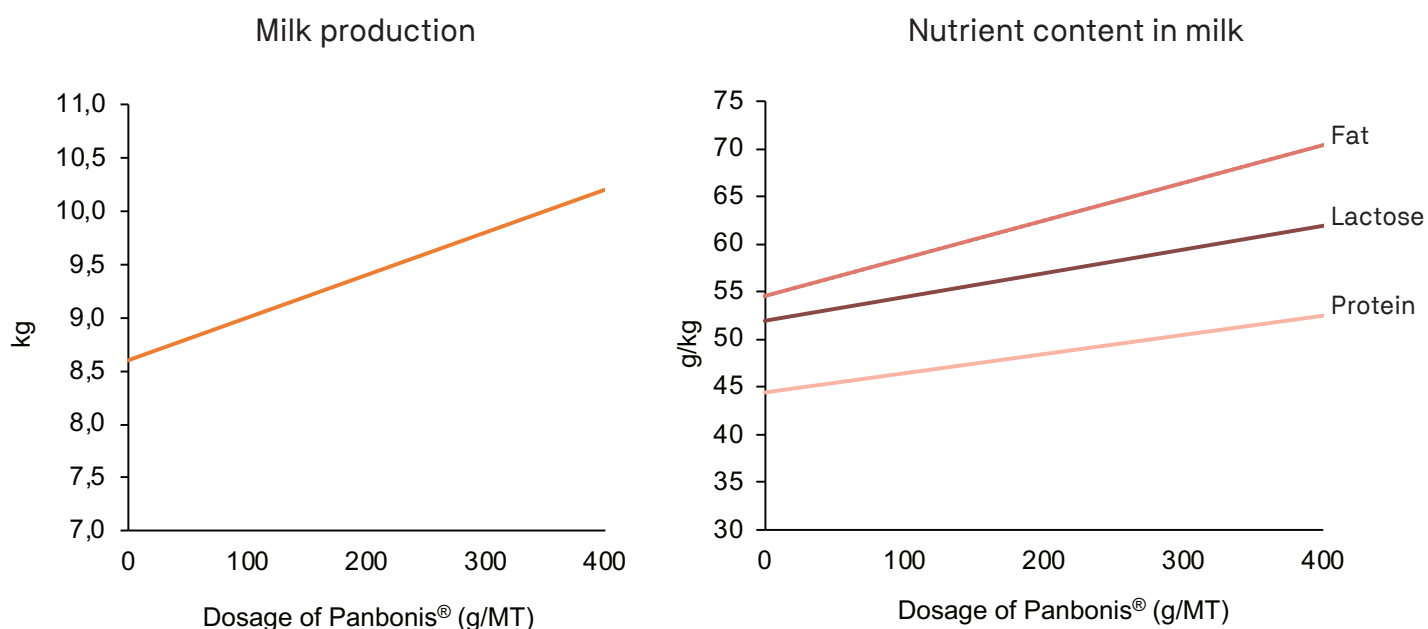
PANBONIS® INCREASES SOW PERFORMANCE BY > 1 EXTRA WEANED PIGLET PER SOW/YEAR

Lactation

HIGHER MILK YIELD WITHOUT NUTRIENT DILUTION

Panbonis® stimulates colostrum and milk production, without dilution of nutrient contents.

University Huazhong, China



The inclusion of 100 g/MT Panbonis® in sow diets increased milk production per sow per day by 0.4 kg and increased milk fat content (4.0 g/kg), lactose content (2.5 g/kg) and protein content (2.0 g/kg).

Better litter performance

Colostrum production (measured as kg/sow by measuring piglets' weight at birth and 24h later) is increased by 20% or 0.5 kg (average of 3 trials), consequently increasing the colostrum intake by the piglets.

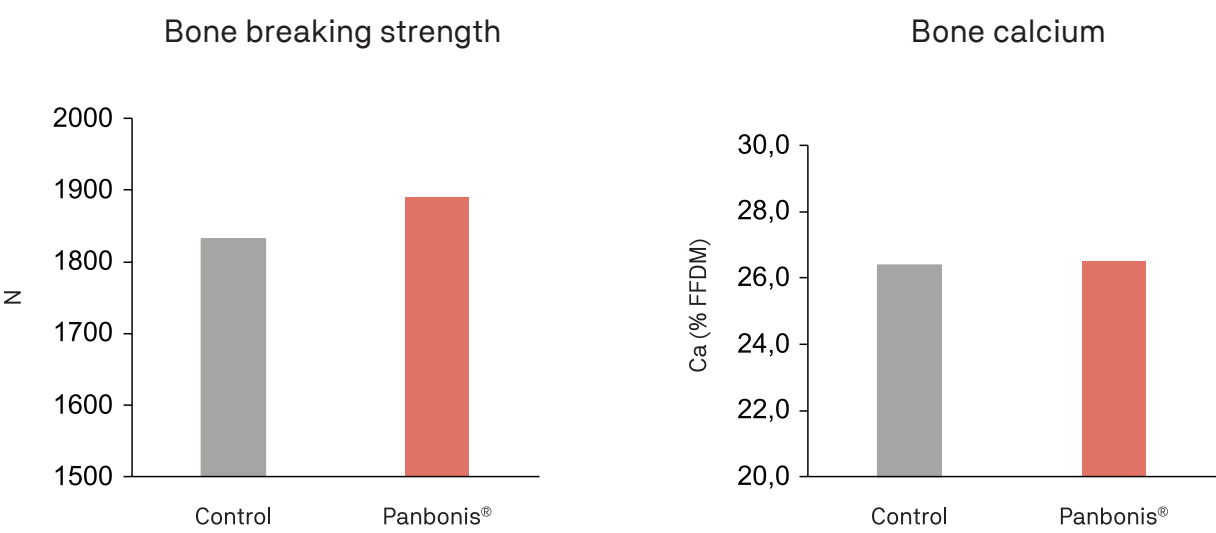
As a result, the weaning weight of the litter is improved by 7% (~ 5kg) with Panbonis®.



Skeletal integrity

Lameness is among the top reasons for premature culling of sows. The origin of lameness can be infectious (e.g. chondronecrosis) or non-infectious (e.g. claw lesions). Poor skeletal health is considered not only an economical issue but also as an animal welfare concern. Maintaining strong bones increases sows' lifetime performance and reduces early replacements.

University ILVO, Belgium

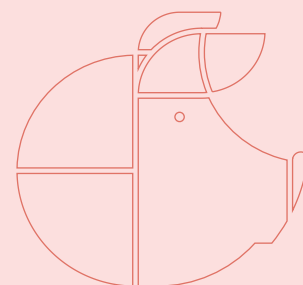


Piglets

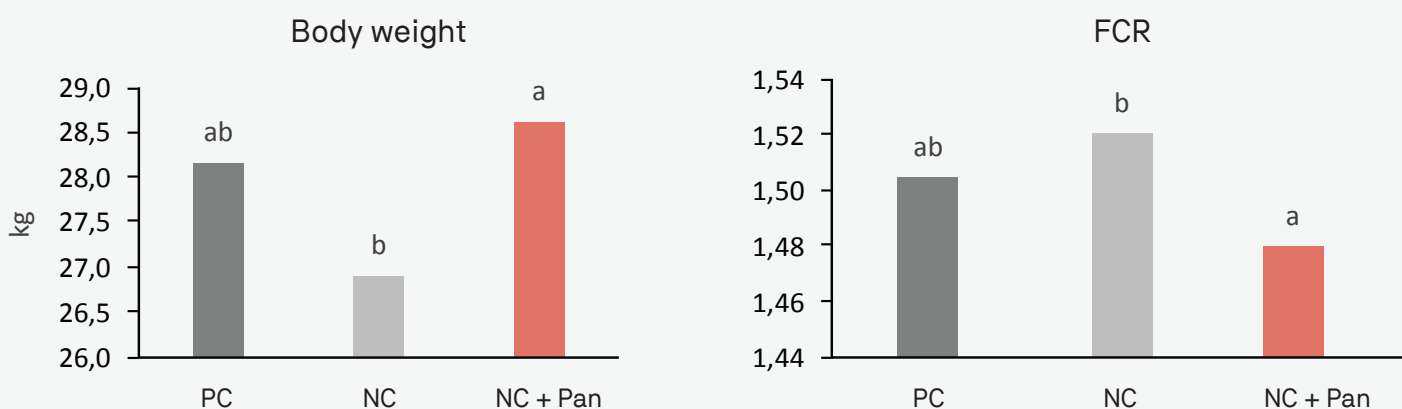
Good start after weaning

Weaning is a challenging phase and Panbonis® improves piglet performance during the first 6-10 weeks post-weaning. Moreover, Panbonis® supply during this phase has a positive effect on weight at slaughter.

The improvements of Panbonis® are visible in a variety of conditions and dietary compositions, like replacement of ZnO (top section) and reduced dietary Ca and P (bottom section).



University Berlin, Germany (Bühler et al, 2023)



PC: with 2500 ppm ZnO

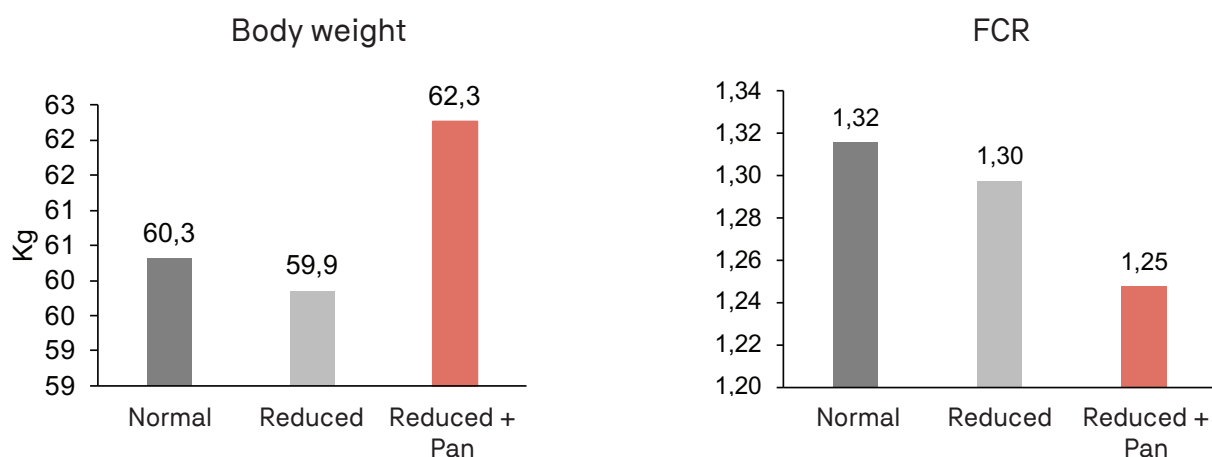
NC: without 2500 ppm ZnO

NC+ Pan: without 2500 ppm ZnO + 100 g/MT Panbonis® 10

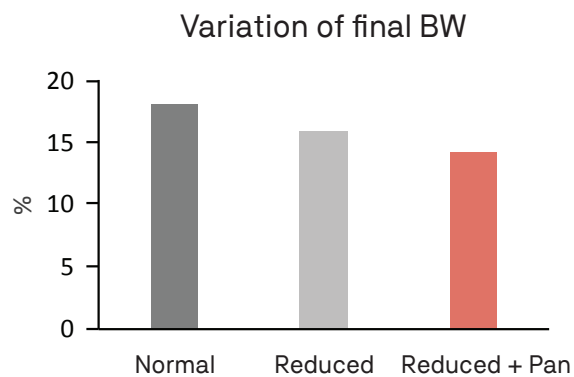
a,b indicates significant differences $P < 0.001$

Comparison between normal and reduced dietary Ca and P levels (20-25%) and Panbonis® supplementation.

University Milan, Italy (Marchetti et al, 2024) and Leeds University, UK



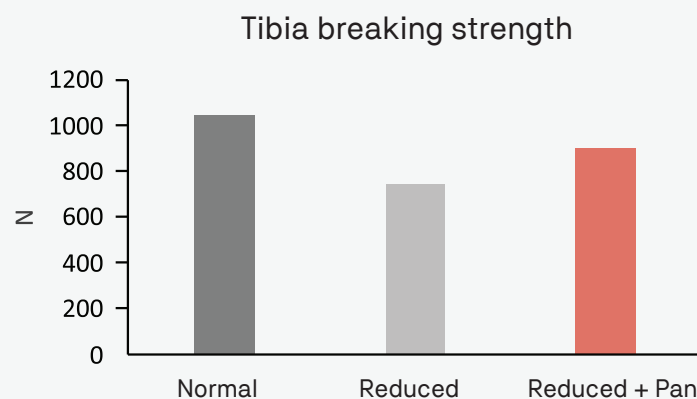
Average values of 2 trials



Reducing Ca and P levels by 20-25% in standard commercial piglet diets did not affect performance but does affect bone development and mineralisation during this crucial growth phase. Panbonis® is an effective solution to not only enhance performance by increasing mineral absorption but also improve bone strength.

MORE UNIFORM PIGLETS!

Agroscope Institute, Switzerland (Schlegel, P. and A. Gutzwiller, 2015)

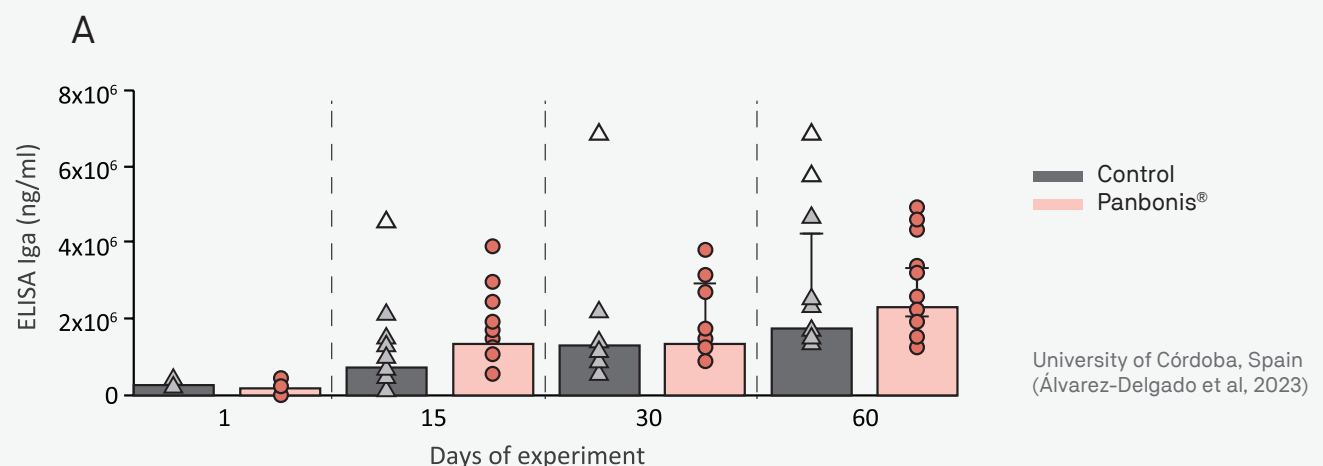


Immune system

The modulation of the immune response by $1,25(\text{OH})_2\text{D}_3$ has been associated with numerous types of cells of the immune system (monocytes, macrophages, natural killer cells, dendritic cells, T and B lymphocytes) that express the vitamin D receptor. Hence, $1,25(\text{OH})_2\text{D}_3$ can modulate immune responsiveness.

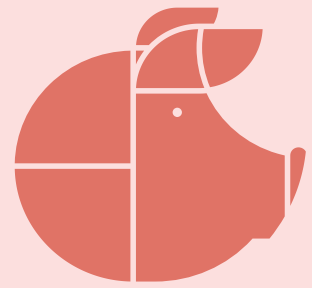
$1,25(\text{OH})_2\text{D}_3$ can also modulate humoral immune response. IgA plays a pivotal role protecting mucosal surfaces from virus and bacteria by preventing binding to the mucosal surface or through direct neutralization.

Higher levels of IgA in serum of piglets supplemented with Panbonis® has been identified.



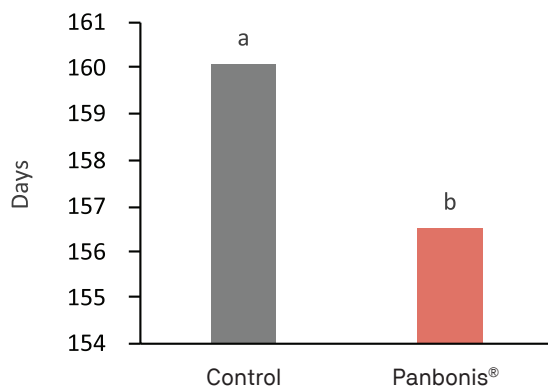
Fattening pigs

In fattening pigs, Panbonis® supplementation in commercial grower and finisher diets improves performance, carcass weight, bone integrity and therefore locomotion.

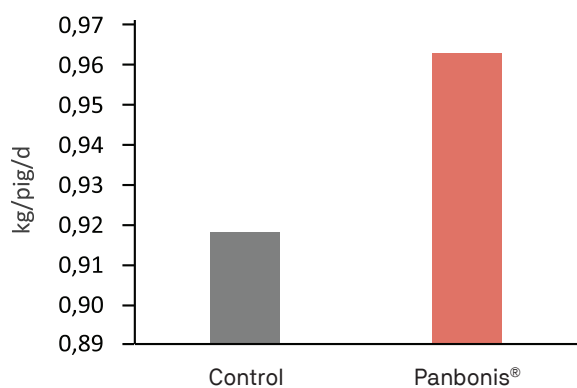


Zootest Institute, France

Age at 100 kg BW



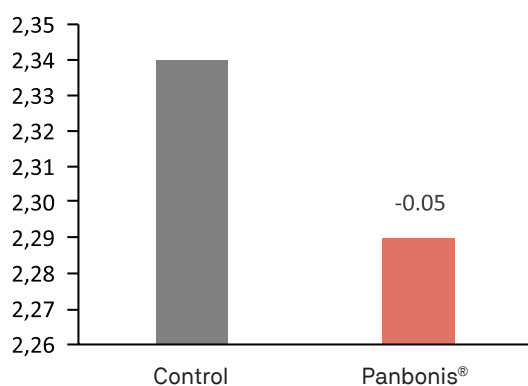
Daily growth



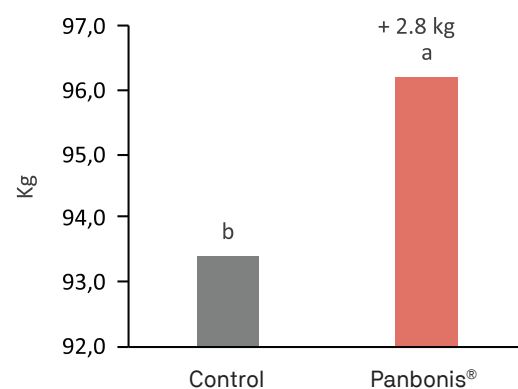
86-100 kg BW pigs

a,b indicates significant differences $P > 0.001$

FCR



Carcass weight



86-100 kg BW pigs

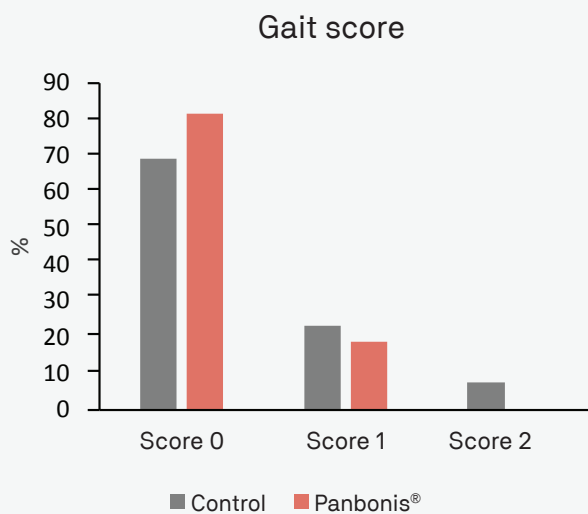
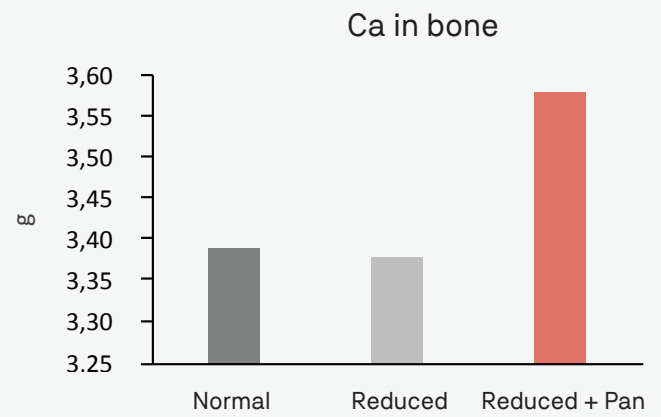
a,b indicates significant differences $P > 0.001$





Reducing dietary Ca and P in grower and finisher diets has a negative impact in bone mineralization and gait score of fattening pigs.

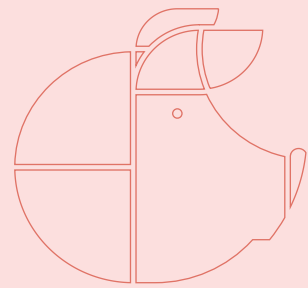
Panbonis® increases mineral deposition in bones improving locomotion.



Score 0: even strides. Pigs walk normally
Score 1: abnormal strides length. Movements no longer fluent
Score 2: shortened strides. Uneven posture. Lameness detected



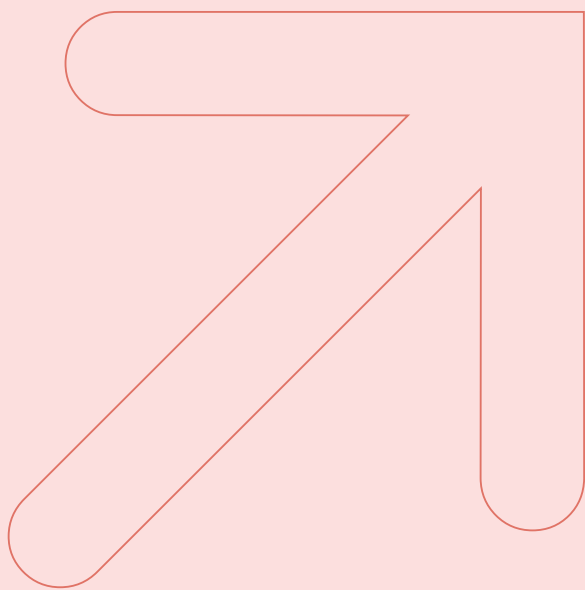
Benefits of using Panbonis®



SOWS	 + Higher reproductive performance + Faster farrowing + More and better milk + Higher weaning weight + Lower piglet mortality + Better bone health
PIGLETS	 + Better post-weaning health and performance + Higher immune competence and less inflammations + Potential alternative to pharmaceutical ZnO levels + Secures mineral supply in crucial growing periods (performance and bones)
FATTENING PIGS	 + Better performance + Higher carcass weight + Better bone mineralization and gait score

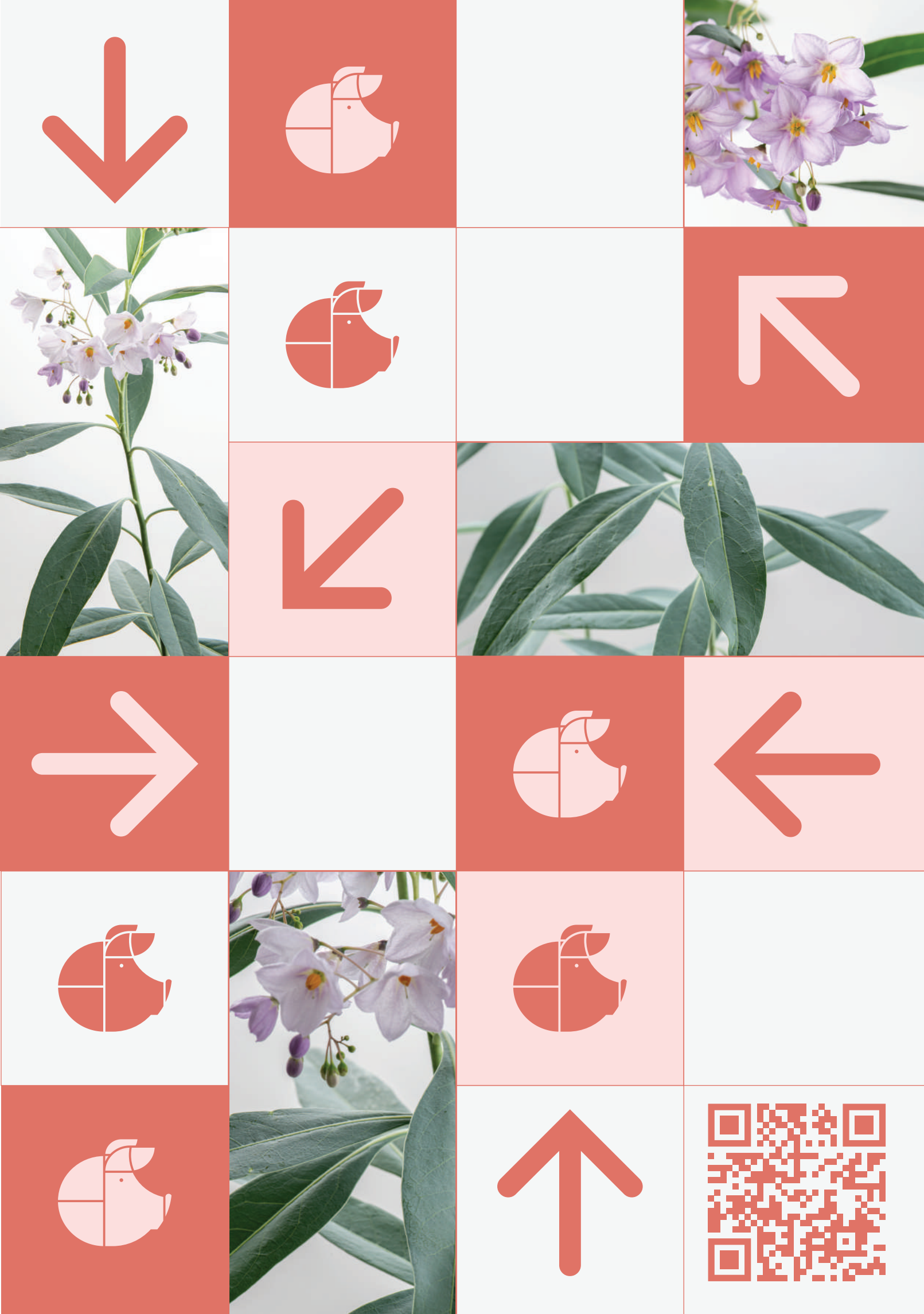
Dosage and recommendation

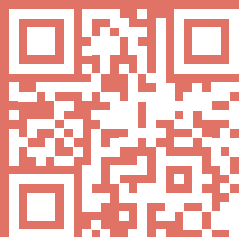
For swine, 100 g/MT of Panbonis® 10 and 50 g/MT of Panbonis® 20 are recommended. Panbonis® 1 (1000 g/MT) and Panbonis® 2 (500 g/MT) are also available.



Panbonis[®] for swine

Supporting Vitamin D metabolism





For more information
please visit
herbonis.com

Panbonis[®] for swine

Supporting Vitamin D
metabolism

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