



# Effect of cholecalciferol and calcitriol on growth performance and mineral status in weaned piglets.



**P. Schlegel<sup>1</sup>, A. Gutzwiller<sup>1</sup> and H. Bachmann<sup>2</sup>**

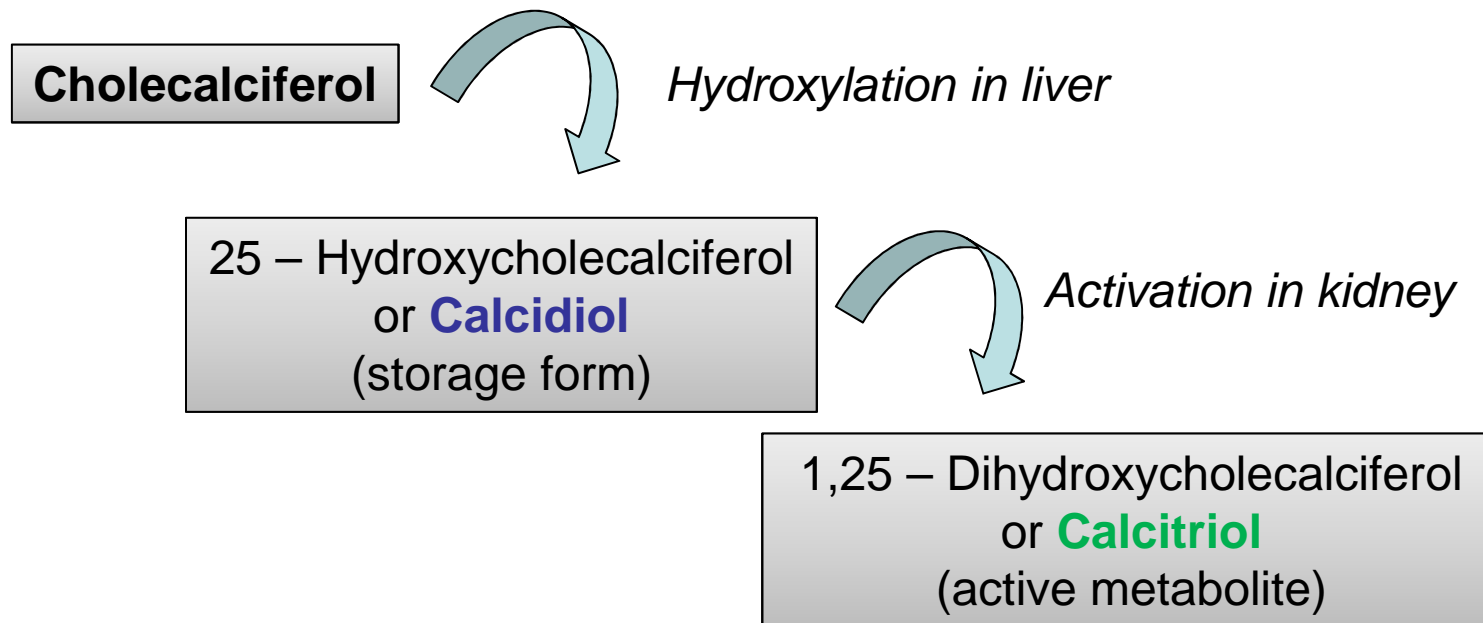
*<sup>1</sup>Agroscope, Posieux, Switzerland, <sup>2</sup>Herbonis Animal Health GmbH, Basel, Switzerland*

*63<sup>rd</sup> EAAP Meeting, Bratislava the 29.08.2012*



# Introduction

- Vitamin D<sub>3</sub> (cholecalciferol) is necessary for the active Ca and P transport from the lumen into the intestinal cell.
- Forms of vitamin D<sub>3</sub>:



- E.U. Legislation: **Calcidiol** is authorized in poultry and pigs since 2009.  
**Calcitriol** is not listed.



# Introduction

- **Calcitriol** in broilers: successful to improve P utilization (Edwards, 1993; Rennie *et al.*, 1993; Baker *et al.*, 1995; Baker *et al.*, 1998; Cheng *et al.*, 2004; Schäublin *et al.*, 2010).
- **Calcitriol** in pigs: No effect on P utilization (Cromwell *et al.*, 1996)

## Objectives of weaning piglet exp.

- **Cholecalciferol**: Are the recommended dietary D<sub>3</sub> levels of 1000 IU / kg (Agroscope) sufficient, when using **cholecalciferol** ?
- **Calcitriol**: Tolerance test when feeding **calcitriol** up to 10 times the producer's recommended level?



# Experimental design

## ○ Product calcitriol

«Herbal active vitamin D<sub>3</sub>»

Leaves from *Solanum glaucophyllum*,  
Panbonis<sup>®</sup>, Herbonis Animal Health, Basel, Switzerland

Product content:

10 mg 1,25-Dihydroxycholecalciferol / kg  
in glycoside form

Recommended level:

50 - 200 g / t feed  
on top of usual cholecalciferol level

Legislation:

CH: registered as feed additive

EU: notified as under Regulation EC767/2009  
as SG standardized leaves





# Experimental design

- 70 Large White piglets (28 days) from own breeding herd, blocked by BW and gender, placed into 14 pens.
- Duration: 6 weeks from weaning
- Two basal diets: based on maize, barley, soybean meal, casein and whey
  - BD I: Vit/Min premix to provide **1000 IU Cholecalciferol** / kg diet
  - BD II: Vit/Min premix to provide **2000 IU Cholecalciferol** / kg diet

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<b>Nutrient composition [g/kg]</b>	
Digestible energy [MJ/kg]	14
Crude protein [g/kg] <sup>1)</sup>	173
Calcium [g/kg] <sup>1)</sup>	9.7
Phosphorus [g/kg] <sup>1)</sup>	5.5
Non phytic Phosphorus [g/kg]	3.6
Phytase activity [FTU/kg] <sup>1)</sup>	700
Digestible phosphorus [g/kg]	3.5

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<sup>1)</sup> Analyzed



# Experimental design

- Experimental diets: Supplementation of Cholecalciferol and Calcitriol

Treatment	Basal diet	Cholecalciferol <sup>1)</sup> [μg/kg]	Calcitriol <sup>2)</sup> [μg/kg]
<b>25 / 0</b>	<b>I</b>	25	0
<b>25 / 5</b>	<b>I</b>	25	5
<b>50 / 0</b>	<b>II</b>	50	0
<b>50 / 2.5</b>	<b>II</b>	50	2.5
<b>50 / 5</b>	<b>II</b>	50	5
<b>50 / 10</b>	<b>II</b>	50	10
<b>50 / 20</b>	<b>II</b>	50	20

<sup>1)</sup> 25 ug Cholecalciferol / kg = 1000 IU / kg; 50 ug cholecalciferol / kg

<sup>2)</sup> Panbonis®, 10 mg Calcitriol / kg product

- Data collection: Pen FI (weekly); individual BW (weekly)

Blood (weekly); tibia (slaughter)

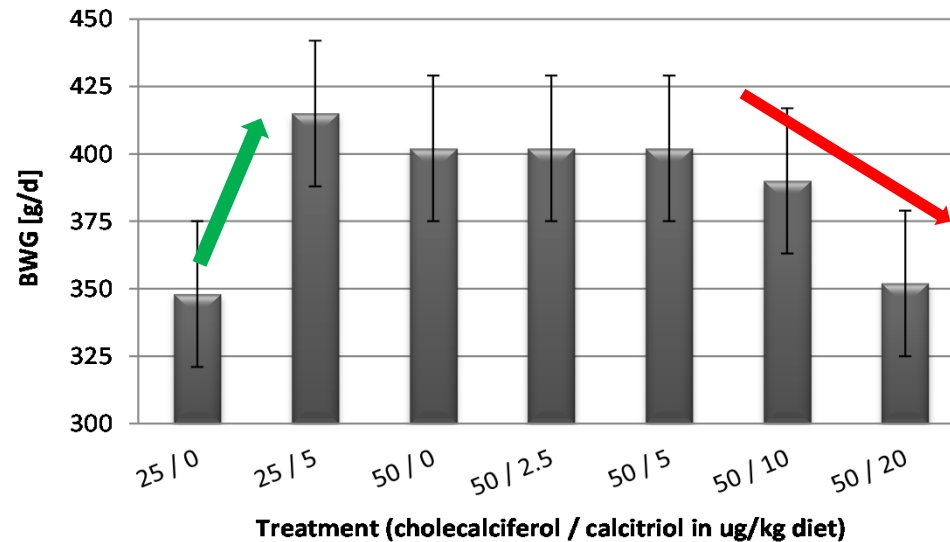
- Statistical analysis of data: GLM including bloc and treatment effects.



# Results

## ○ Growth performance

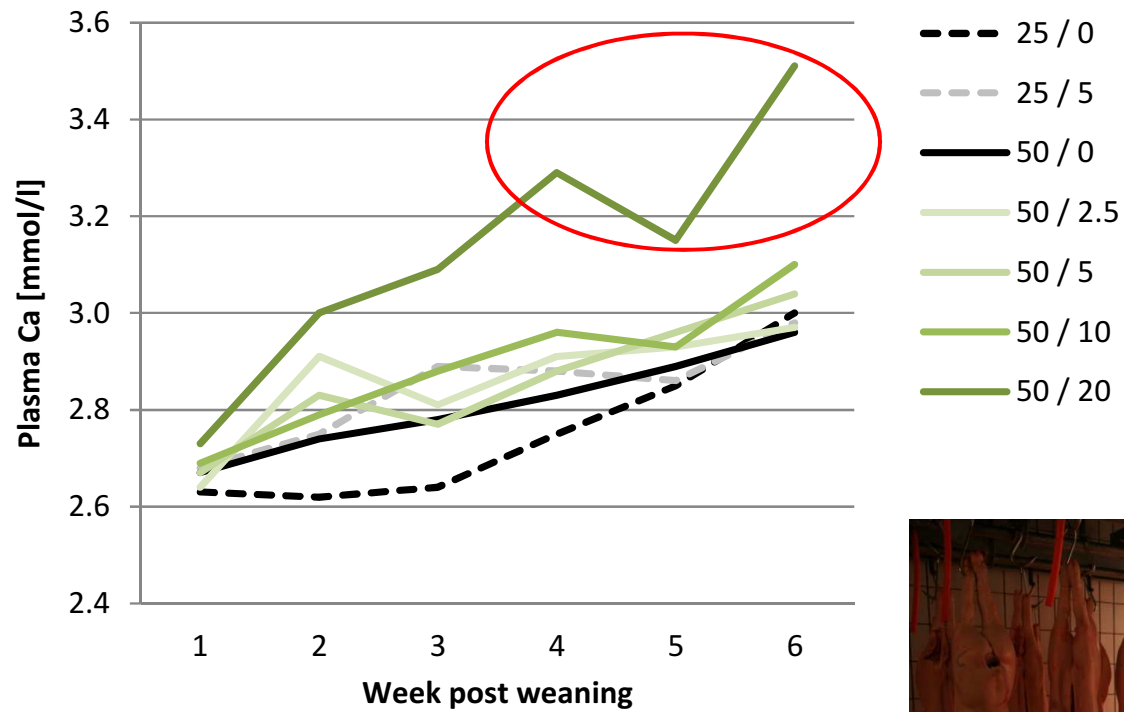
Cholecalciferol level [ $\mu\text{g} / \text{kg}$ ]	25	25	50	50	50	50	50	SEM	P Value
Calcitriol level [ $\mu\text{g} / \text{kg}$ ]	0	5	0	2.5	5	10	20		
BW weaning [kg]	9.2	9.3	9.1	9.1	9.2	9.1	9.1	0.4	n.s.
Final BW [kg]	23.8	26.7	26.0	26.0	26.1	25.5	23.9	1.2	n.s.
BWG [g/d]	348	415	402	402	402	390	352	27	n.s.
FI [g/d]	585	665	682	665	645	667	652	-	-
FCR	1.68	1.60	1.70	1.65	1.60	1.71	1.85	-	-





# Results

## ○ Plasma values



Ca: 25/0 vs:  
< 50/20 : wk 3 – 6 (P<0.05)







# Results

## ○ Plasma values

P: 25/0 vs (P < 0.05):

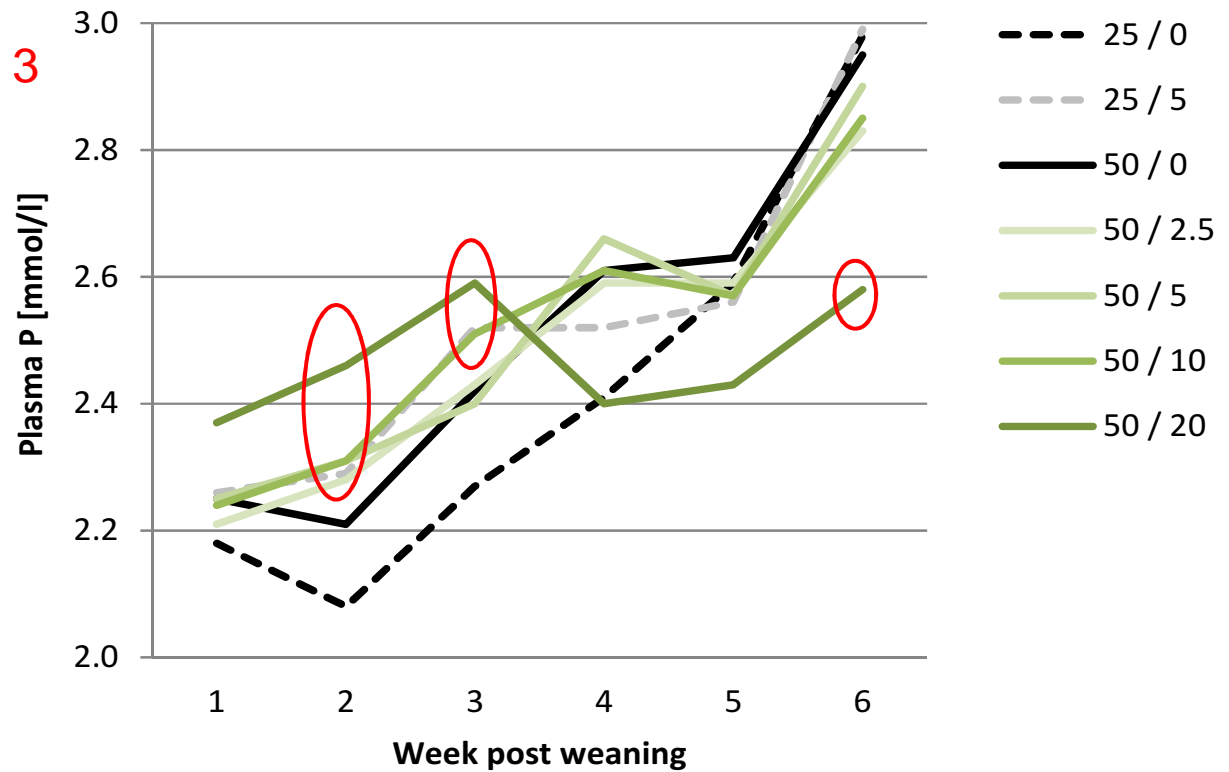
< 25/5 : wk 2 – 3

< 50/2.5: wk 2

< 50/5 : wk 2

< 50/10 : wk 2 - 3

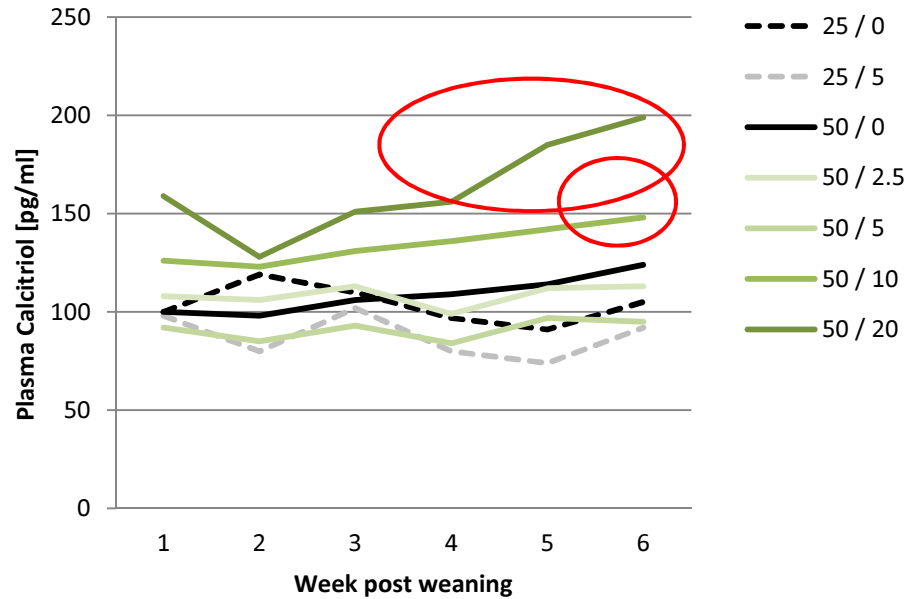
> 50/20 : wk 6





# Results

## ○ Plasma values

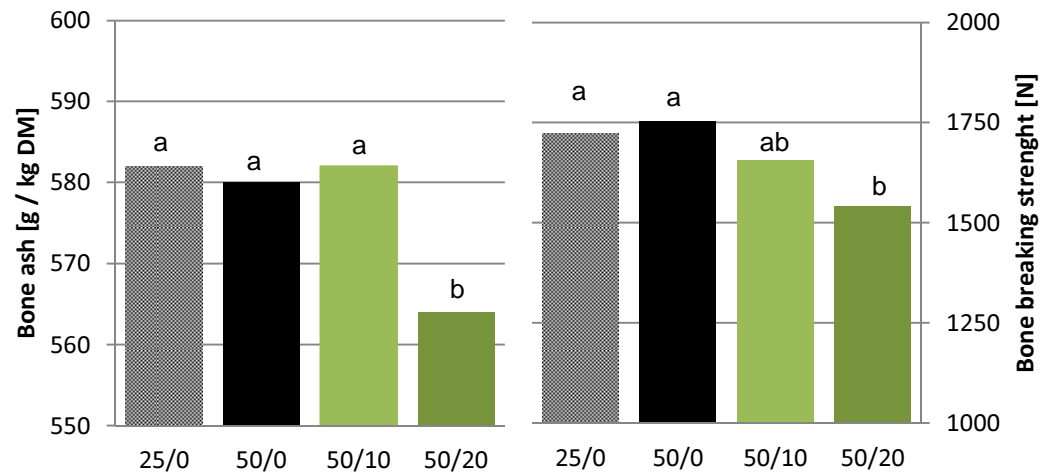


Calcitriol: 25/0 vs:  
< 50/20 : wk 4 – 6 (P<0.05)  
< 50/10 : wk 6 (P<0.05)



# Results

- Bone traits





# Conclusion

- **Cholecalciferol:** 2000 IU/kg vs. 1000 IU/kg: No effect.  
➔ BWG (+50 g/d).

The actual Swiss recommendation (1000 IU D<sub>3</sub> / kg) is not required to change.

- **Calcitriol:** 5 µg/kg (**500 g Panbonis<sup>®</sup> / t feed**) on top of 1000 IU/kg  
**Cholecalciferol:** ➔ Plasma P (0-3 wk post weaning)  
BWG (+70 g/d)

2.5 - 10 µg/kg (**250 - 1000 g Panbonis<sup>®</sup> / t feed**) on top of  
2000 IU/kg **Cholecalciferol:** No effect.

20 µg/kg (**2000 g Panbonis<sup>®</sup> / t feed**) on top of 2000 IU/kg  
**Cholecalciferol:** ➔ Hypercalcemia  
➔ Bone ash and breaking strength.

- With ≤ 10 µg/kg **Calcitriol (1000 g Panbonis<sup>®</sup> / t feed)** to diets containing recommended Ca and P levels and 2000 IU/kg cholecalciferol, no adverse effects are expected up to 25-30 kg BW.



**Thanks for your attention**