



SelSaf[®]₃₀₀₀
Selenium enriched yeast

**Enhanced Productivity
through better
Bioavailability.**

Bioavailability Defined:

Proportion of a nutrient that is absorbed from the diet and used for normal body functions.

1. Aggett PJ (2010); 2;Hurrell R & Egli I (2010)



Metabolic pathway where changes in nutrient bioavailability may occur

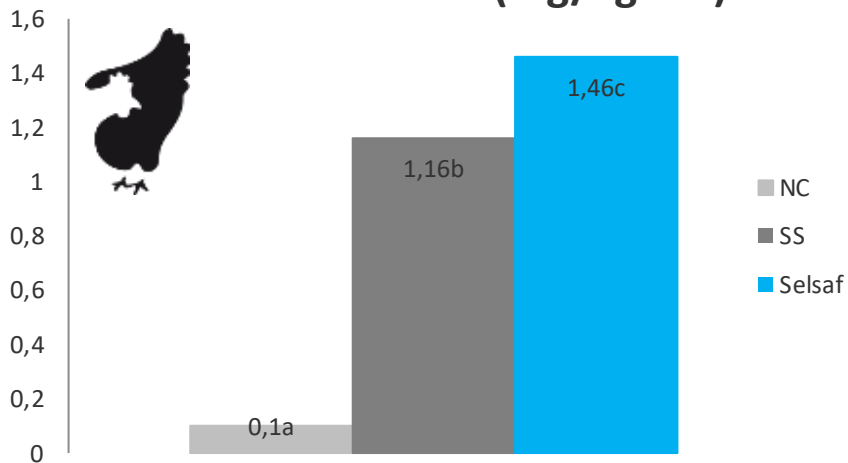
- Release of the nutrient from the physicochemical dietary matrix
- Effects of digestive enzymes in the intestine
- Binding and uptake by the intestinal mucosa
- Transfer across the gut wall (passing through the cells, in-between them or both) to the blood or lymphatic circulation
- **Systemic distribution**
- **Systemic deposition (stores)**
- **Metabolic and functional use**
- **Excretion (via urine or feces)**

1. Aggett PJ (2010);

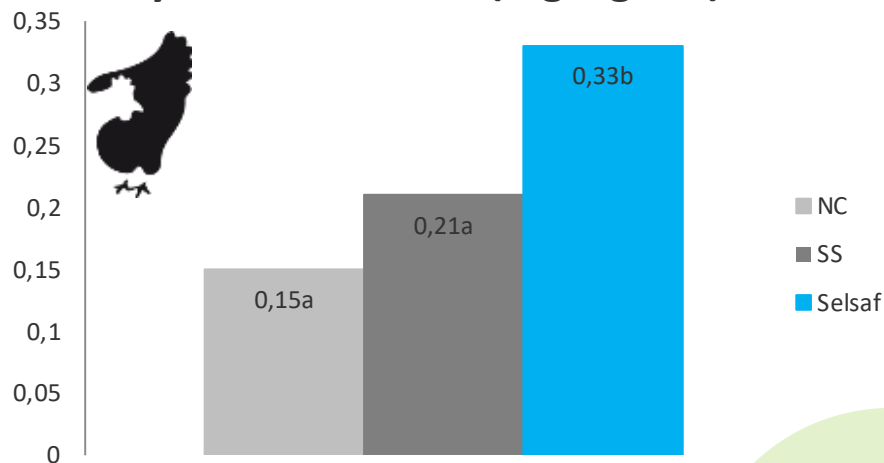


Selsaf : More Bioavailability:

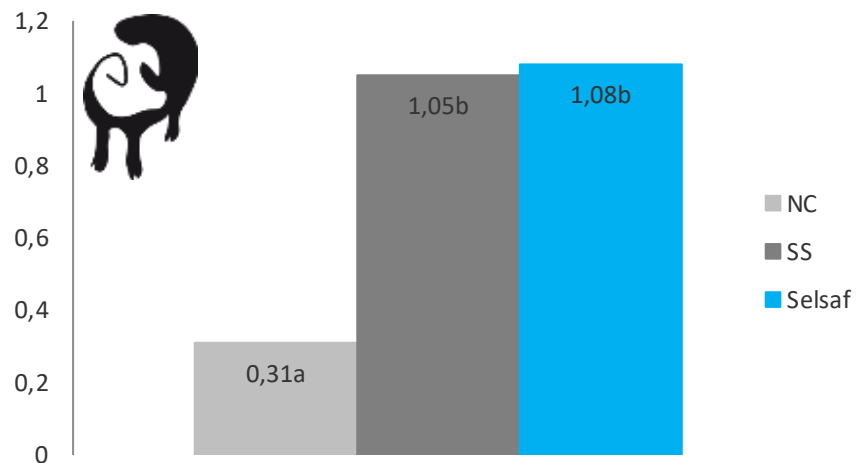
Broilers - Se Blood (mg/kg MS)



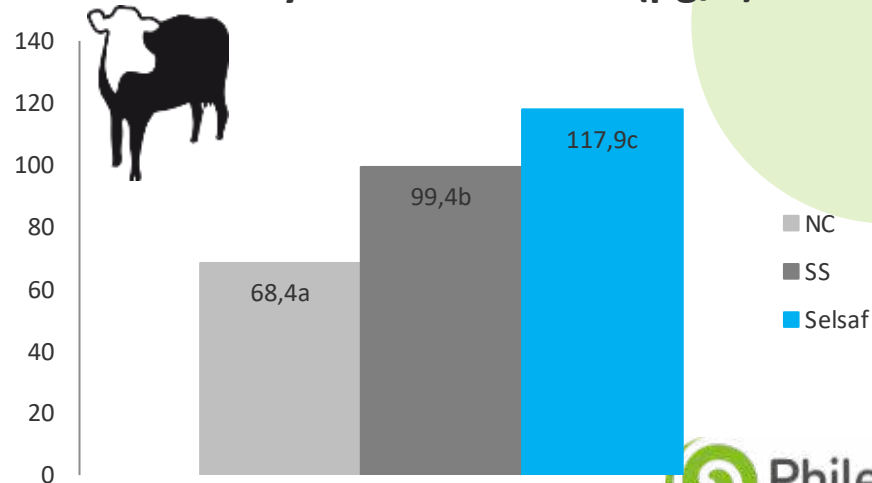
Layers – Plasma Se (mg/kg MS)



Swine - Se blood (mg/kg MS)

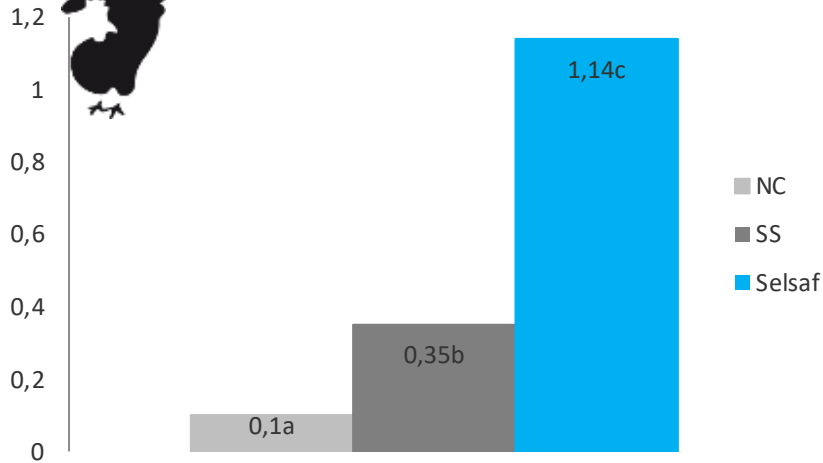


Dairy cows - Se blood (µg/L)

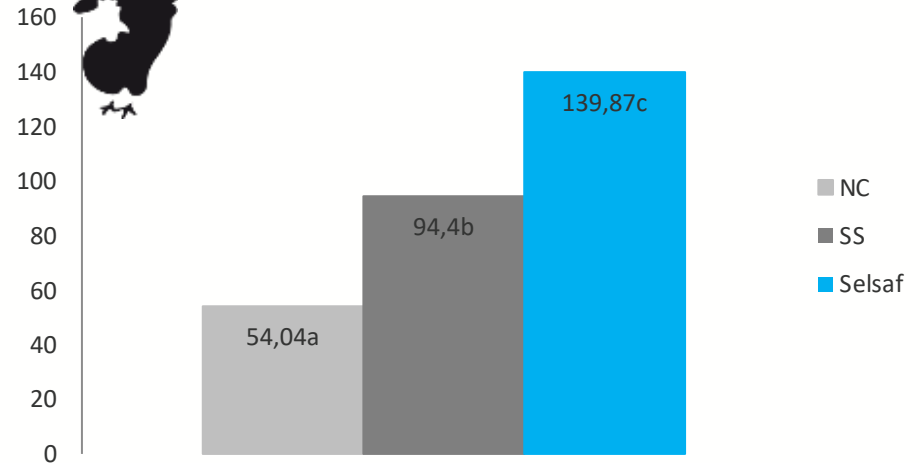


Selsaf more Se protein deposited in muscle

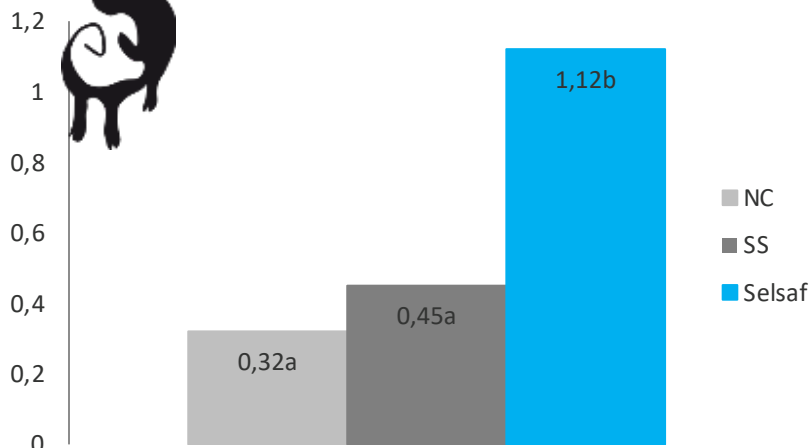
Broilers - Se muscle (mg/kg MS)



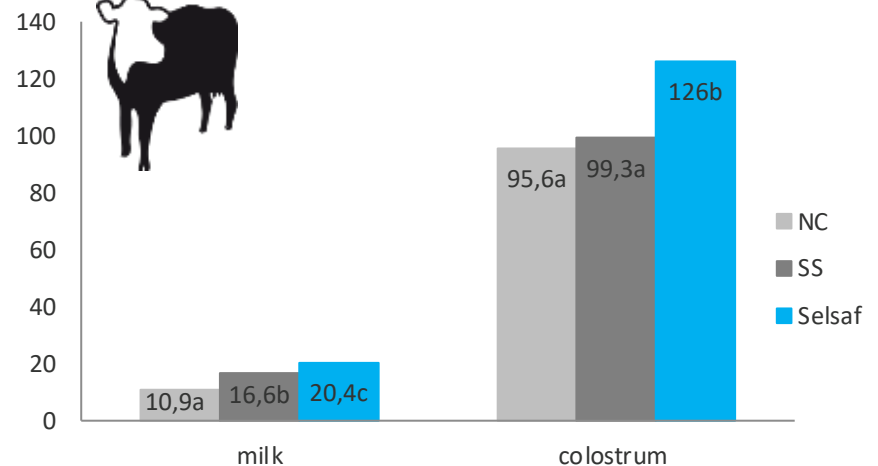
Layers - Se eggs (mg/kg MS)



Swine - Se muscle (mg/kg MS)

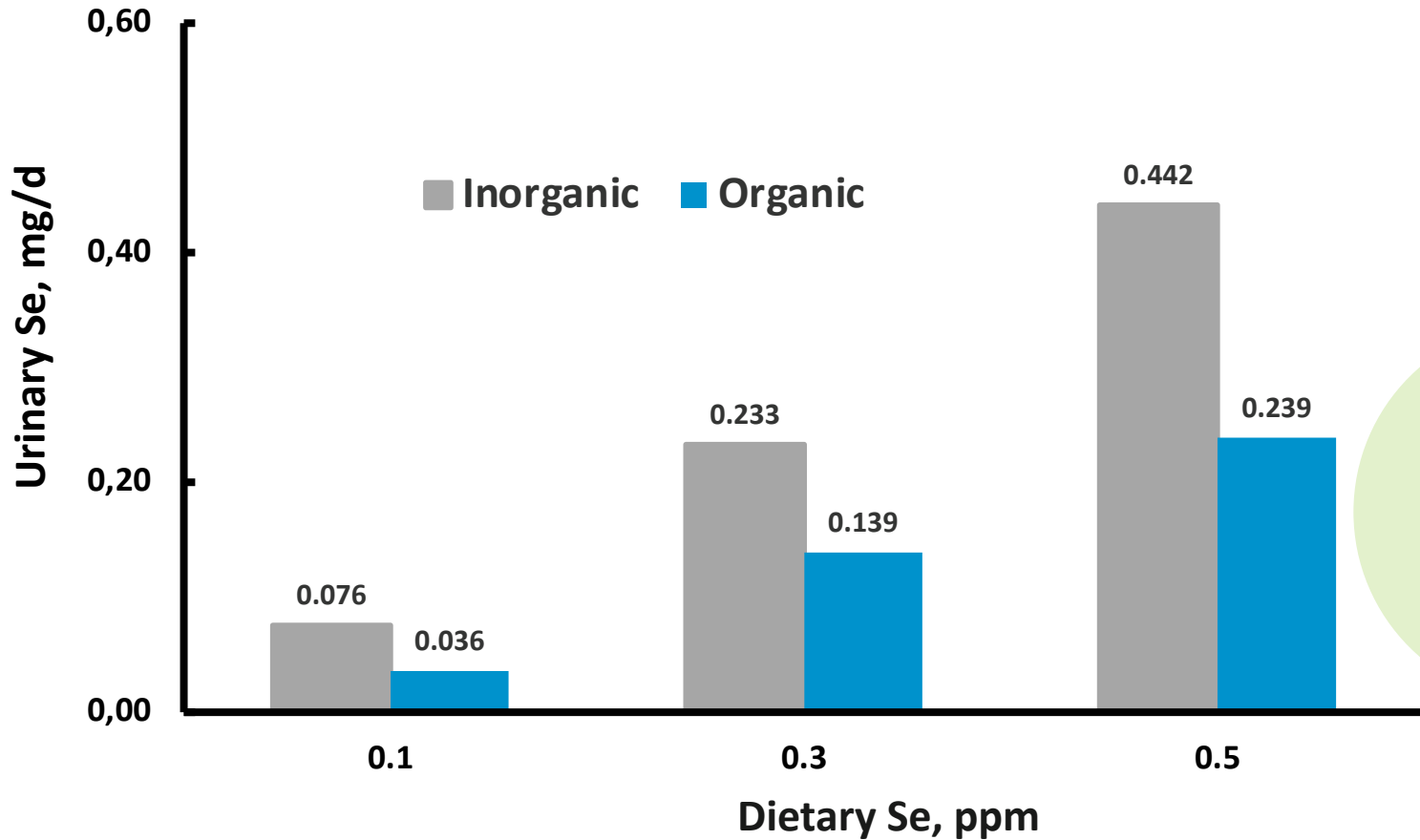


Dairy cows - Se milk and & colostrum (µg/L)



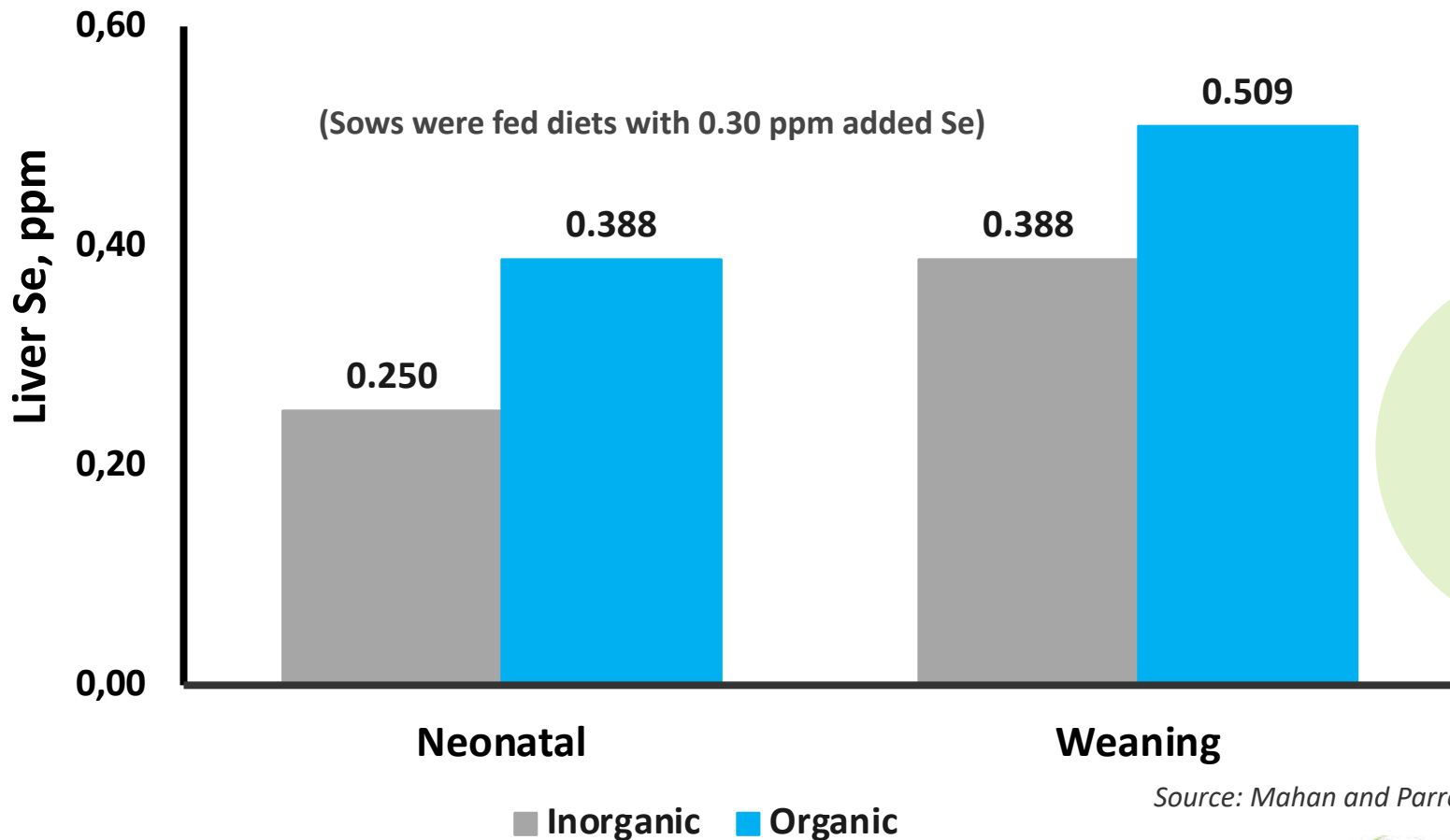


Organic Se and Urinary Excretion of Se by Swine



Source: Mahan and Parrett, 1996

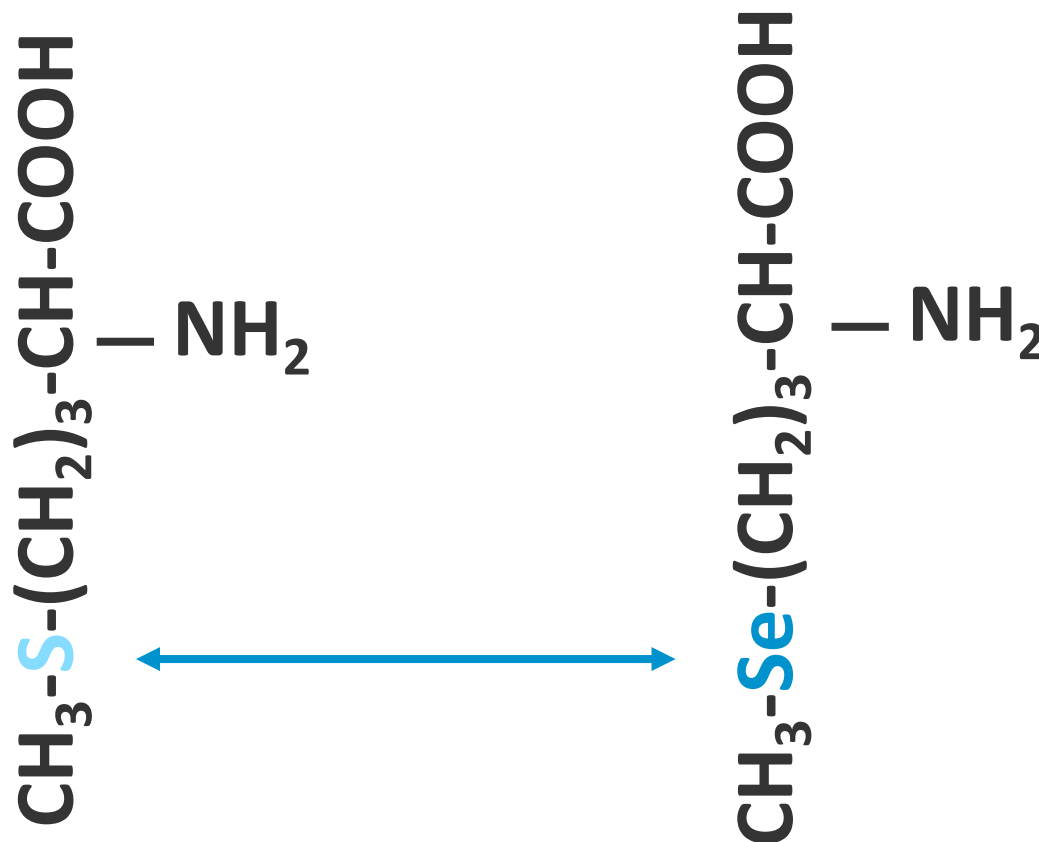
Organic or Inorganic Se Fed to Sows on Fetal or Weaning Pig Liver Se



Source: Mahan and Parrett, 1996

Methionine or Selenomethionine

- Neither form synthesized by swine
- Equally used by body tissue



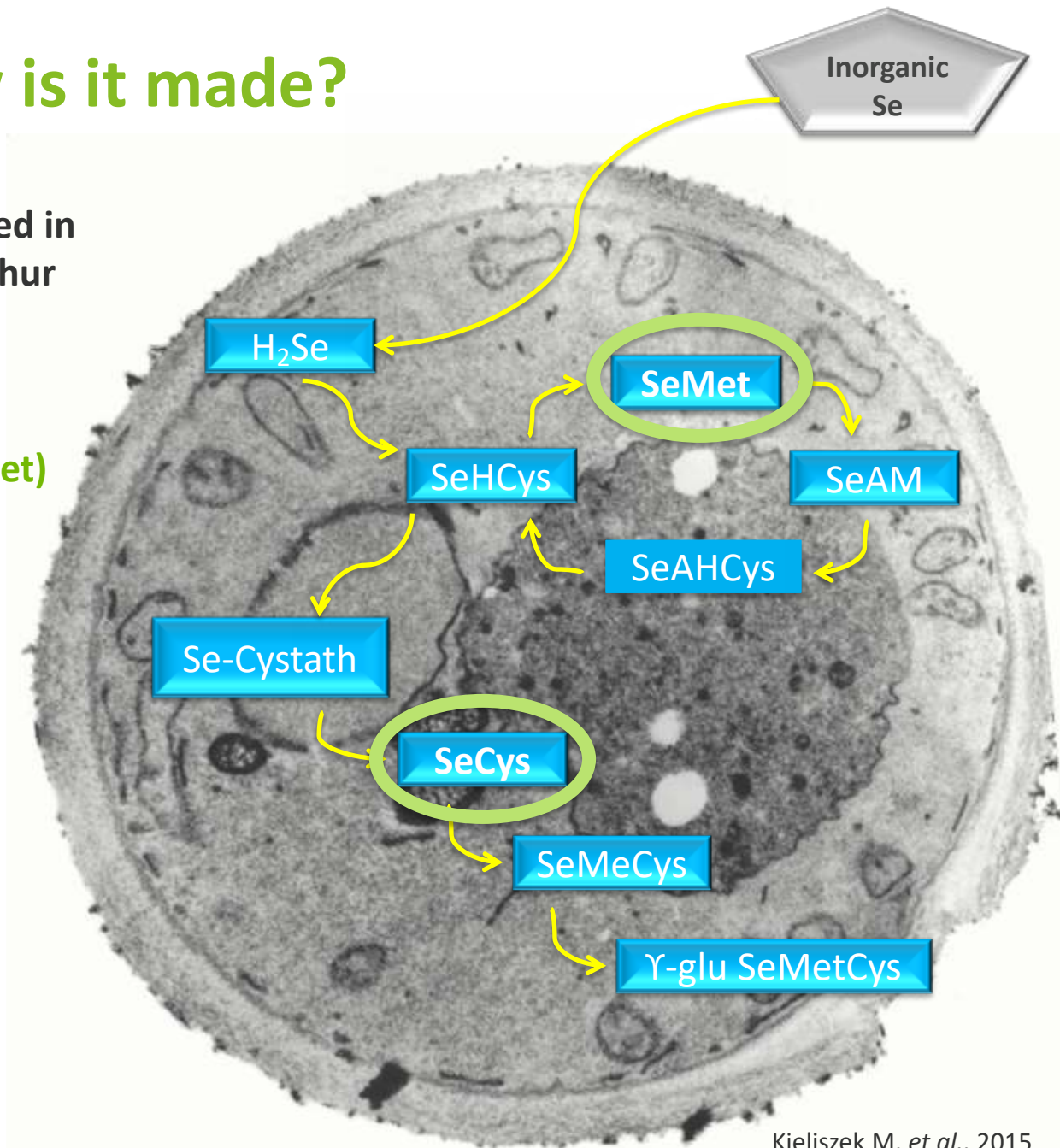


Selsaf[®], how is it made?

Inorganic Se is reduced and used in molecules instead of the sulphur atom

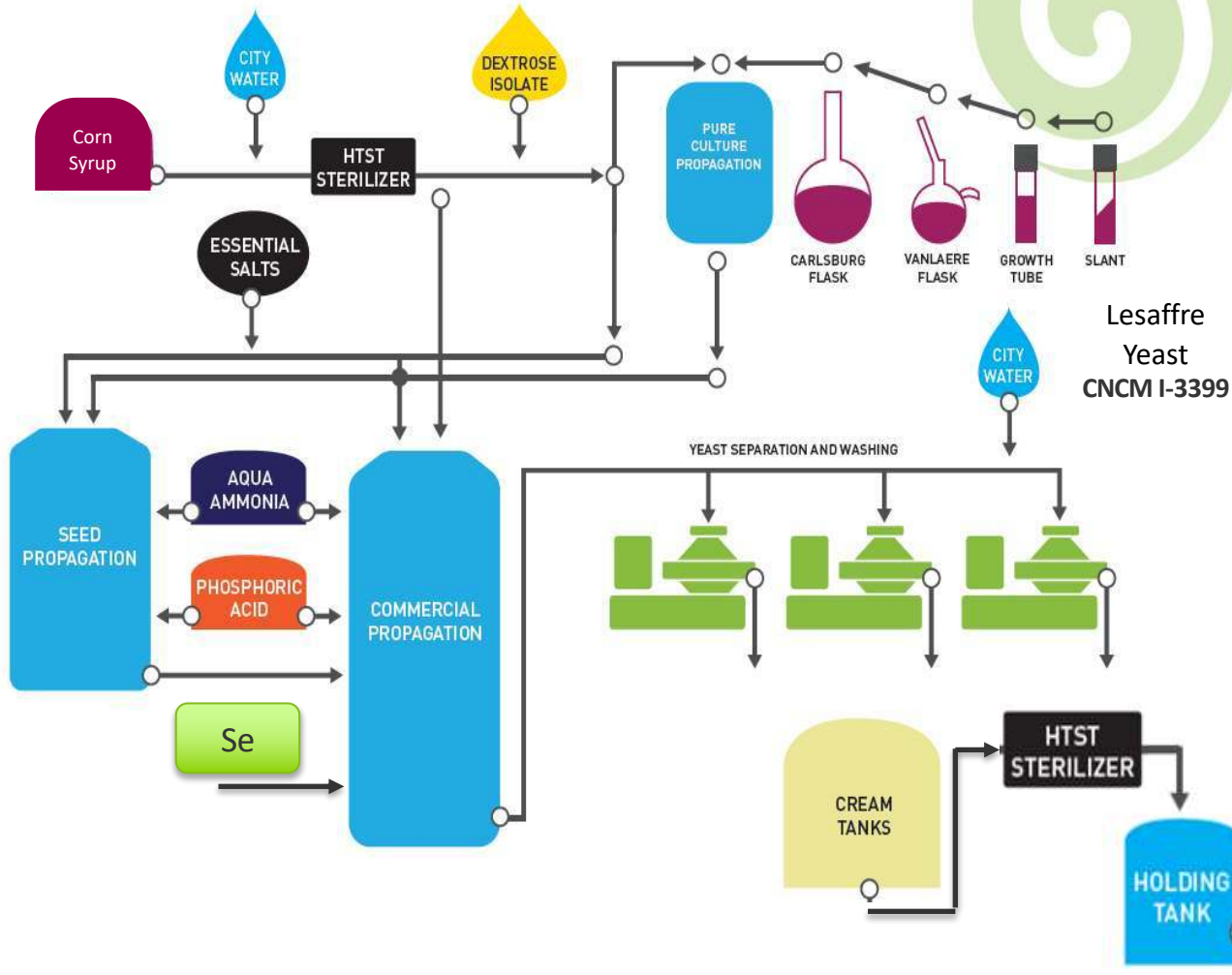
2/3 Seleniummethionine (SeMet)

1/3 Seleniumcysteine (SeCys) other Active selenium-components
actives



SCHEMATIC FLOW DIAGRAM

Phileo
LESAFFRE ANIMAL CARE
7475 West Main Street,
Milwaukee, WI 53214, USA
Tel.: 1-877-677-7000
phileo-lesaffre.com



Lesaffre
Yeast
CNCM I-3399

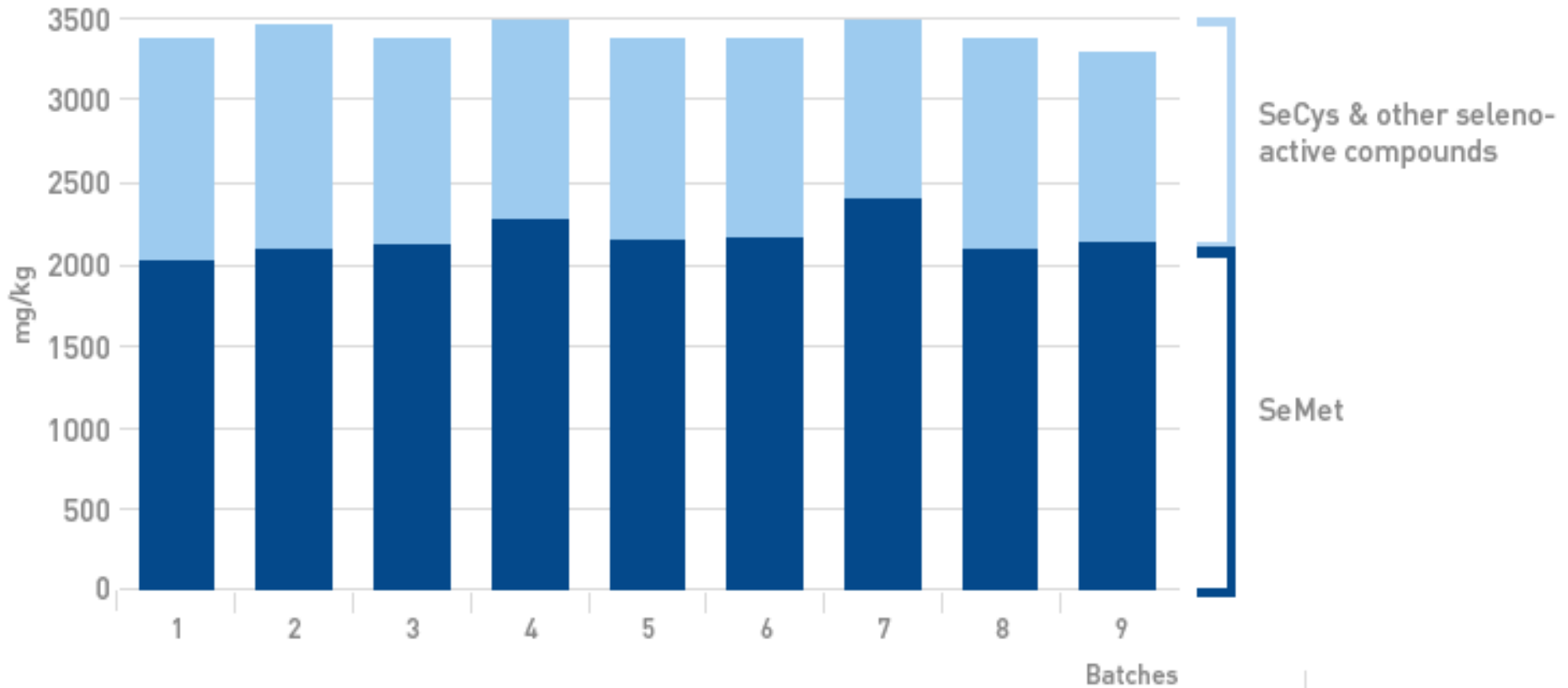


METAL DETECTION

Phileo
by Lesaffre



Consistency of the product



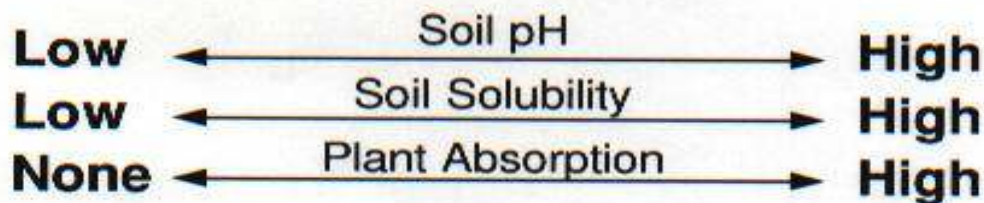
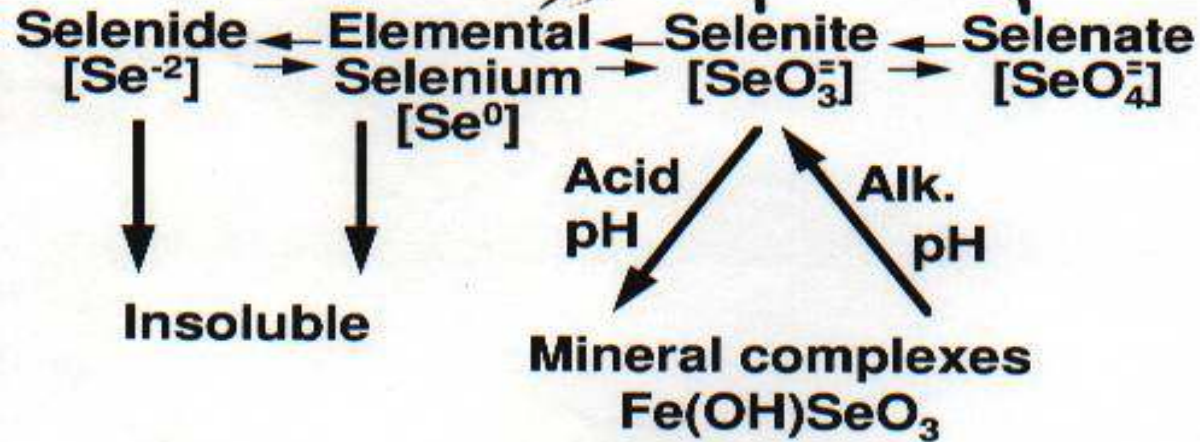
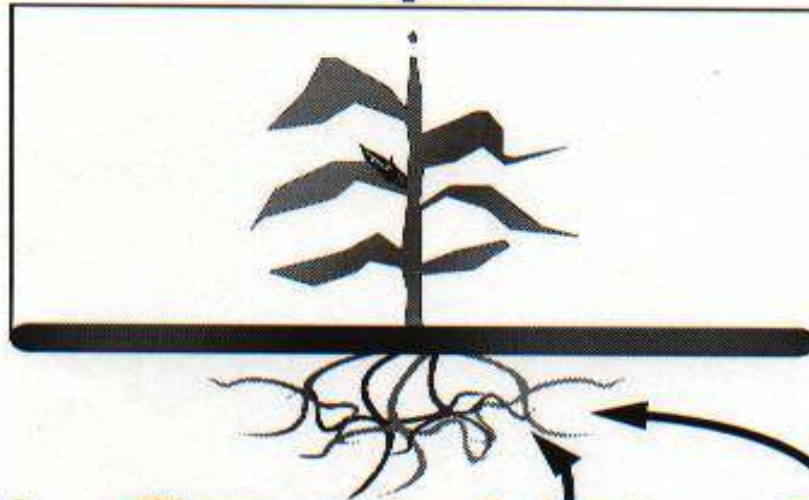


Selenium contain in grains

Biological materials	SeMet (%)	SeCys (%)
Wheat	56-83	4-12
Corn	61-64	15-16
Rice	68-81	6-10
Soybeans	>80	-

Adapted from Whanger, 2002

Soil Factors Affecting Se uptake



Deficient Soils

Low pH
drained
rainfall

Poorly
Excess

Corrective Measures

Se appl. (2 kg/hectare)
Superphosphate fert.
Liming soil
Legumes

Toxic Soils

High pH
drained
ppm)

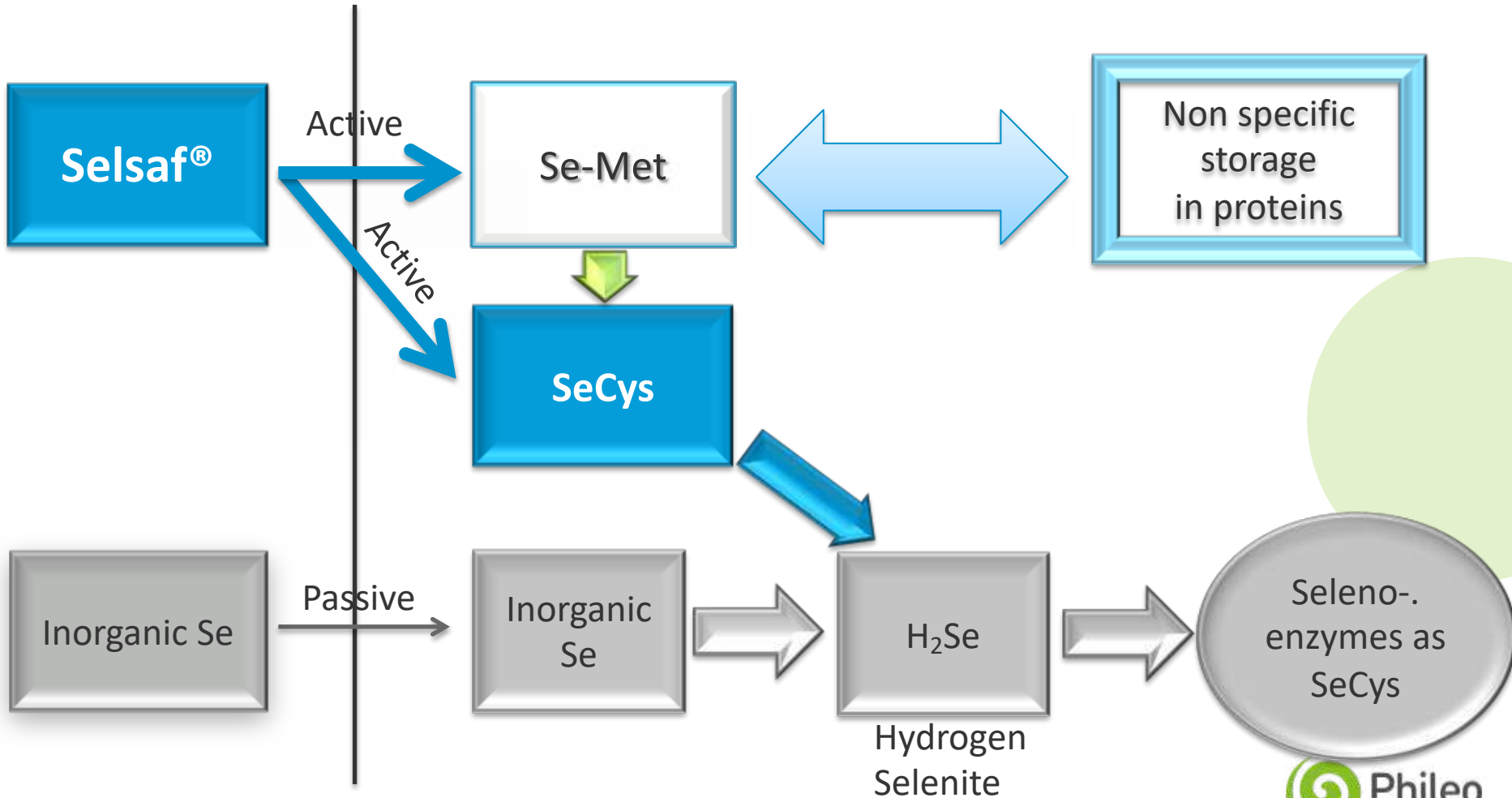
Well
High Cu (>
800 ppm) High Zn (>2100
ppm)

Oldfield, 1999

Difference between inorganic & organic Se?

ABSORPTION

TRANSFORMATION & ACTION





Selenocysteine and Selenoprotein

Se is incorporated into proteins in the form of selenocysteine (SeCys) and selenomethionine.

The term selenoprotein is restricted to SeCys-containing proteins (1).

More than 15 selenoproteins have been found in animals, and some of them have been shown to exert biological functions (3).

There are 25 known selenoprotein genes in humans (1,2), which encode selenoproteins with a variety of functions.

Selenoprotein P typically accounts for approximately half of the selenium in plasma (3).



Mobilizing Se

- Se-Cys provides readily available Se for immediate uptake/use without need to scavenge from lean tissue stores.
- Se-Met is stored and released to the free amino acids pool as part of normal protein turnover.
- Proteasome activity accelerates during stress conditions and increases body protein turnover.
- Increased body protein turnover increases circulating Se levels to help attenuate stress effects.

Our challenge:

- Produce more

(growth in population and purchasing power)

- Better

(food safety, health and wellness)

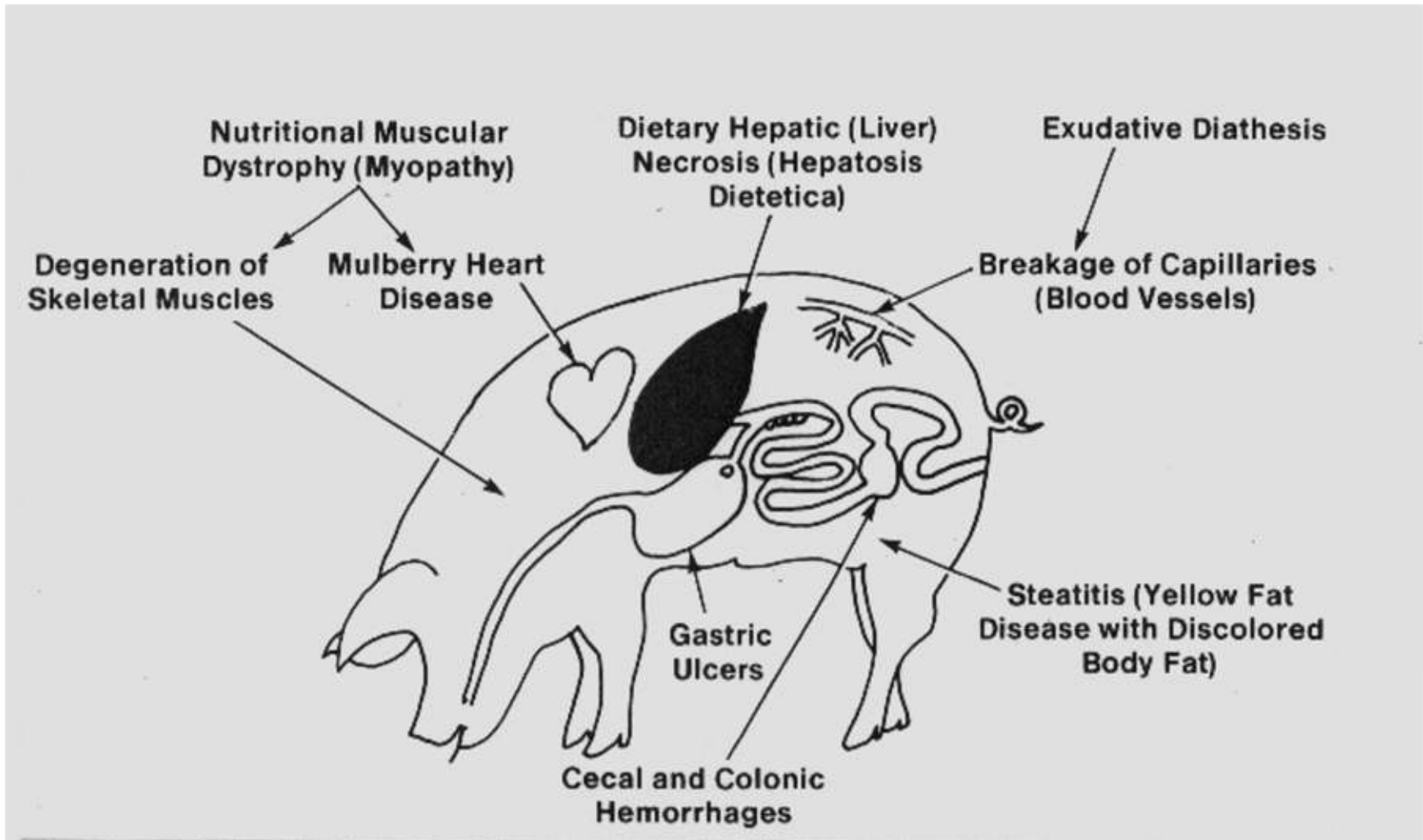
- With less resources

(less land, water, labor, energy & higher prices)

- With sustainability

(environment & animal well-being)

Areas of Oxidative Damage in Pigs (Vitamin E and Se Deficiency)





Se Carryover from the Sow to the Progeny

Item	Sow dietary Se, ppm Se	
	Basal No added Se	Basal + Se + 0.10 ppm
28-day postweaning		
No. pigs examined	6	6
White skeletal muscle, %	67	0
Liver necrosis, %	100	0
Enlarged heart, %	50	0
Gastric ulcers, %	83	0
56-day postweaning		
No. pigs examined	0 ¹	5
White skeletal muscle, %	-	40
Liver necrosis, %	-	100
Enlarged heart, %	-	40
Gastric ulcers, %	-	100

¹ Pigs were removed from the trial due to sudden deaths.

Mahan et al., 1974



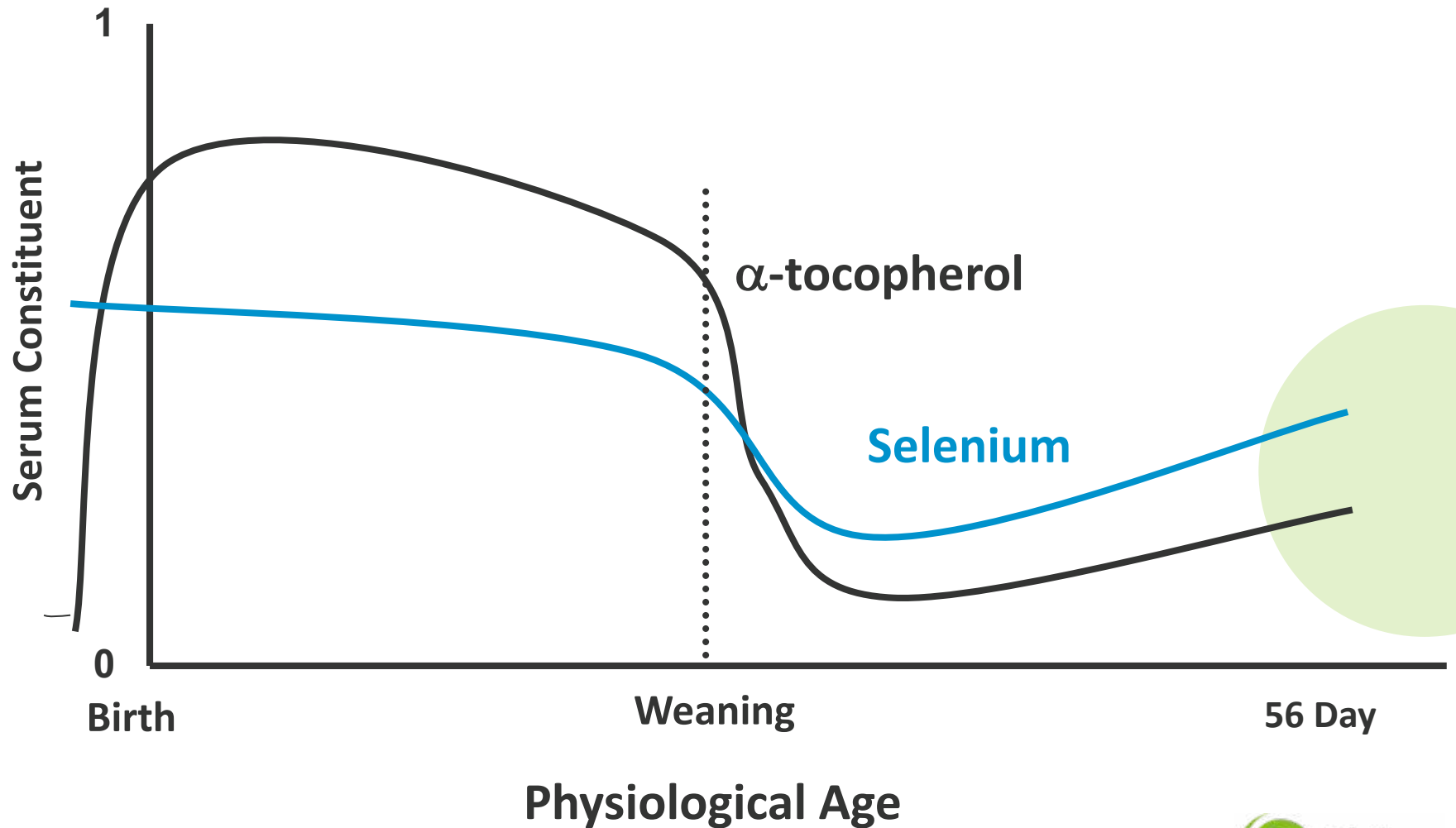
Critical stages for Selenium and Vitamin E deficiencies

- 1. Neonatal pigs**
- 2. Weaning Pigs**
- 3. Reproduction**





Relative Changes in Serum concentrations of Vit. E, Vit. C and Se in young pigs

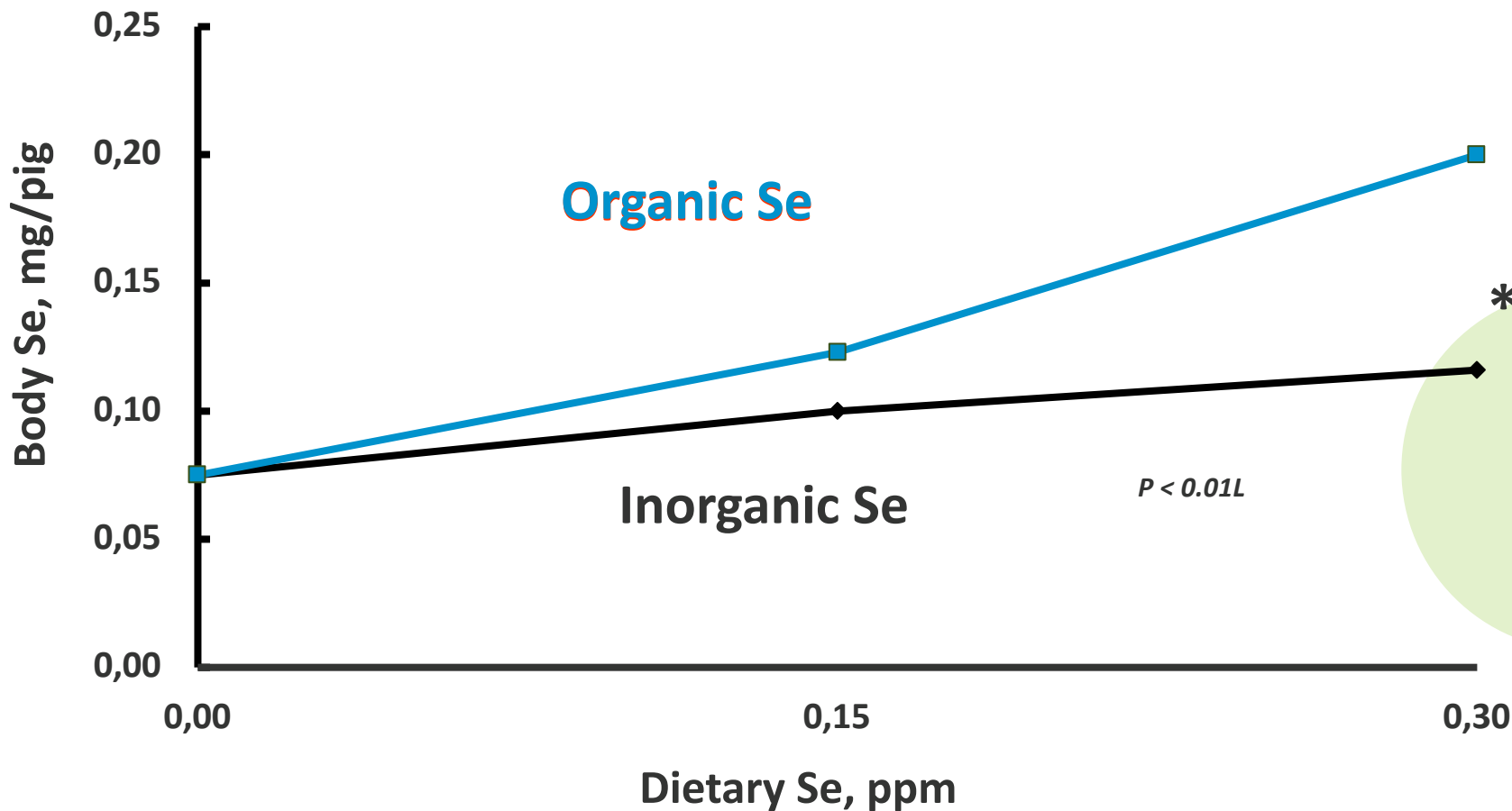




Selenium and Vitamin E deficiency in Neonates

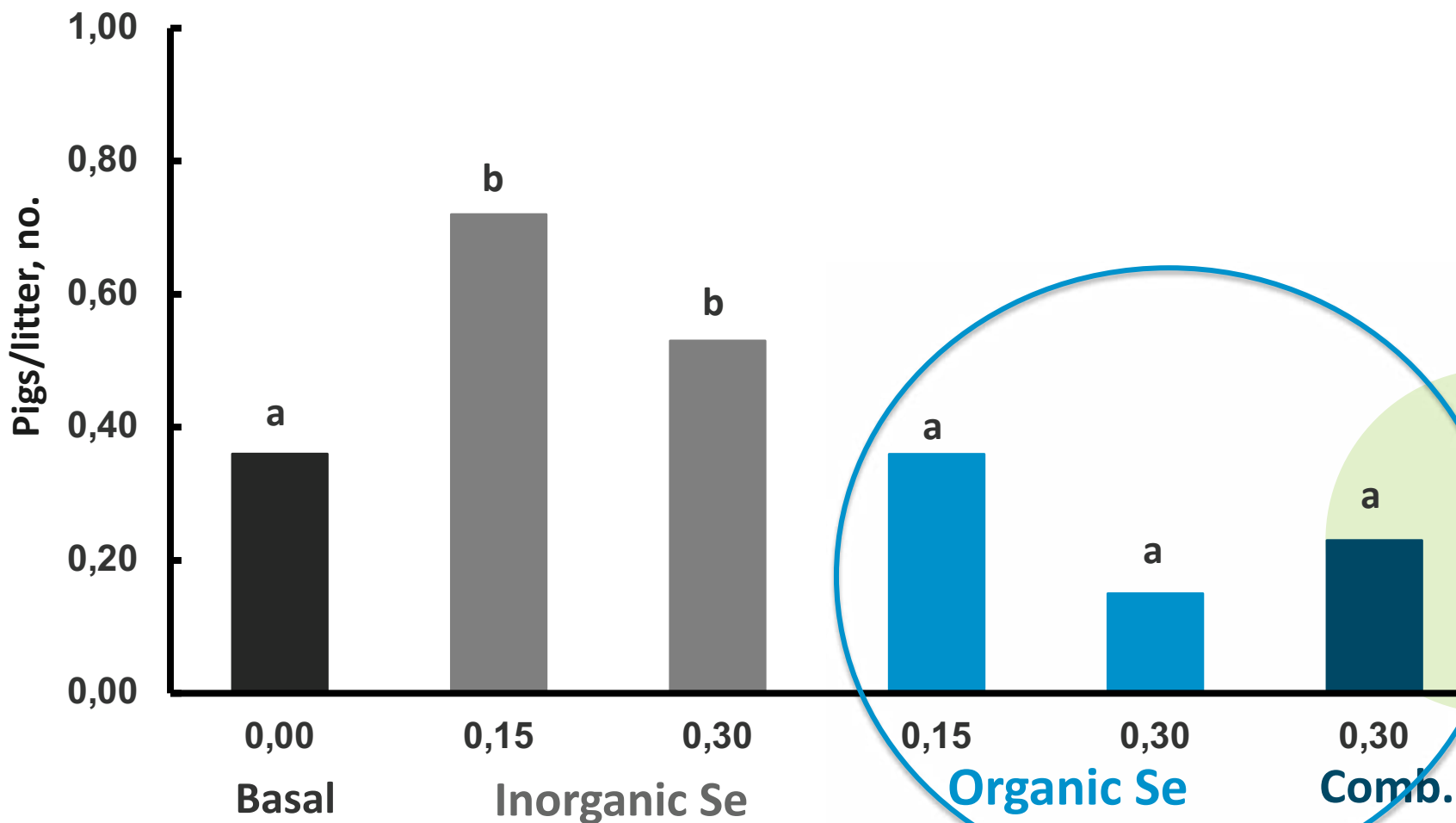
- **Weak**
- **Lack desire to nurse sow**
- **Iron Toxicosis**

Neonatal Total Body Se by Sow Se Source and Level





Stillborn Pigs by Se Source and Level



$P < 0.05$ Source: Mahan, 1994



Effect on Reproduction

- Sows
- Boars





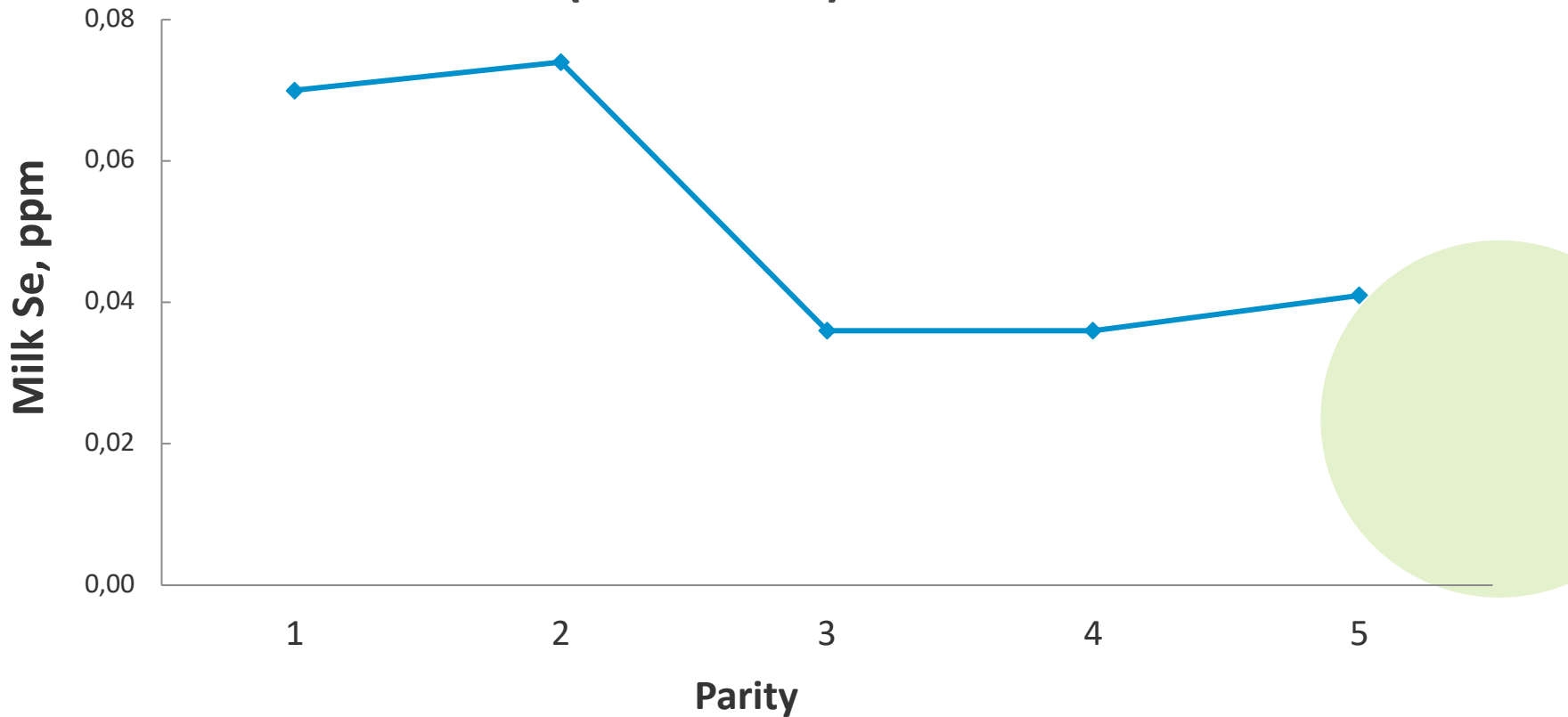
Observations of Selenium Deficient Sows

- **Long Parturition Time**
- **Lower Litter Size**
- **Poor and Infrequent Milk Let-Down**
- **Higher Incidences of “MMA”**



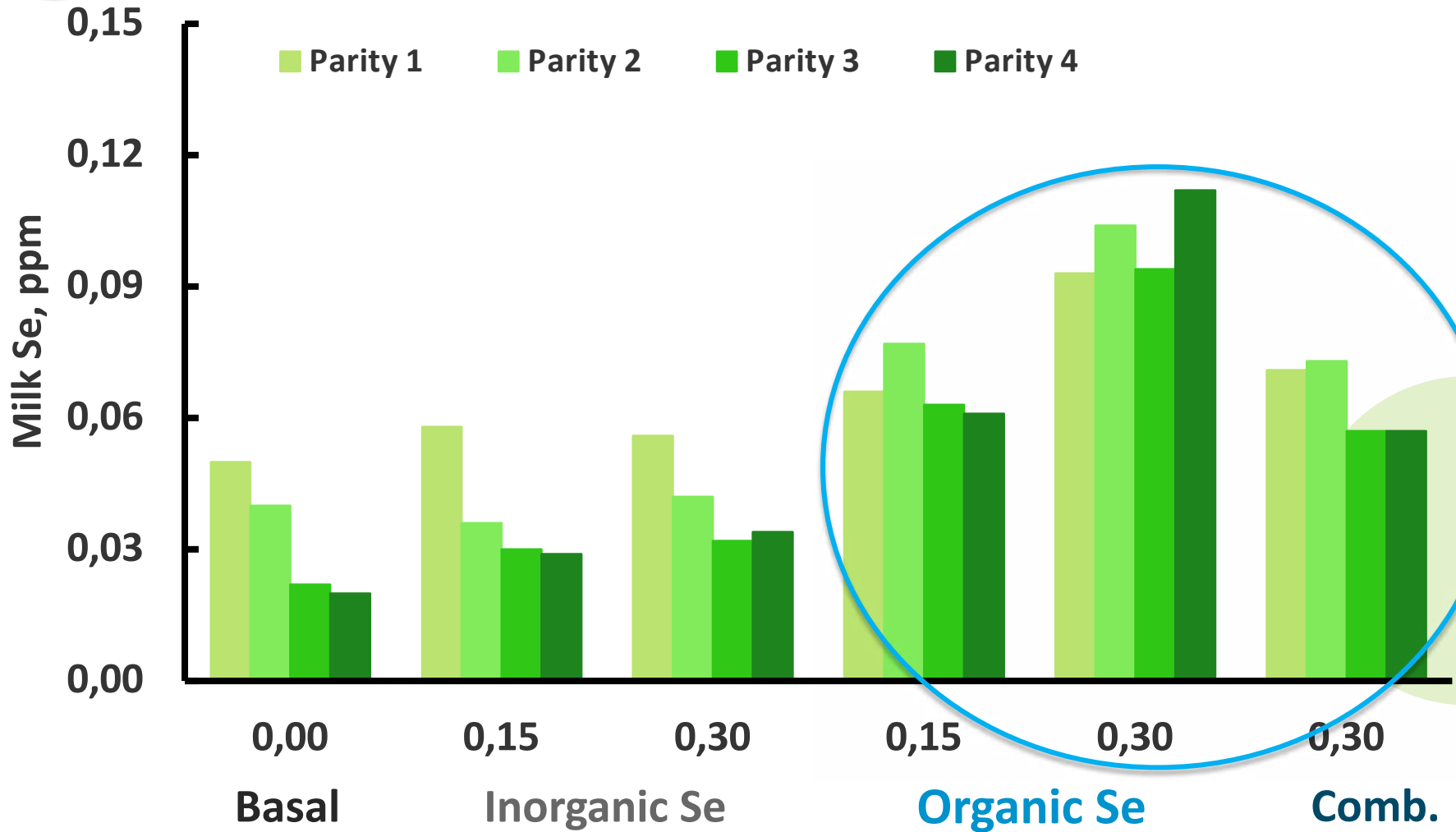
Selenium Content of Sow Milk

Avg 14 & 21 day Lactation
(5 Parities)



Source: Mahan, 1991,1994

Sow Milk Se by Parity



$P_{\rho \times trt} < 0.01$)

Source: Mahan, 1991,1994



Phagocytic and Microbicidal Activity of Sow Milks when fed Vitamin E and Se

Treatment	Phagocytic Act.		Microbicidal Act.	
	Colostrum	Milk	Colostrum	Milk
No E, No Se	35	21	3.2	1.2
No E, + Se	44	24	3.6	2.2
+ E, No Se	33	20	2.6	1.6
+ E, + Se	50	28	6.2	2.7

Source: Wuryastuti et al. (1993)



Conclusion

- **The balance in the cell between antioxidants and pro-oxidants is responsible for regulation of many physiological processes**
- **All antioxidants in the body are working together as a team (antioxidant system) , Vitamin E, Carotenoids, Vitamin A, Vitamin C, Flavonoids, Selenium, Mn, Zn, Cu, Fe.**



Conclusion

- **Selsaf[®]** is taken up through active transport.
- **Selsaf[®]** is a source of **SeCys** for the production of antioxidant enzymes as **Glutathione Peroxidase**.
- **Selsaf[®]** is stored in protein under the form of **SeMet**
- **Selsaf[®]** in pigs = **more reserve of Se** in body.
- **Selsaf[®]** in sows = **more Se content in colostrum and milk**, thus more Se for piglet at birth and weaning leading to **better health status and immunity**.
- **Selsaf[®]** is safe = **more than 5x less toxic** than inorganic sources.

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RAISING LIFE



Phileo

by Lesaffre

Premium Yeast Products from the World's Largest Primary Fermenter

