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A Bluestar Company

OH-selenomethionine: an efficient source of Se in fattening pigs

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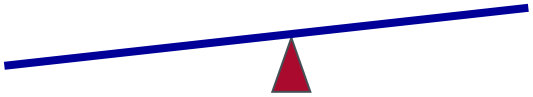
What are our challenges at the animal level?

Pork:

Transform 1 kg piglet into 110 kg BW pig in 6 months
With on average 2.6 kg feed per kg BW

Rapid Growth Rate ← **High Metabolic Rate** ← **Stress** ← **Oxidative Stress** ← **Free Radicals**

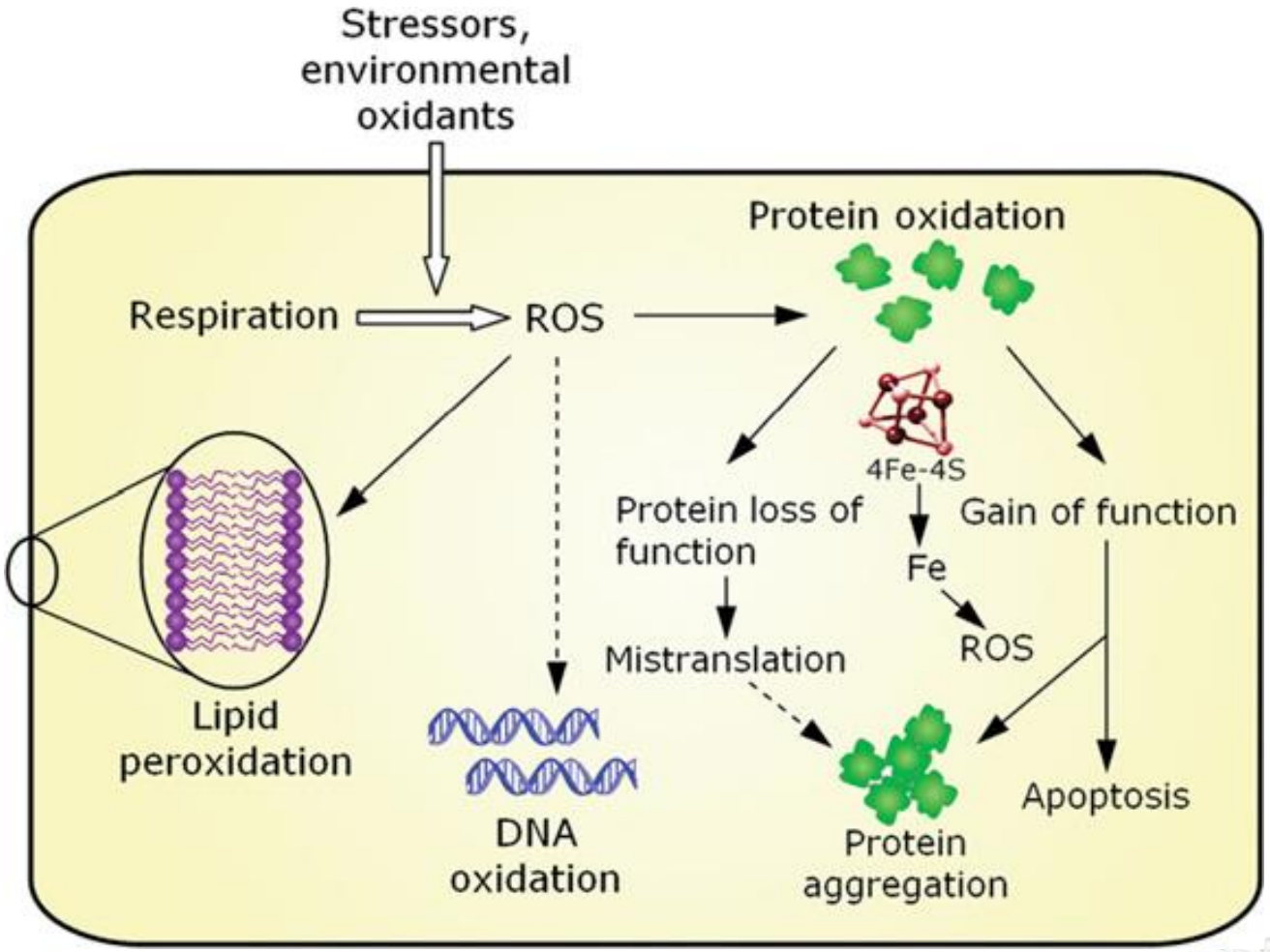
Excess Oxygen
=
Free Radicals



Anti-Oxidant Capacity

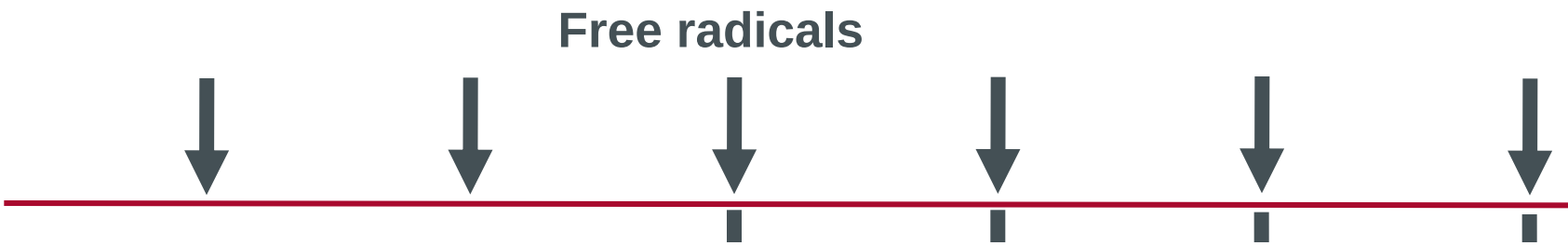
Oxidative Stress

High metabolic rate means production of ROS



Avery, 2011

3 major levels of antioxidant defence



First Level

Breaking down Free Radicals

(SOD, catalase, Se-GPx…)

Second Level

Capturing Free Radicals

(glutathione, vitamin E, carotenoids…)

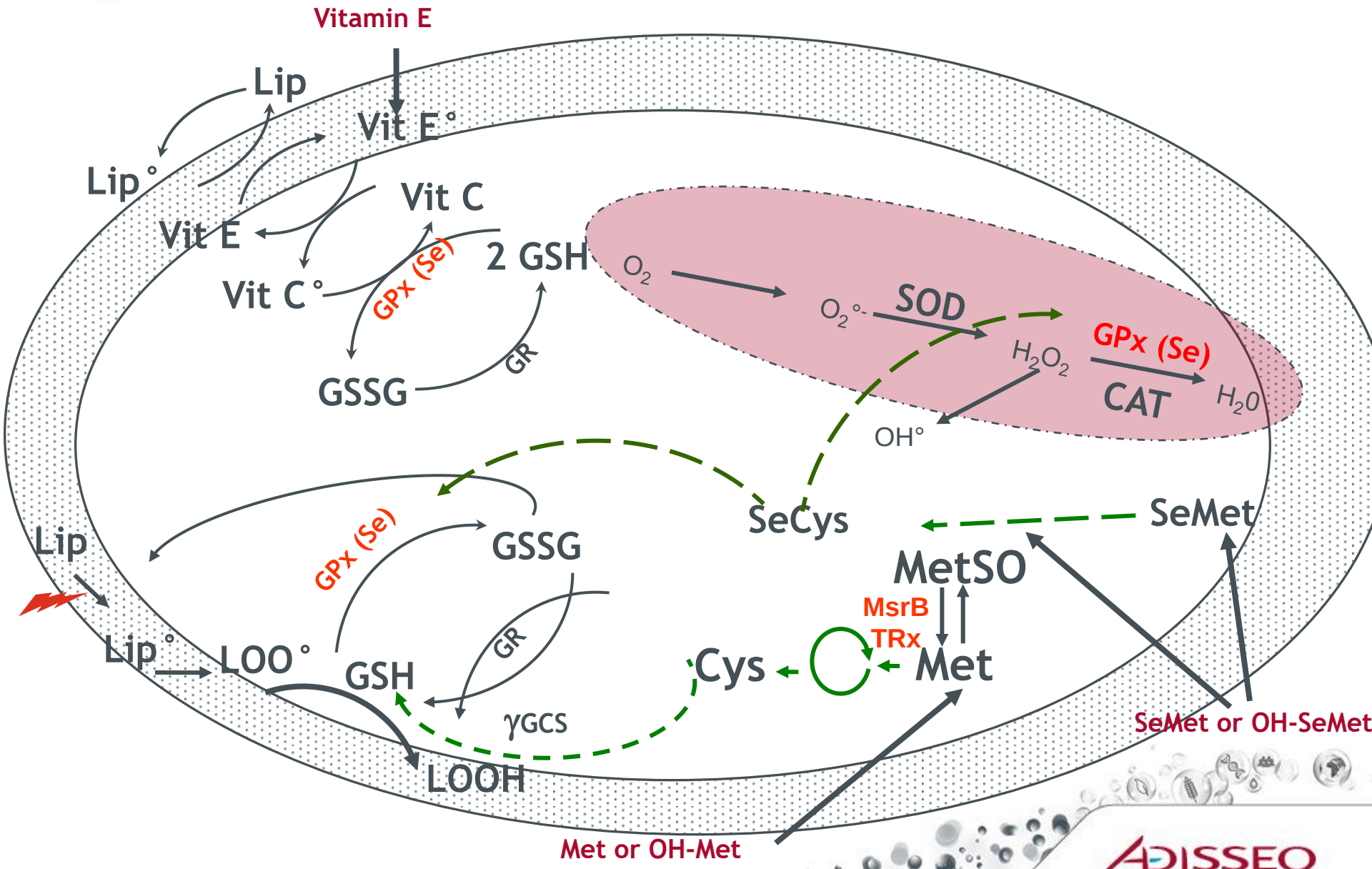
Third Level

Elimination of oxidized products

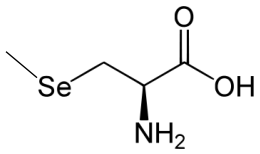
Enzymes to breakdown oxidized lipids & proteins

Surai, 2006

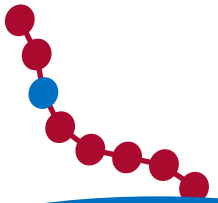
Selenium : key in the Anti-Oxidant System



SeCys: the functional Se for antioxidation

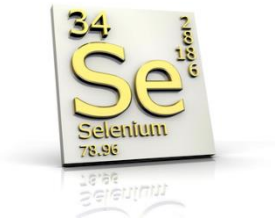


Selenomethionine
(SeMet)

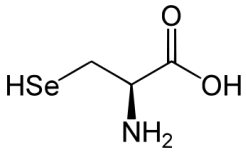


Selenium containing proteins

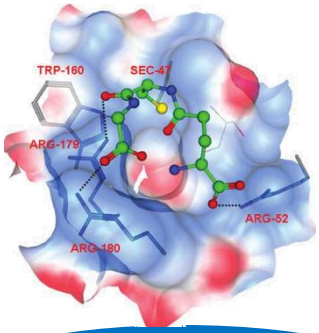
Se storage form



Trace element



Selenocysteine: the 21st amino acid
(SeCys)

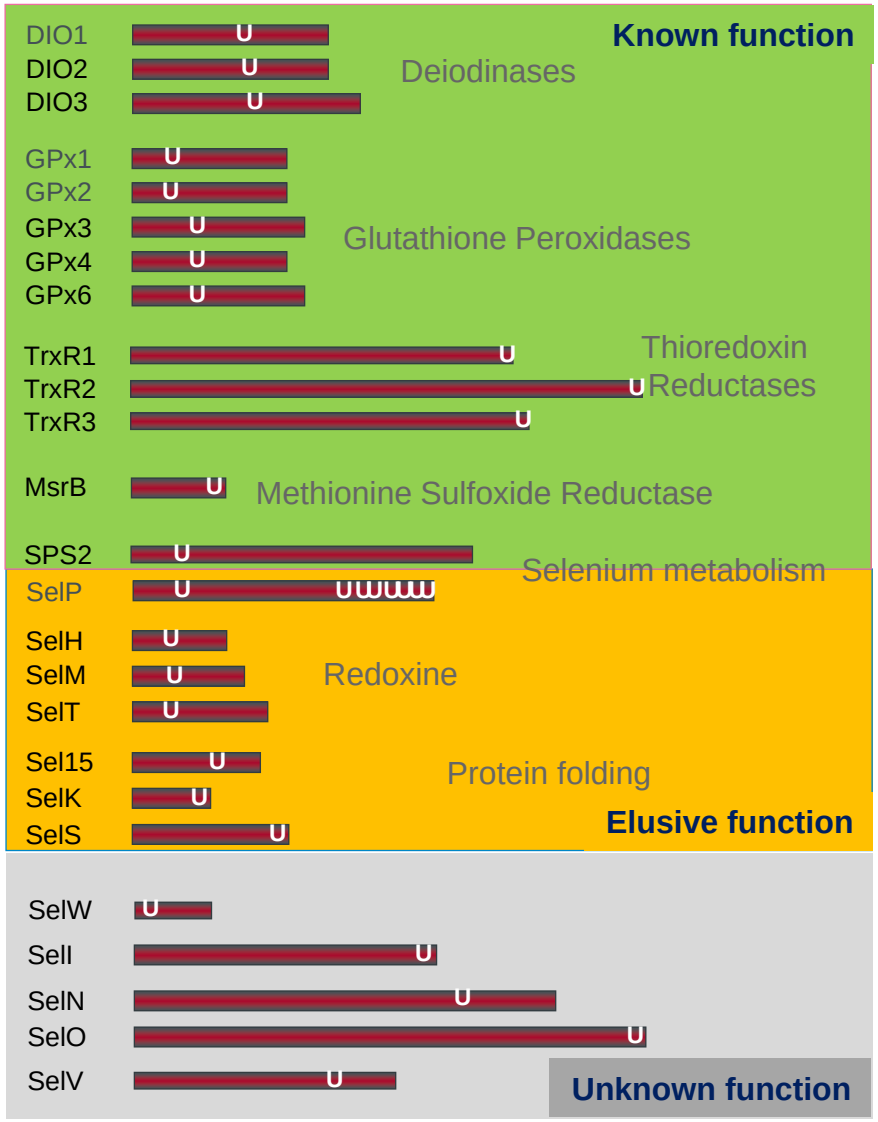


Selenoproteins

Se as SeCys in enzyme catalytic site

Schrauzer 2003, Flohé et al. 2011, Hondal et al. 2013

SeCys: key for functional Selenoproteins



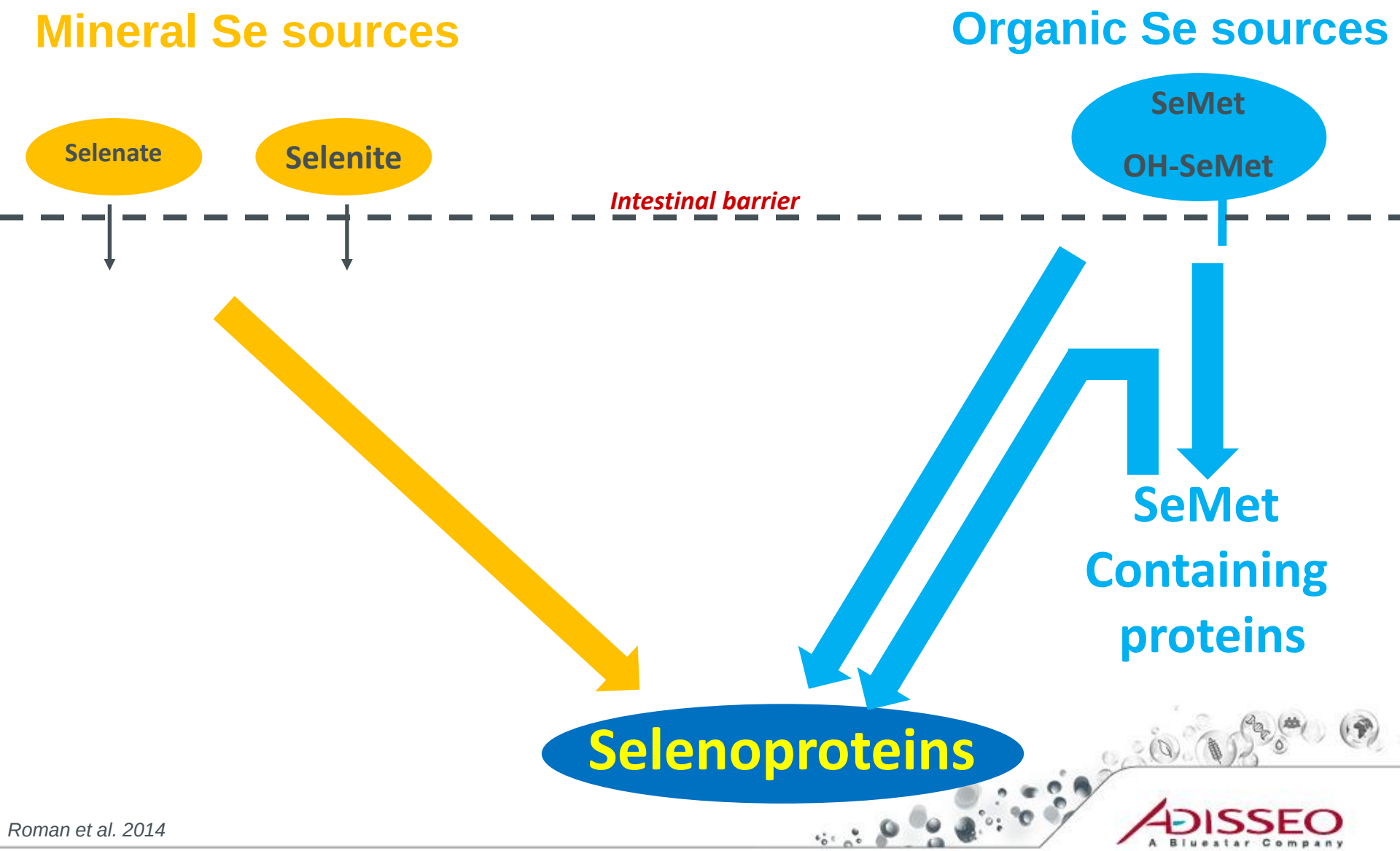
Lescure et al., 1999 ; Kryukov et al., 2003

DIO	→	Thyroid hormone activation
GPx	→	Peroxide detoxification
TrxR	→	Thioredoxin regeneration
MsrB1	→	Methionine reduction

Major roles in Redox regulation

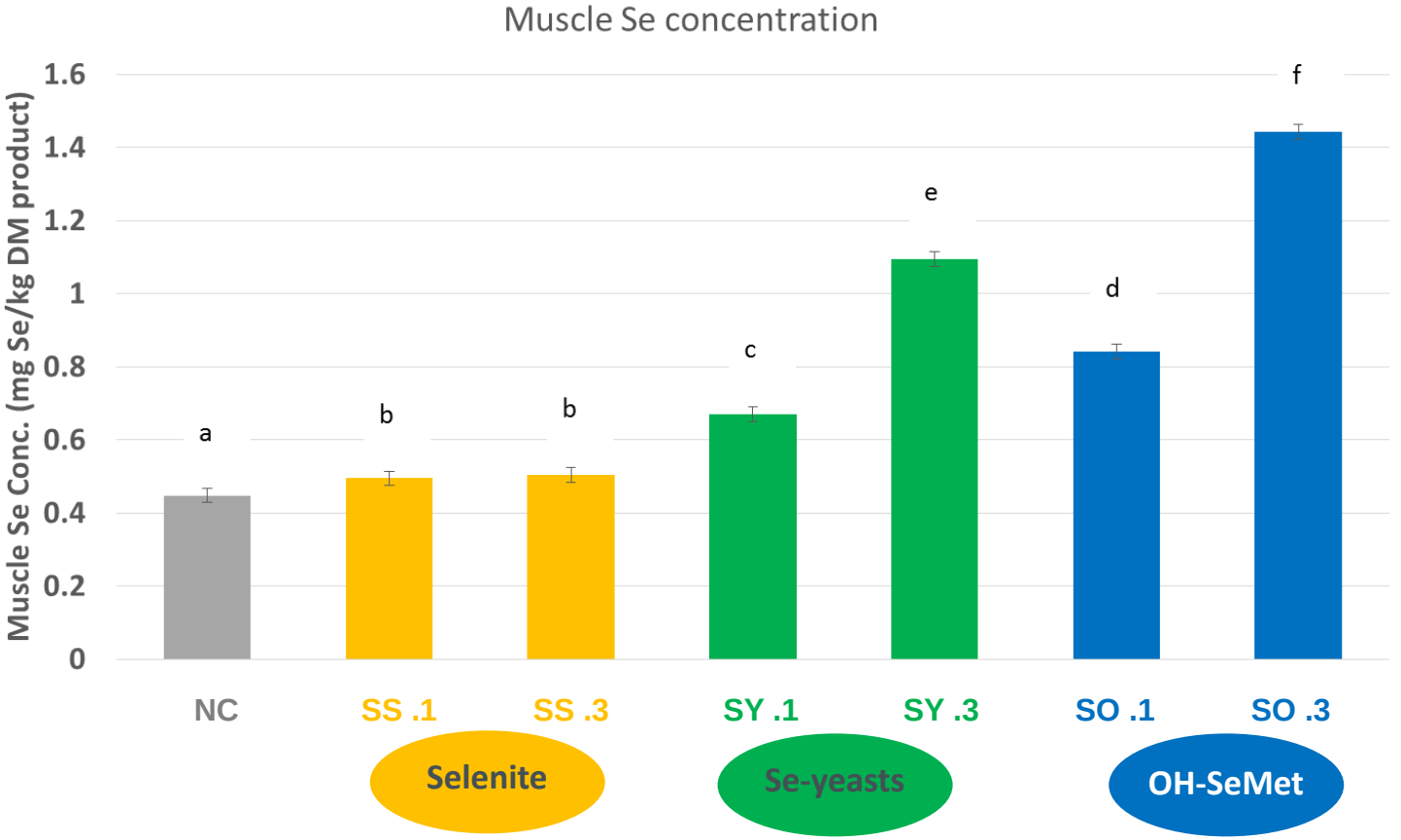
25 Selenoproteins in most animals

Different sources of selenium for animal feed



Roman et al. 2014

OH-SeMet: more bioavailable Se source in pigs



JOURNAL OF ANIMAL SCIENCE
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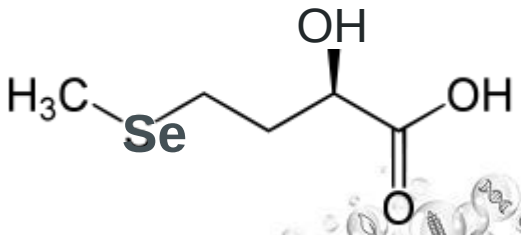
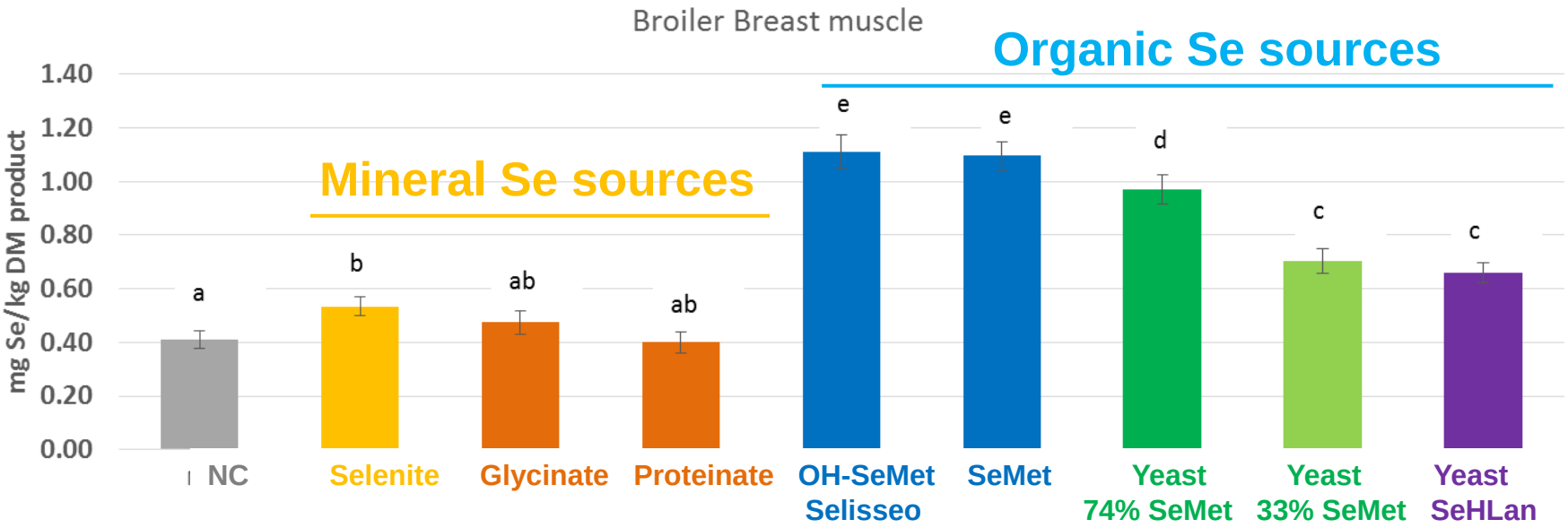
Evaluation of the efficacy of 2-hydroxy-4-methylselenobutanoic acid on growth performance and tissue selenium retention in growing pigs

M. Jlali, M. Briens, F. Rouffineau, P.-A. Geraert and Y. Mercier

J ANIM SCI 2014, 92:182-188.
doi: 10.2527/jas.2013-6783 originally published online December 18, 2013



Pure sources of organic Se are the most bioavailable

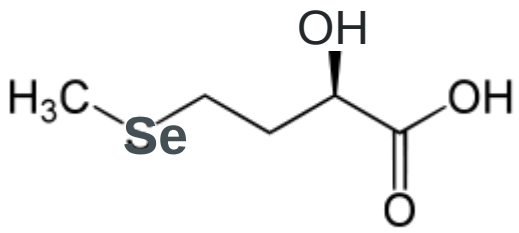


- **Using a 7d rapid bioavailability test in chicks (Poult. Sci. 2015, 94, 2708-2714)**
- **Pure sources (OH-SeMet & SeMet)** the most efficient Se sources
- **Se-Yeasts:** an efficacy related to their SeMet level

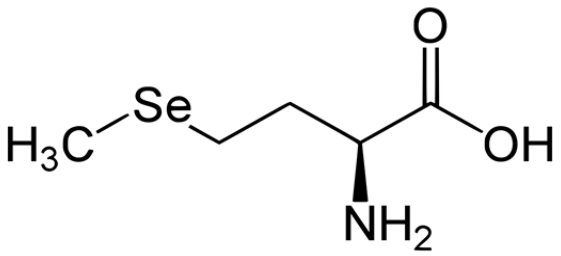
Experimental protocol – Practical swine trial

- One farm with 2 identical stables (Europe, Belgium 2015), pigs (PIC x Belgian Pietrain)
- Pre-study, animals were fed a standard commercial feed (0.20 mg Se/kg feed as Na selenite) up to # 65 kg BW
- During last 8 weeks before slaughtering (study phase), 2 treatments applied at the feedmill at 0.2 ppm on top of Na selenite in the premix
  - SeMet (Excential Se 4000): 4 000 mg SeMet/kg i.e. 1 600 mg Se/kg
  - OH-SeMet (Selisseo 2% Se): 50 000 mg OH-SeMet i.e. 20 000 mg Se/kg
- Dosage of total Se concentration in muscle and liver (after sampling at slaughter house on 10 pigs per treatment), speciation SeMet and SeCys done on male pigs
- Blood biomarkers: GPx and GSH (after blood sampling one week before slaughtering)

Experimental Feed Se analyses



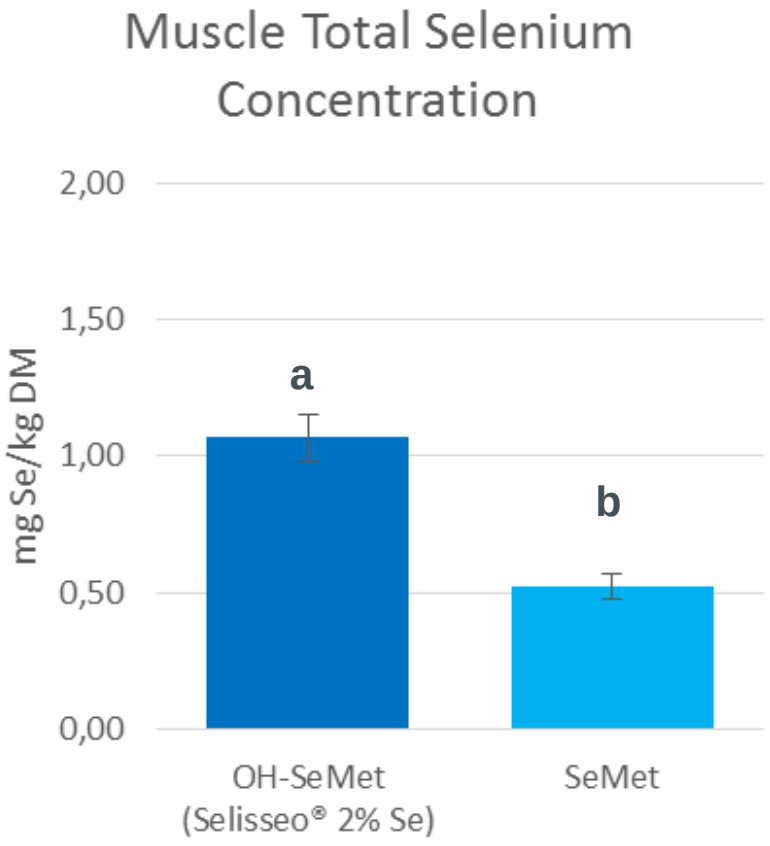
OH-Selenomethionine

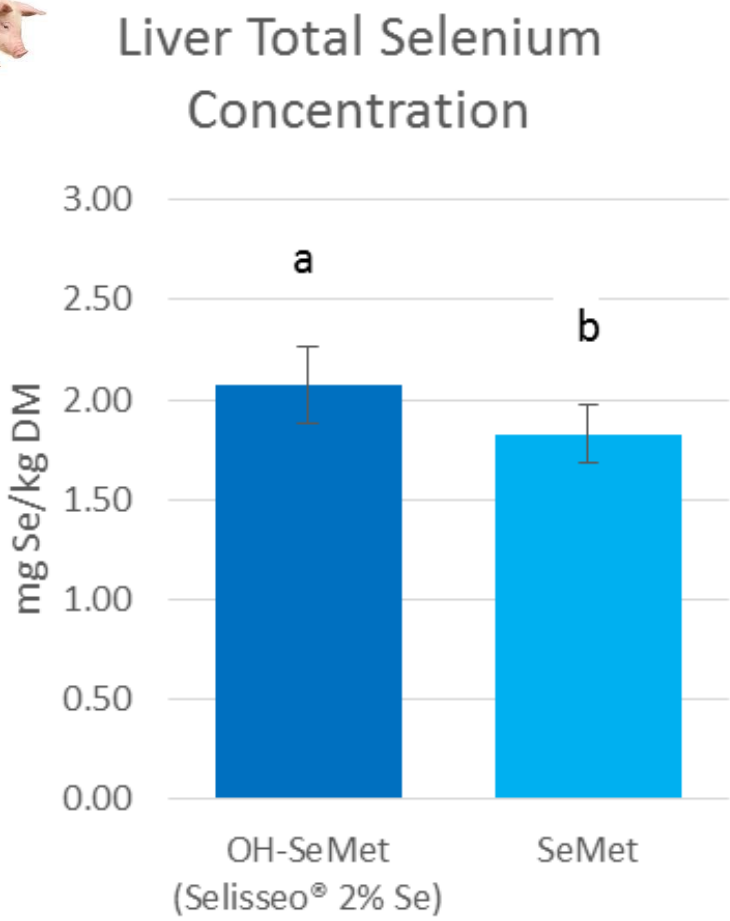


Selenomethionine

Feed analyses	Total Se (mgkg)	Average	Standard deviation
Exp Diet SeMet	0,27	**0,40**	0,13
	0,31		
	0,53		
	0,48		
Exp Diet OH-SeMet	0,29	**0,39**	0,08
	0,50		
	0,40		
	0,50		
	0,258		
	0,35		
	0,468		
	0,42		
	0,42		
	0,34		
	0,30		

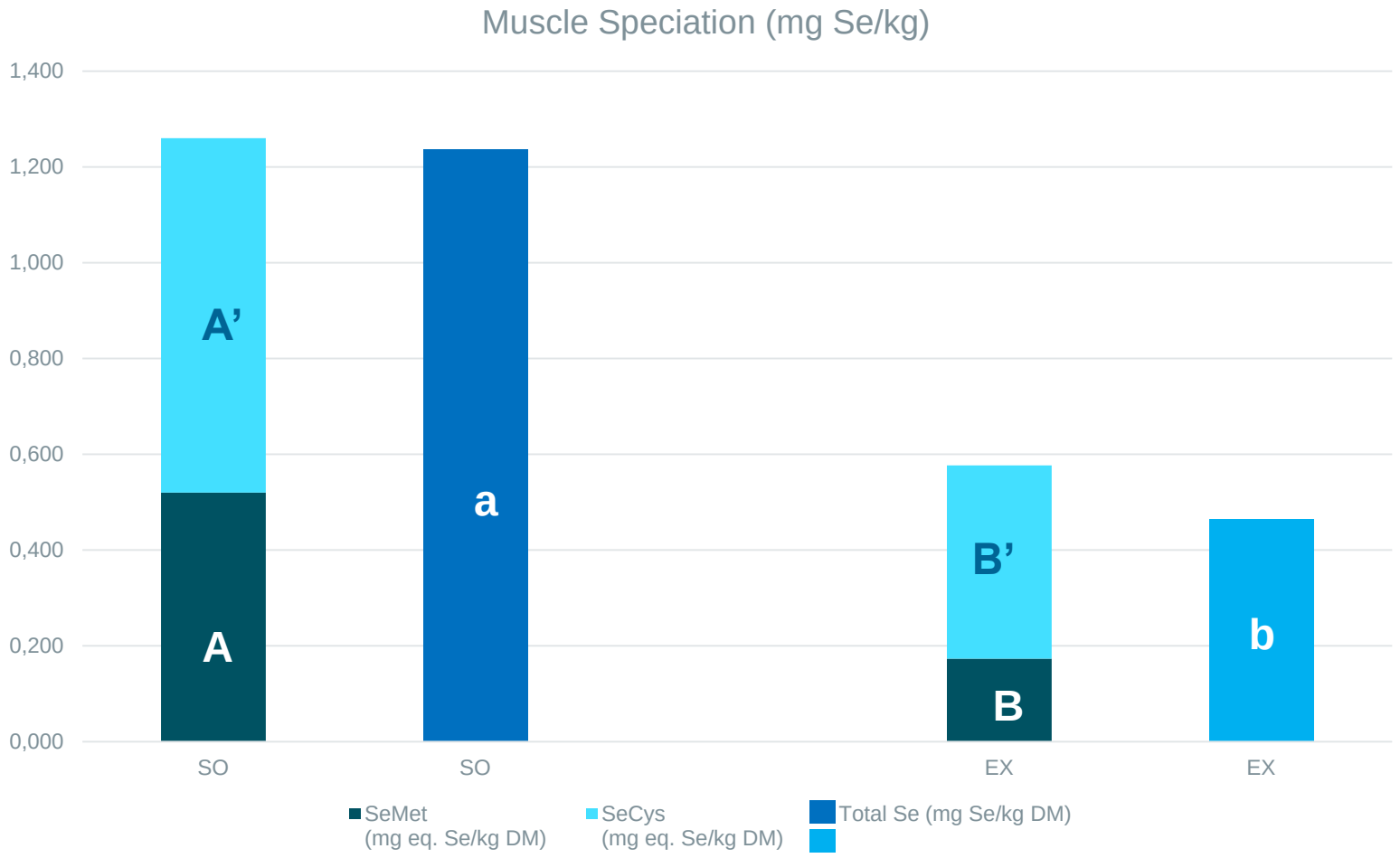
OH-SeMet an efficient source in fattening pigs





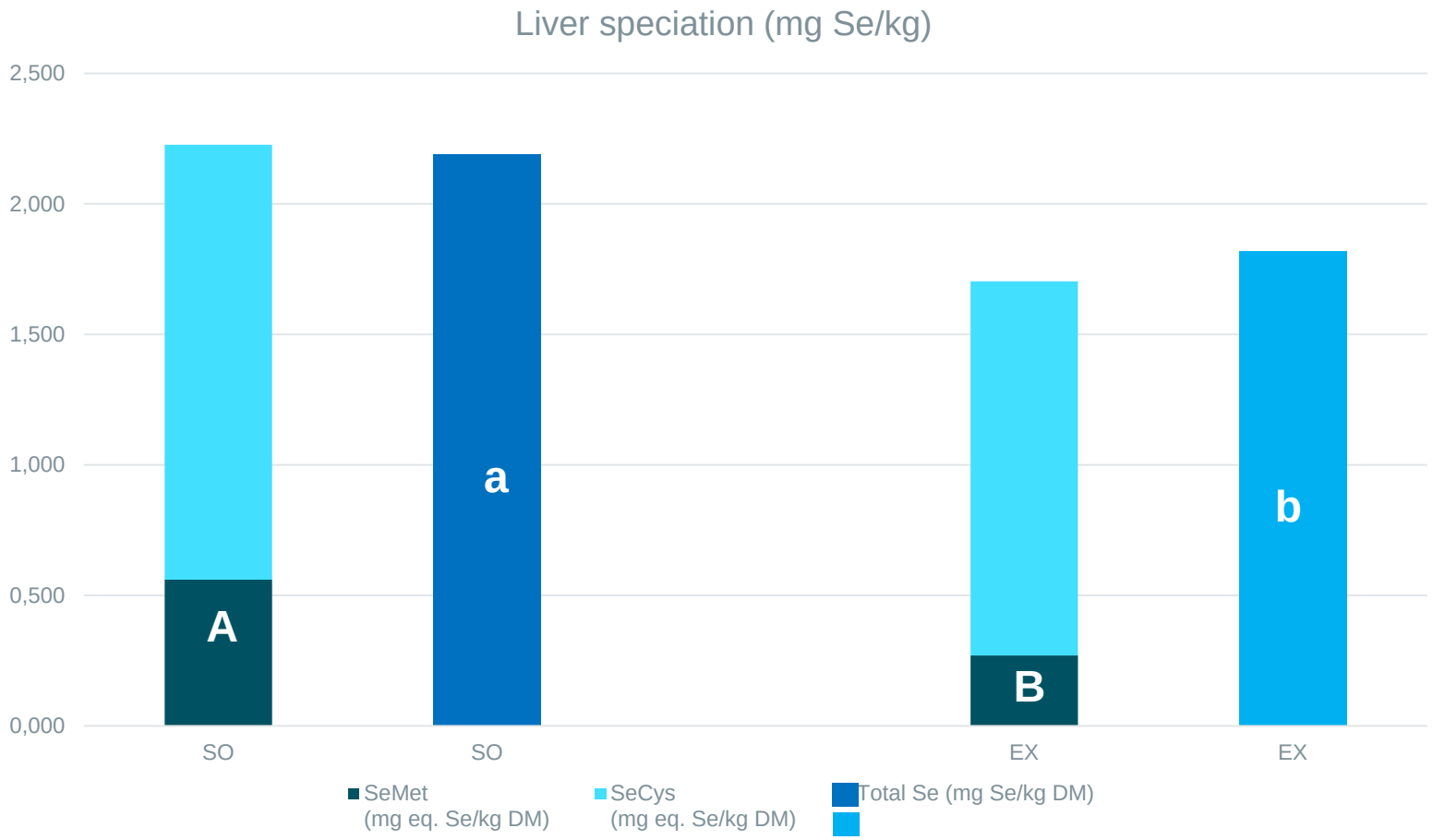
10 replicates of male & female pigs per treatment

Muscle Se speciation (SeMet & SeCys) in OH-SeMet or SeMet fed finishing pigs



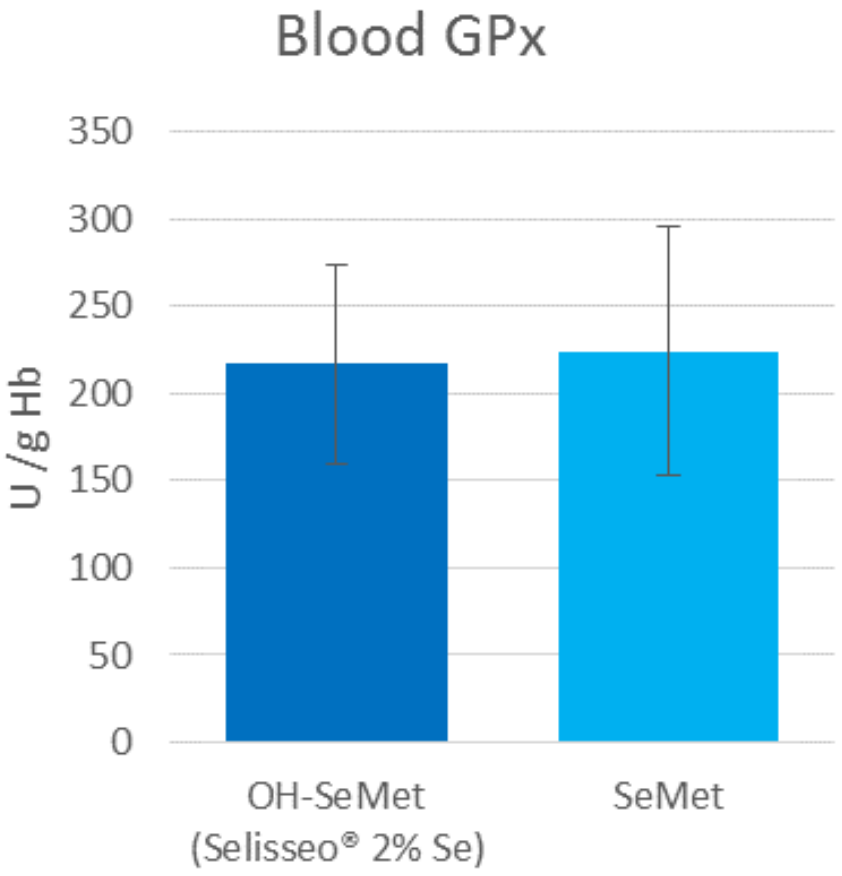
3 replicates of 2 male pigs per treatment

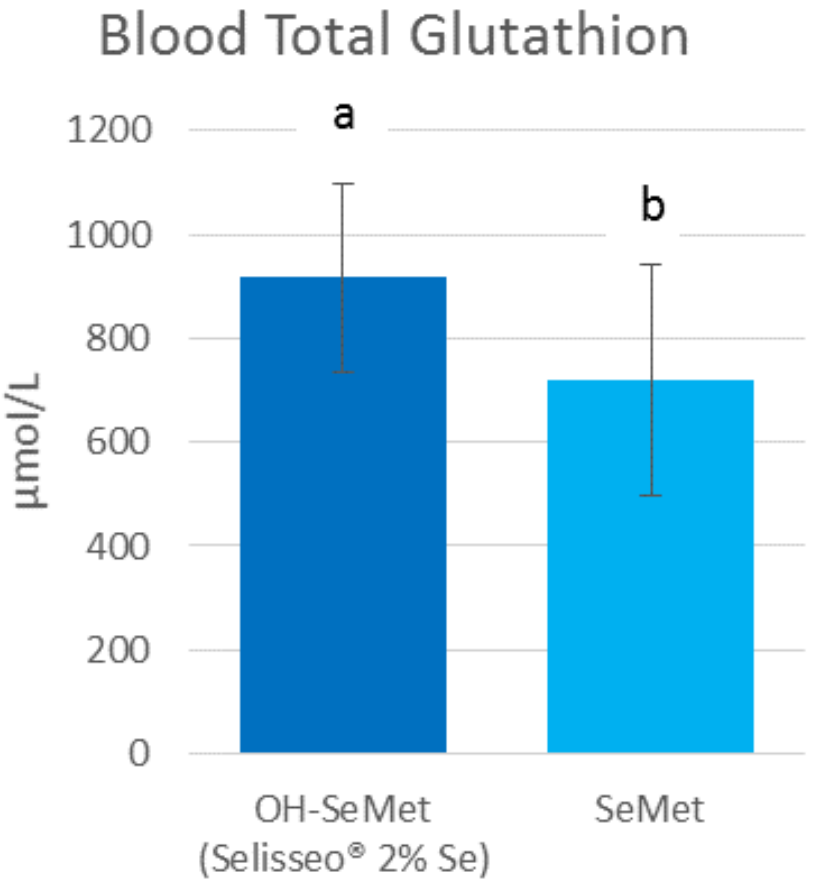
Liver Se speciation (SeMet & SeCys) in OH-SeMet or SeMet fed finishing pigs



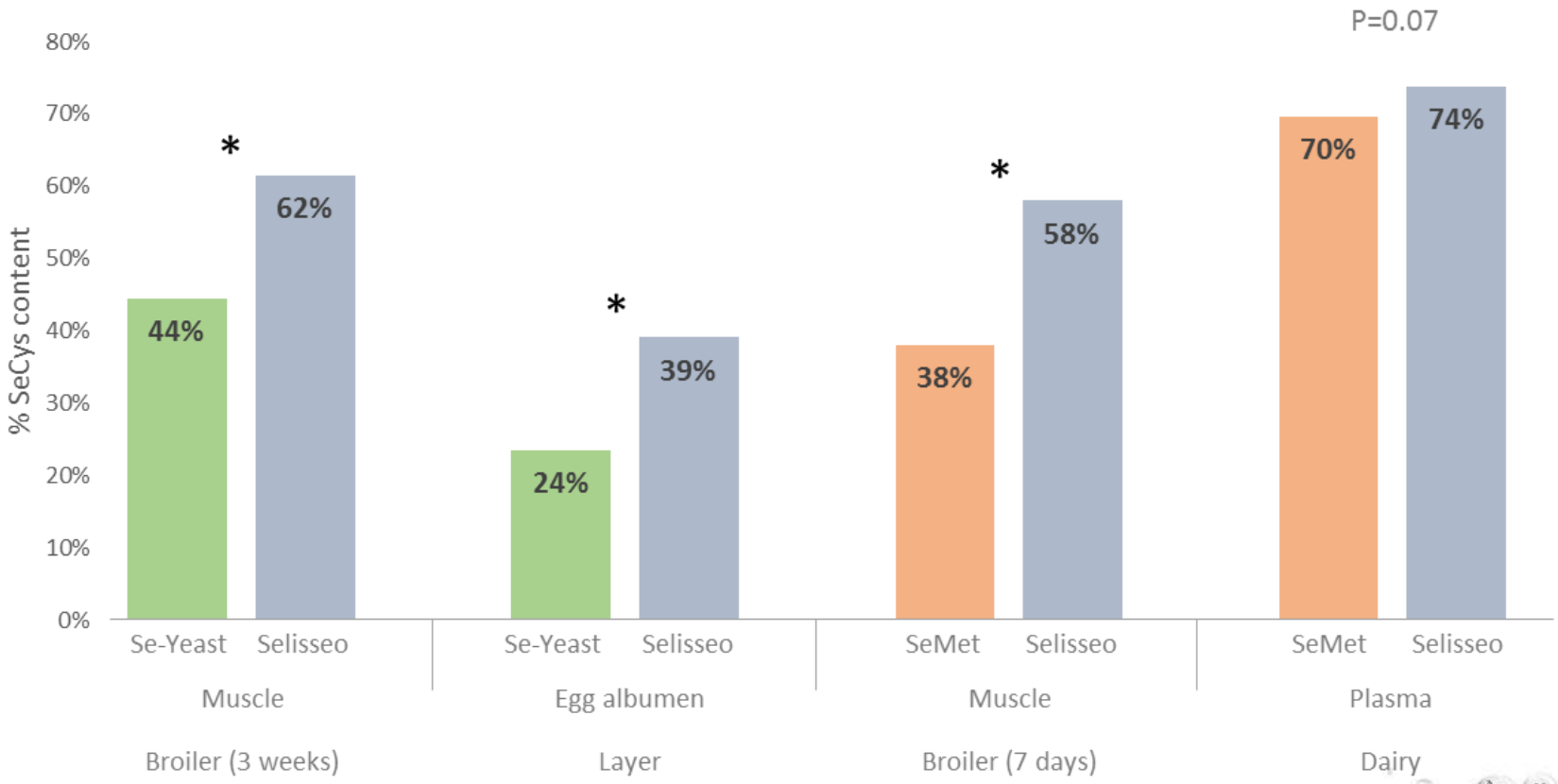
3 replicates of 2 male pigs per treatment

OH-SeMet an efficient source in fattening pigs





OH-SeMet: the source of functional Se as SeCys



Take home messages

- Within the range of Se sources on the market, the pure organic forms (**SeMet & OH-SeMet**) are the most efficient to enhance Se deposition
- Se is only deposited as SeMet in all tissues and as SeCys, the functional form of Se included in selenoproteins
- **OH-SeMet** is fully stable under feed processing conditions including premix storage (data not shown)
- **OH-SeMet** is also the only organic Se source enhancing the functional SeCys guaranteeing the most efficient antioxidant potential
- More research has to be performed to better understand the mechanism explaining the stimulation of SeCys synthesis