Stress in swine and how to deal with it

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In intensive pig production daily weight gain and feed efficiency are high. However, high performance is associated with enhanced levels of oxidative stress. Stresses (e.g. productive, social, heat etc.) during the production cycle can negatively impact embryonic development, increase the number of stillbirths, lower the litter size, as well as growth of piglets. Stress is associated with enhanced levels of reactive oxygen species (ROS) and is linked to suboptimal antioxidant status.

Selenium (Se) is important in this respect as it is a vital component of selenoenzymes (e.g. glutathione peroxidase), which play a role in reducing ROS and therefore maintain antioxidant status.

A continuous, optimal selenium supply is difficult to maintain as uptake from the diet will be impaired when high stress (e.g. sickness) is present. At that moment selenium is in high demand, for the production of selenoenzymes, and a storage inside the animal would be beneficial.

Maintaining an optimal selenium status – A nutritional solution

Selenium can be added to the diet in either inorganic or organic forms. The advantage of using organic selenium (L-Selenomethionine) over inorganic sources (e.g. sodium selenite or selenate) is its ability to be incorporated directly into animal proteins. This incorporated selenium acts as a storage depot of selenium inside the animal.

L-Selenomethionine is the only selenium compound that can be directly, without conversion, built into animal structural proteins (e.g. muscle and liver). This ensures optimal selenium supply, even during stressful periods when it is in high demand by the animal.

L-Selenomethionine has traditionally been supplied to the diet via addition of selenised yeast. However, the yeast approach is limited. Normally, around 63% of the total selenium in a selenised yeast is present as L-Selenomethionine but there is a huge variation between products and batches. The percentage of selenium present as L-Selenomethionine can be as low as 18%! The remaining selenium in yeast cells is present in forms that are no more active than much cheaper inorganic selenium. The introduction of Excential Selenium 4000 (Orffa, The Netherlands) into the market now provides a superior option to optimally supply animals with L-Selenomethionine.

The success of L-Selenomethionine in swine

Literature shows that L-Selenomethionine supplementation during pregnancy is an excellent way of increasing the selenium and antioxidant status of sows and their piglets.

This supplementation helps to lower oxidative stress-related effects (e.g. smaller litter size and birth of weak lethargic piglets).. Falk et al. (2019) evaluated the effect of L-Selenomethionine in sows on feed intake, haematological and biochemical parameters as well as total selenium in plasma, colostrum and milk. Supplementation was initiated 30 days prepartum and continued throughout the lactation period.

Results showed significantly increased total selenium levels in colostrum (x2) and in milk (x3) compared to the control diet (sodium selenite supplemented).

Total plasma selenium was not significant different between groups. Feeding of diets supplemented with

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L-Selenomethionine led to higher concentrations of SelP and SeAlb, selenoproteins active in selenium transport from extramammary tissue to colostrum and milk, at farrowing.

A higher amount of selenium in colostrum and milk is beneficial as it strengthens the piglets' antioxidative system, passive immunity and improves their weight gain. In this trial, interestingly, higher average daily feed intake (ADFI) was observed during the lactation period.

From day 13 post-partum until the end of the study, the ADFI was significantly higher in the SeMet supplemented group.

Besides beneficial effects in sows and their piglets, L-Selenomethionine addition is also able to alleviate additional oxidative stress in the fast growing fattening pig. Falk *et al.* (2018) evaluated the expression of specific genes in female finisher pigs.

L-Selenomethionine was seen to positively influence the finisher pigs' immune and antioxidant genes. Sodium selenite, on the other hand, induced additional oxidative stress.

The capacity of L-Selenomethionine to be incorporated in general body proteins led to higher muscle-Se-concentrations. This will improve meat quality by protecting myoglobin against oxidation, enhancing the integrity of cell membranes and decreasing drip loss while stabilising meat colour.

Lifted to maximum potential

L-Selenomethionine has long-standing proven benefits over inorganic selenium, especially during stressful periods. Thanks to day-to-day engineering and innovation, organic selenium has been lifted to its maximum potential.

Excential Selenium 4000 (Orffa, the Netherlands) is the only organic product in the market providing all selenium in the most effective, bioavailable form (= L-Selenomethionine).

There is no variation in concentration in comparison with other organic selenium sources (e.g. selenised yeasts) and on top of that it is the only organic Se source that ensures workers' safety due to the absence of dust.

Key points to consider when using Excential Selenium 4000 (L-Selenomethionine)

- Multifunctional product - Used in selenoenzyme synthesis and creates a storage pool of selenium in general body proteins.
- Stored selenium is released during times of stress and low feed intake.
- Consistent levels of selenium and L-Selenomethionine for feed formulators.
- Dust free preparation of L-Selenomethionine.
- Most other forms of selenium are less versatile and are prone to excretion/additional oxidative stress if levels are too high. Poor return on investment.
- Highest selenium transfer from sow to piglets.