ADVERTORIAL

Biofortification of animal products to fight 'hidden hunger'

Selenium can be supplemented in an organic or an inorganic form. The organic form L-selenomethionine has an important benefit since it is utilised by the body as an amino acid (in the same way as methionine) and is built into general body protein. Via this metabolism, L-selenomethionine is able to build up selenium reserves in the body, which ensures a good selenium status at all times.

Optimal selenium supply results in optimal metabolic functioning, increased immunity, decreased susceptibility to infections, improved cognitive functioning and fertility. Organic sources used in the tests mentioned in this review are selenised yeast (SY), L-selenomethionine (L-SeMet) and hydroxy-selenomethionine (OH-SeMet; hydroxy-methylselenobutanoic acid, HMSeBA).

Selenium in animal products

Delezie *et al*. (2014) reported the high efficiency of a dust free preparation of L-SeMet in augmenting selenium concentrations in eggs compared to SY and sodium selenite (*Figure 1*). After eight weeks of supplementing 0,3ppm of selenium in the form of L-SeMet, the concentration in the whole egg reached 472,9µg Se/kg. Based on the average egg weight (67g) this amounts to 32µg Se/egg. This value represents 45,71% of the adequate intake (70µg Se/day) for adults (EFSA Journal 2014;12(10):3846). The addition of SY and sodium selenite resulted in only 374,7µg Se/kg and 287,98µg Se/kg, respectively.

Van Beirendonck *et al*. (2016) showed the highest deposition of selenium in broiler breast muscle when birds received a dust-free preparation of L-SeMet (0,2mg Se/kg diet) compared to SY and sodium selenite. The data clearly proved that selenium deposition in muscle is linearly correlated with the amount of selenium in the form of L-SeMet added to the diet. More recent data (Van Beirendonck *et al*., 2018; *Figure 2*) shows the benefit of L-SeMet compared to OH-SeMet. The efficiency of OH-SeMet, to biofortify broiler breast muscle with selenium, was seen to be only ±80% compared to L-SeMet.

The hydroxy form cannot be used directly by the animal as it must be

Figure 1: Selenium deposition in eggs related to the selenium source and dosing in the feed (results published in Poultry Science: Delezie (2014), 93 :3083–3090). Means (n = 10/dietary treatment) with the same letter are not significantly different from each other at P ≤0,05.

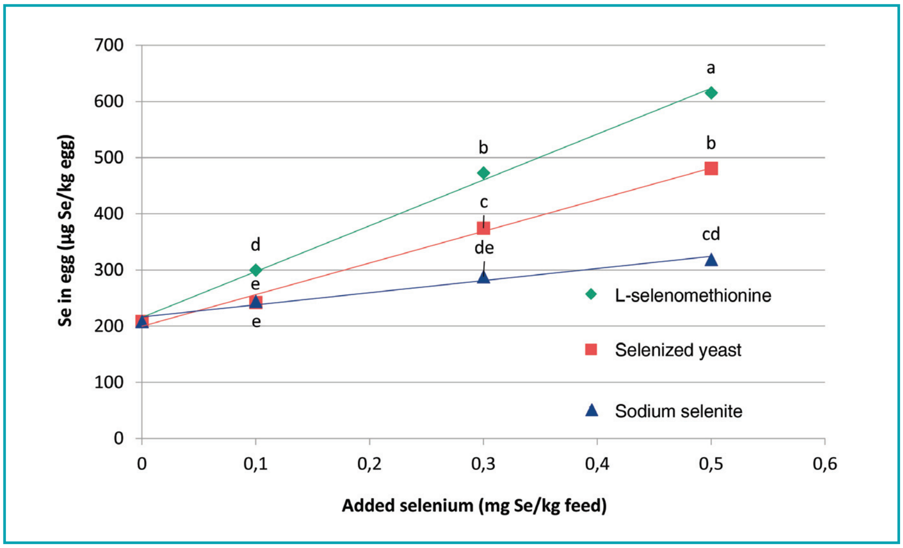


Figure 2: The efficacy of four different selenium sources on the deposition of selenium in broiler muscle tissue (results published in proceedings PSA 2nd LASC, 6-8 Nov, Brazil, p70-71). Means (n = 12/dietary treatment) with the same letter are not significantly different from each other at P ≤0,05.

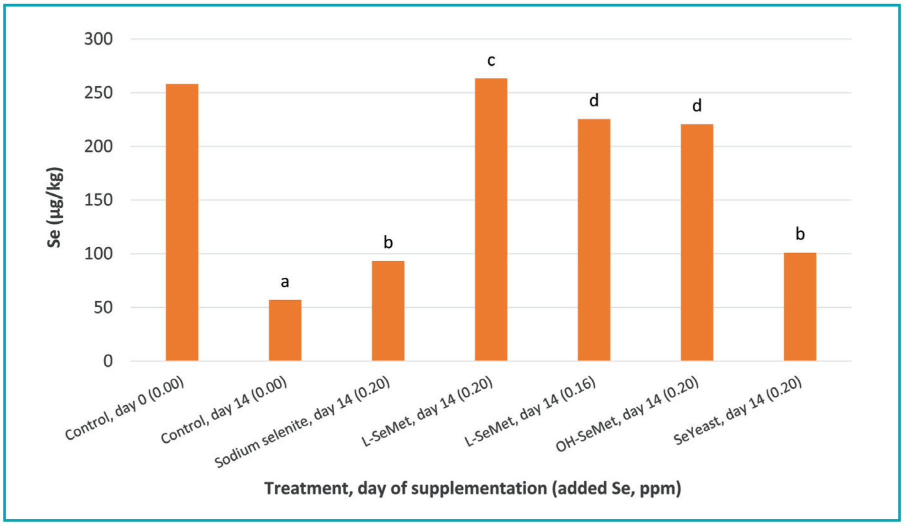
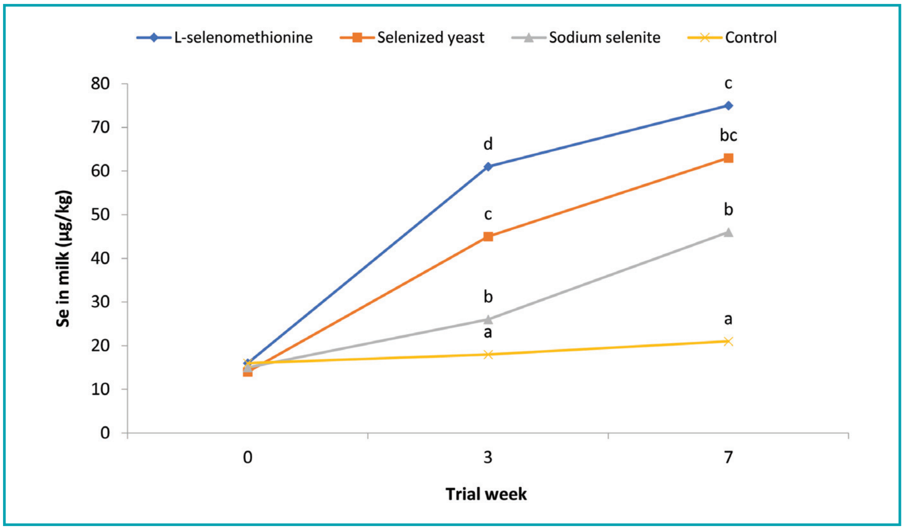


Figure 3: The efficacy of three different selenium sources on the deposition of selenium in milk (results published in proceedings EAAP, 25-28 August, Denmark). Means within a time point with the same letter are not significantly different from each other at P ≤0,05.



converted to L-SeMet first before it can be used for protein production. Literature also states that the relative utilisation of hydroxy-methionine, compared to L-methionine, for chickens and pigs is only 80% (EFSA Journal 2012;10(3):2623). By augmenting the selenium concentration in broiler breast muscle, the animal has a reserve to combat different stressors during its lifetime.

L-SeMet, in a chronic heat stress model, was able to improve BWG and FCR of broiler finishers (Michiels *et al*., 2016). After slaughter, L-SeMet also has a positive effect on meat quality. Broiler meat is especially vulnerable to (oxidative) stress as it is rich in long chain polyunsaturated fatty acids (PUFA). L-SeMet is not only able to reduce lipid peroxidation, but it also increases the alpha-tocopherol content (Skřivan *et al*., 2008). Other trials show a reduction in drip loss of almost 1%, after storing the meat for 48 hours, when diets are supplemented with L-SeMet compared to sodium selenite (Wang *et al*., 2011; Zhang *et al*., 2014).

Vandaele *et al*. (2014) analysed the selenium content in milk samples of dairy cows after supplementation of 0,3mg Se/kg dry matter from sodium selenite, SY and a dust free preparation of L-SeMet (*Figure 3*). After seven weeks of treatment, the Se concentration in the milk was the highest in the L-SeMet group (75µg/kg).

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