



## Supplementation with spirulina enriched with seleno-hydroxyacid in young trotters : a randomized, double-blind controlled trial

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### Introduction

During exercise, both human and equine athletes experience different types of stress, including thermal, metabolic, mechanical and oxidative stress. Oxidative stress (OS) reflects an imbalance between production of reactive oxygen species and antioxidant defense in favor of the formers, which may lead to cellular and tissue damage. Dietary antioxidants are commonly supposed to attenuate exercise-induced OS and inflammation. Among antioxidant compounds, a positive influence of dietary spirulina, a cyanobacterium (blue-green algae) on muscle response to exercise, has been shown in human athletes (Lu et al. 2006; Kalafati et al., 2010; Johnson et al., 2016).

**The aim of the study was to evaluate the influence of oral supplementation with a seleno-hydroxyacid enriched spirulina (SeHsp) on oxidative balance markers and muscle enzymes activity in a population of young trotters in training.**



### Materials and Methods

- Seventy-nine young Trotters of two and three year-old, in full training, included in a 90-day trial.
- One month of control diet (1.25 mg/d of inorganic Se and 1000 UI/d of Vit E) for all,
- Random assignment in the SeHsp group (n = 39) with 25 g/d of SeHsp (3 mg of selenium/d) mixed in control diet or in the control group (n= 40).
- Evaluations before supplementation (T0), after 45 days (T45) and after 90 days (T60)(fig.1),
- At rest : - hematological analysis,  
- basic biochemical analysis (liver, kidney and muscles enzymes activities),  
- oxidative status markers: plasma Se and vitamin E concentrations, erythrocyte glutathione peroxidase (GPx) and superoxide dismutase (SOD), reduced glutathione (GSH), oxidized glutathione (GSSG), lipid peroxides (POXL) and plasma uric acid (UA).

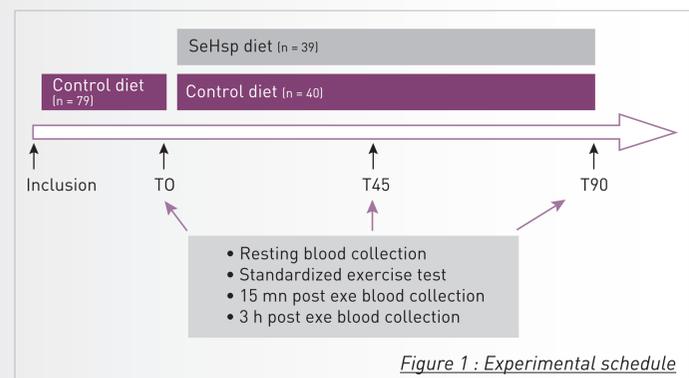


Figure 1 : Experimental schedule

- After exercise : response in plasma uric acid, GSH, GSSG (15 min post-exe) and CK (3 h post-exe) were measured.
- Repeated measures analysis of variance to test the influence of time, treatment and interaction.

### Results

- 17 horses did not complete the whole trial period.
- Analysis of data performed on 30 horses for SeHsp group and 32 horses for control group.
- Plasma concentration of selenium, GPx and SOD : significantly higher in SeHsp group compared to the control group at T90 (Fig.2).
- Plasma concentration of Vit E, uric acid, POXL unaffected by treatment and significantly decreased with time in both groups.
- Resting GSH and CK : no time or treatment effect.
- Resting basic hemato- biochemical variables : not influenced by treatment.

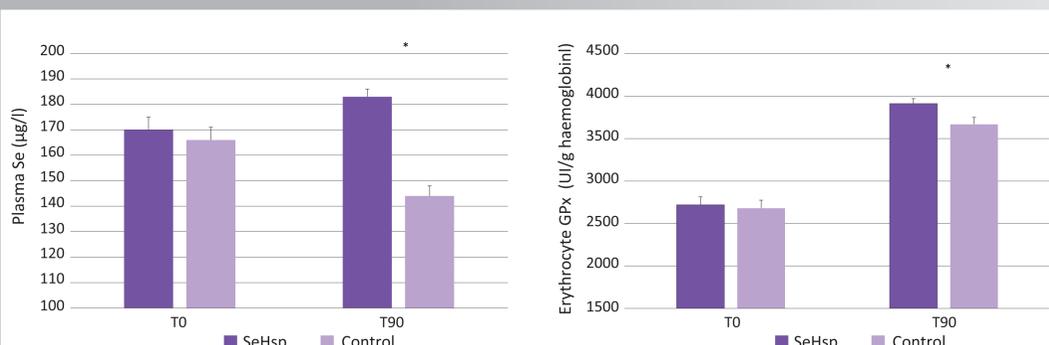


Figure 2 : Changes in plasma Se and GPx in seHsp and control groups between T0 and T90  
\* : p<0.05

### Discussion

The main result of the study was a significant increase of resting plasma concentration of selenium and erythrocytes GPx, in the SeHsp group when compared to control. These data suggest that the oral supplementation with Se enriched spirulina potentially improve the antioxidant capacity in trained horses. However, markers of lipid peroxidation and muscle enzymes activity were not affected by the SeH-spirulina supplementation in our study. In human athletes, spirulina supplementation has been shown to decrease the level of markers of lipid peroxidation such as malondialdehyde (Lu et al., 2006) and thiobarbituric acid-reactive substances (Kalafati et al.,2010).

### Conclusion

A 90-day oral supplementation with spirulina enriched with seleno-hydroxyacid in young trotters in full training resulted in significant higher resting plasma concentration of selenium and certain antioxidant enzymes (GPx and SOD). However, indicators of lipid peroxidation and the muscular response to exercise were not influenced by the supplementation.