



Study programme: **General Animal Science**

Department of: **Veterinary Sciences**

Supervisor: **prof. Markéta Sedmíková, sedmikova@af.czu.cz**

Co-supervisor: **Dr. José Luis Ross-Santaella**

Topic: Oxidative stress and boar sperm function

Hypotheses:

Exogenous hydrogen sulfide can improve the functional properties of boar sperm.

Summary:

It is well known the capacity of spermatozoa to produce a variety of reactive oxygen species (ROS) such as the superoxide anion, hydrogen peroxide, and nitric oxide. The generation of low amounts of these ROS is necessary for a normal sperm function, playing a significant role in the induction of sperm capacitation, acrosome reaction, and the acquisition of sperm-fertilizing capability, among others. In this sense, the balance between the amounts of ROS produced and scavenged promotes or jeopardizes a given sperm function. However, high generation of ROS (immature and abnormal spermatozoa, semen processing, etc.) together with a low antioxidant levels in seminal plasma or semen extenders could lead a state of oxidative stress (Reviewed in: de Lamirande & Gagnon, 1995; Aitken et al., 2012; Guthrie & Welch, 2012).

Boar spermatozoa are particularly sensitive to oxidative damage due to the high content of polyunsaturated fatty acids (PUFAs) in their membranes, which serve as preferred substrates for ROS generation (Cerolini et al., 2000; Brouwers et al., 2005; Awda et al., 2009). Moreover, the low antioxidant capacity of boar seminal plasma increases the generation of ROS in the sperm membrane inducing lipid peroxidation, which in turn promotes the loss of sperm motility, DNA damage, as well as a decrease of the mitochondrial membrane potential (Awda et al., 2009; Yeste, 2017). In order to palliate the effects of large amounts of ROS on sperm function, several studies have tested the effects of some additives in boar semen extenders with contradictory results (Yeste, 2017). Nowadays the use of natural products, such as plant extracts, has been suitably used in boar semen as a source of antioxidants (Malo et al., 2010; Ros-Santaella & Pintus, 2017). Other substances like gasotransmitter hydrogen sulfide could act like ROS scavengers but they have not been tested in sperm cells submitted to oxidative stress. In spite of the relevance of oxidative stress on sperm physiology, studies concerning the role of ROS on boar sperm function are still scarce.

The main objectives of the present thesis are: a) evaluate the effects of several oxidative stress-inductors on sperm parameters, b) identify the male traits that could explain the individual tolerance of sperm cells against oxidative stress, and c) test the effects of hydrogen sulfide as ROS scavengers in semen samples submitted to oxidative stress

Source of: Institutional support of ICULS

In Prague, date 30.3.2018

signature