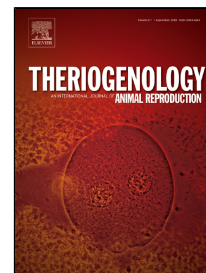


# Accepted Manuscript

Effect of Astragalus polysaccharide addition to thawed boar sperm on *in vitro* fertilization and embryo development

Xiao-gang Weng, Ming-ming Cai, Yu-ting Zhang, Yan Liu, Zheng-ling Gao, Jian Song, Zhong-hua Liu



PII: S0093-691X(18)30566-1  
DOI: 10.1016/j.theriogenology.2018.07.030  
Reference: THE 14644  
To appear in: *Theriogenology*  
Received Date: 23 February 2018  
Accepted Date: 26 July 2018

Please cite this article as: Xiao-gang Weng, Ming-ming Cai, Yu-ting Zhang, Yan Liu, Zheng-ling Gao, Jian Song, Zhong-hua Liu, Effect of Astragalus polysaccharide addition to thawed boar sperm on *in vitro* fertilization and embryo development, *Theriogenology* (2018), doi: 10.1016/j.theriogenology.2018.07.030

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# 1    **Effect of Astragalus polysaccharide addition to thawed boar sperm on *in vitro*** 2    **fertilization and embryo development**

3    Xiao-gang Weng<sup>#</sup>, Ming-ming Cai<sup>#</sup>, Yu-ting Zhang, Yan Liu, Zheng-ling Gao, Jian Song, Zhong-hua Liu<sup>\*</sup>

4    College of Life Science, Northeast Agricultural University, Harbin 150030, Heilongjiang, P.R. China

5    <sup>#</sup>These authors contribute equally to this work.

6    <sup>\*</sup>Correspondence:

7    liuzhonghua@neau.edu.cn

## 9    **ABSTRACT**

10    It is important to utilize an antioxidant to ameliorate oxidative damage during boar sperm cryopreservation and  
11    thawing. Some studies have shown that Astragalus polysaccharide (APS) has antioxidant capabilities in sperm  
12    storage at low temperatures. However, the effects of APS on thawed sperm are unclear. In this study, the effect of  
13    supplementation of thawing boar semen extender with APS (0.5, 1, 5, 10 mg/mL) on sperm quality parameters  
14    (viability, motility, acrosome integrity and mitochondrial activity) was evaluated. Next, we investigated the effect  
15    of APS (0.5 mg/mL) supplementation on antioxidant parameters. Semen from two straws was thawed and diluted  
16    with three volumes of Beltsville Thawing Solution (BTS) and immediately divided into a control group without  
17    addition of antioxidants (CTR) and the APS group. Sperm and antioxidant parameters were evaluated in the CTR  
18    and APS groups after 1 h of incubation at 37°C. Finally, we studied the effect of APS (0.5 mg/mL)  
19    supplementation on *in vitro* fertilization (IVF) and embryo development. The addition of different doses of APS to  
20    thawed sperm did not induce any significant effects on the sperm viability or motility compared to the sperm  
21    without APS treatment. However, the addition of 0.5 mg/mL APS to thawed sperm showed improved  
22    mitochondrial activity, higher penetration rate and increased total IVF efficiency compared with those of the  
23    control group. Moreover, our results indicate that the supplementation of APS in thawed sperm decreased the  
24    concentration of reactive oxygen species (ROS) and improved the activity of superoxide dismutase (SOD) and  
25    catalase (CAT). Finally, the addition of APS significantly increased the cleavage rate and blastocyst rate  
26    compared to those of the control group. In conclusion, the addition of APS to thawed boar sperm can enhance the  
27    antioxidant ability of sperm and improve *in vitro* fertilization (IVF) parameters and the outcomes of embryonic  
28    development. These results imply that APS has practical potential to enhance boar sperm reproductive  
29    performance.

30    **Keywords:** astragalus polysaccharide; boar sperm; *in vitro* fertilization; embryonic development

## 31    **1. Introduction**

32    Cryopreservation is the most practical approach for long-term storage of sperm in boars [1]. For example,  
33    cryopreservation of boar sperm facilitates the distribution of agriculturally desirable genes, provides more

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