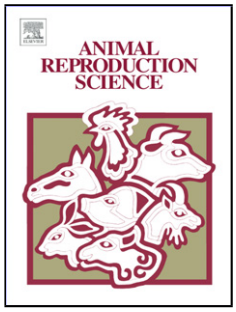

Title: Non-invasive metabolomic profiling of culture media of ICSI- and IVF-derived early developmental cattle embryos via Raman spectroscopy

Authors: Xiao-Xia Li, Ping-Hua Cao, Wen-Xia Han, Ya-Kun Xu, Hua Wu, Xue-Li Yu, Jun-Yi Chen, Fan Zhang, Ying-Hua Li

PII: S0378-4320(18)30384-1
DOI: https://doi.org/10.1016/j.anireprosci.2018.07.001
Reference: ANIREP 5893

To appear in: *Animal Reproduction Science*

Received date: 11-4-2018
Revised date: 18-6-2018
Accepted date: 2-7-2018

Please cite this article as: Li X-Xia, Cao P-Hua, Han W-Xia, Xu Y-Kun, Wu H, Yu X-Li, Chen J-Yi, Zhang F, Li Y-Hua, Non-invasive metabolomic profiling of culture media of ICSI- and IVF-derived early developmental cattle embryos via Raman spectroscopy, *Animal Reproduction Science* (2018), https://doi.org/10.1016/j.anireprosci.2018.07.001

Non-invasive metabolomic profiling of culture media of ICSI- and IVF-derived early developmental cattle embryos via Raman spectroscopy

Xiao-Xia Li[a,b*], Ping-Hua Cao[a], Wen-Xia Han[a,b], Ya-Kun Xu[a,b], Hua Wu[a,b], Xue-Li Yu[a,b], Jun-Yi Chen[a,b], Fan Zhang[a,b], Ying-Hua Li[a,b]

[a]*College of Animal Science and Technology, Henan University of Science and Technology, Henan Province, Luoyang, China*

[b]*Henan Provincial Key Laboratory for Grass-Feeding Animal, Henan University of Science and Technology, Luoyang, China*

[*]Corresponding author: Xiao-Xia Li, Tel: +86-15303796872; E-mail: xxcphzs@126.com

ABSTRACT

The aim of the present study was to compare differences in composition between *in vitro* cultured early developmental embryos resulting from either *in vitro* fertilization (IVF) or intracytoplasmic sperm injection (ICSI). Non-invasive metabolomic profiling of culture media was conducted with laser tweezer Raman spectroscopy (LTRS), providing molecular information that was used to aid the diagnosis or treatment of embryos that were adversely affected by ICSI treatment, ultimately improving the ICSI embryonic developmental potential. Cattle embryos were generated via ICSI and IVF with development to the 2-, 4-, 8-, 16-, 32-cell, and blastocyst stages with individual *in vitro* culturing occurring for 4 h. The culture media for embryos in different developmental stages were separately analyzed using LTRS. The resulting composition of culture media used for culturing IVF- and ICSI-derived embryos was mainly altered in contents of carbohydrates, lipids, DNA, and proteins. Bands at 1004 cm^{-1} (phenylalanine) and 1529 cm^{-1} (-C=C-carotenoid) had specific patterns