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Development of a transcriptomic protocol combining bovine somatic cells and OpenArray® technology to trace the ab(use) of somatotropin in dairy cattle

Alexandre Lamas ^{1*}, Patricia Regal ¹, Beatriz Vázquez ¹, Alberto Cepeda ¹, Carlos Manuel Franco ¹

¹ Department of Analytical Chemistry, Nutrition and Bromatology. Faculty of Veterinary of Lugo, University of Santiago de Compostela

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ABSTRACT

The administration of exogenous recombinant somatotropin (rbST) in dairy cattle is used to increase the milk yield. Since its approval in dairy production in 1993, the use of rbST has been controversial due to its possible harmful effects on animal welfare and human health. While its use is approved in countries such as the United States of America, Mexico or Brazil, the European Union (EU) banned its use in 1999. In spite of this ban, in the year 2013 the illegal use of somatotropin was detected in Spain, making the authorities aware of the need to control the illegal use of this substance in the EU. For this purpose, the development of analytical methods to detect their fraudulent use is necessary in the EU. Analytical chemistry methods based on the direct detection of the banned substance as Liquid Chromatography Tandem Mass Spectrometry are the first option to detect their use [1]. However, some commercially available rbST has the same amino acid composition as the natural bST, rendering impossible their differentiation. Therefore it is of great importance to develop indirect methods that allow detecting the use of rbST in cattle [1]. In the last years, transcriptomic technology has experienced a boom due to the development of RNA-seq, microarrays or High-Throughput Real-Time PCR. Real-Time PCR is considered the gold standard for quantification purposes, allowing the measurement of small differences between samples. Recently, transcriptomics has been used as a tool to detect the use of growth promoters in beef cattle [2]. However, these studies are focused on the use of target tissues such as liver or muscle obtained *post-mortem*. In the case of rbST, it is key to control its misuse *in vivo*, during the period of lactation. Therefore, target samples must be easy to collect, the method of collection should be non-invasive and it must be economically viable. The goal of this study was to develop a transcriptomic protocol based on the combination of High-Throughput Real-Time PCR and milk somatic cells (MSCs) to detect the ab(use) of rbST. MSCs were collected from 6 treated and 3 control cows at different time points to analyze the expression of selected genes. To represent real conditions, cows were housed in a semi-intensive farm and administered with 500mg of rbST every two weeks (Lactotropina®, Elanco®, Eli Lilly, México). The results showed that MSCs are an optimal alternative to isolate RNA with good quality using a simple protocol for their collection. The use of OpenArray® technology allowed the simultaneous analysis of 18 selected genes for 48 samples taken at different treatment points. With this technology it was possible to establish a transcriptomic profile of treated and control cows that could be used to detect the illegal use of rbST in dairy cattle in the EU.

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References:

- 1] P. Regal, A. Lamas, C. Fente, C.M. Franco, A. Cepeda, *Journal of Liquid Chromatography and Related Technologies* (2017) 1-8.
- 2] I. Riedmaier, M.W. Pfaffl, and Heinrich HD Meyer, *Drug testing and analysis* 4.S1 (2012) 70-74.

Correspondence: Email - alexandre.lamas@usc.es