

Serotonin receptors description in goat mammary gland

Aridany Suarez-trujillo¹, Miguel A. Rivero², Anastasio Argüello¹, Juan Capote³, Noemí Castro¹

¹ *Animal Science, Universidad de Las Palmas de Gran Canaria, Spain*

² *Department of Morphological Sciences, Universidad de Las Palmas de Gran Canaria, Spain*

³ *Unidad de Producción Animal, Pastos y Forrajes, Instituto Canario de Investigaciones Agrarias, Spain*

Mammary gland function and structure is modulated by local (produced by mammary epithelial cells) or systemic (produced outside the mammary gland) serotonin. It acts through serotonin receptors (5-HTR), transmembrane proteins. The presence of different serotonin receptors subtypes has been described in cow, mouse, rat and human mammary tissue. In goats, 5-HTR presence in mammary gland tissue has not been described yet. The objectives of this study are to elucidate if goat lactating mammary tissue presents any of the serotonin receptors subtypes (5-HTR 1A, 1B, 1D, 1E, 1F, 2A, 2B, 2C, 3A, 4, 5a, 6 and 7) using qPCR analysis; and then, to describe by immunohistochemistry (IHC), the arrangement of some of those qPCR-positive receptors, in the mammary tissue of lactating and dry off goats. Tissue samples for qPCR were taken from three lactating Majorera goats at the slaughterhouse. Hypothalamic tissue was also collected as positive control. RNA extraction and cDNA synthesis were performed. Specific primers for each receptor subtype were developed in goat tissue, and used for qPCR analysis. Hypoxanthine phosphoribosyltransferase I, Ribosomal Protein, β -Actin and Glyceraldehyde 3-Phosphate Dehydrogenase genes were utilized as internal control. IHC for 5-HTR 1B, 1E, 2A, 2B, 5 and 7 was performed in paraffin-embedded tissue from three lactating and three dry off Majorera goats. 5 μ m sections were immunostained using rabbit primary antibodies against each 5-HTR subtypes. Anti-rabbit secondary antibody was conjugated with streptavidin peroxidase, and visualization of binding was realized using diaminobenzidine substrate. Hypothalamic tissue was also used as positive control. qPCR analysis showed that 5-HTR 1B, 1D, 1E, 2A, 2B, 4, 5a and 7 were presented in goat lactating tissue. In the IHC analysis, all six studied receptors were expressed in mammary epithelial cells. Furthermore, 5-HTR 1E was expressed in the myoepithelial cells. Blood vessels were positively stained for receptors 1B, 2A and 2B. In lactating animals, receptor disposition in the mammary epithelial cells was cytoplasmic. However, in mammary tissue from non-lactating animals, arrangement changed to the apical membrane in all receptor subtypes. In conclusion, 5-HTR 1B, 1D, 1E, 2A, 2B, 4, 5a and 7 are expressed in goat mammary tissue and receptors 1B, 1E, 2A, 2B, 2 and 7 were expressed in different cells of the mammary tissue. This is the first approach to describe the presence of serotonergic components in the goat udder, and further studies need to be performed in order to elucidate the function of serotonin on this species.

Keywords: Serotonin, receptors, goat