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Influence of horn status on bovine *Semitendinosus* muscle proteome: An analysis of the canonical pathways, upstream regulators and interactive networks

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Abstract

Stress levels within bovine animals are influenced by several factors, one of which is the horn status of the animals in the herd. Previous research from our group identified 95 differentially abundant proteins (DAP) in *M. semitendinosus* in relation to horn status, when other factors were controlled [1]. Here, a bioinformatics analysis was applied to these DAP to identify canonical pathways, upstream regulators and interactive networks associated with differences in bovine horn status. The most activated canonical pathway in muscle from disbudded bovines was “Glycolysis I” with 10 of 27 proteins of this pathway observed, all more abundant in muscle of disbudded animals. Several pathways were inhibited in disbudded animals, including some involving proteasome proteins (“Regulation of Apoptosis” and “Metabolism of Polyamines”). The most significant upstream regulators were DMD (predicted activated, Z-score +2.6) and sesaminol (predicted inhibited, Z-score -3.2). The most activated and inhibited upstream transcription factors were MEF2C (Z-score +2.4) and NFYC (Z-score -2.8), respectively. The results demonstrate that energy metabolism was enhanced in disbudded animals, while protein turnover was inhibited. Previous studies also showed that the presence of horns has implications for the animal’s metabolic and physiological status. More specifically, horn growth is dependent upon the presence of various hormones associated with energy metabolism, including; growth and thyroid hormones, prolactin, and testosterone. Horn status appears to influence overall energy and physiological status of the animal, with consequences for specific metabolic muscle characteristics as evidenced in this study.

Reference:

Ben Mbarek, R., Terlouw, C., Hamill, R., Kerry, J., Picard, B., Mullen, A.M., Reiche, A-M., Silacci, P. & Gagaoua, M. (2022). Effect of rearing practices and pre-slaughter handling on the *Longissimus thoracis* and the *Semitendinosus* muscle proteomes of young bulls. *In*: Proceedings of the 68th International Congress of Meat Science and Technology, pp. 168. 22th to 25th August, Kobe, Japan.