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Growth hormone, prolactin, and sodium acetate have complex and non-uniform effects on the lipid distribution of a differentiated bovine mammary epithelial cell line

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ABSTRACT

Non-polar lipids (NPL) accumulate within the mammary epithelial cell during lactation; however there are no reported systematic studies that utilize NPL composition as a sign of differentiation. Additionally, there are no reported systematic studies on the response of a bovine mammary alveolar cell line (MAC-T), to a range of lactogenic hormone concentrations, or different lipogenic substrates. In a 3 x 3 factorial arrangement, the effect of growth hormone (GH; 0, 10, 100 ng/ml), and prolactin (PRL; 0, 5, 10 µg/ml) on the lipid composition of MAC-T was examined using thin layer chromatography. Using the optimal hormone treatment (10 ng/ml GH, 5 µg/ml PRL) for NPL synthesis, inclusion of 10 mM sodium acetate (NaOAc) was assessed to determine the effect of lipogenic substrate on lipid composition. GH had a significant effect on NPL, cholesterol, phosphatidylcholine, phosphatidylinositol, and sphingomyelin (SM), while PRL only affected SM. NaOAc had a significant effect on NPL, phosphatidylethanolamine and SM. The proportion of NPL peaked with 10 ng/ml GH, but dropped to near-control levels with 100 ng/ml GH. This study underscores the importance of testing a range of hormone concentrations when assessing lipogenic profile of MAC-T cells.