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The newly established bovine endometrial gland cell line (BEGC) forms gland acini in vitro and is only IFNτ-responsive after E2 and P4-pre-incubation

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1. Introduction

Embryonic loss occurs within the first two weeks of gestation and is of economic importance [1]. During bovine implantation significant alterations take place in the endometrium concerning changes in endometrial structure [2] and gene expression [3]. Key regulators of such alterations are estrogen (E_2), progesterone (P_4) [4] and interferon tau (IFNτ), which is the pregnancy-recognition signal in ruminants [5, 6]. In bovine E_2 and P_4 exert cellular effects via the nuclear progesterone PR [7] and estrogen receptors ESR1/2 [8]. In addition membrane-associated steroid receptors are used by P_4 [9] and E_2 [10]. In humans the activation of the receptors leads to the release of intracellular calcium and activation of mitogen-activated protein kinases [11, 12]. The steroids promote implantation by modifying bovine endometrial histiotroph [13] and downregulating tight-junction-associated proteins in the ovine endometrium [14].

Bovine interferon tau (IFNτ) is produced in mononuclear trophoblast (TR) cells during ruminant blastocyst elongation [15] and acts via the receptor subunits IFNAR1/2 [16]. It has also been associated with ovine blastocyst elongation [16] and the induction of an anti-inflammatory response in uterine epithelial cells from GD 5-9 in cattle [17, 18]. In ruminants IFNτ mediates its effects via non-classical signaling pathways involving mitogen-activated protein kinases (MAPK) and by classical pathways encompassing activation of Janus-activated kinases (JAKs) and signal transducer and activator of transcription 1 (STAT1) [19, 20]. During implantation E_2, P_4, and IFNτ act in a precisely orchestrated chronological sequence [21]. In previous studies it has been shown that P_4 is permissive to the expression of ISGs which are