

Expression of local luteotropic factors during induced luteolysis in the bovine corpus luteum

D. Schams¹, H.H.D. Meyer¹, B. Berisha^{1,2}

¹Physiology Weihenstephan, Technische Universität München, Germany

²Faculty of Agriculture and Veterinary, University of Prishtina, Kosovo

INTRODUCTION

The essential role of endometrial prostaglandin F₂ alpha (PTGF) in induction of the corpus luteum (CL) regression (luteolysis) is well documented in the cow. However, the following regulatory cascade of functional luteolysis is still not fully elucidated. The aim of the present study was therefore to determine the regulation patterns of local luteotropic factors: progesterone (PG), progesterone receptor (PGR), oxytocin (OXT), insulin-like growth factor 1 (IGF1) and insulin-like growth factor binding protein 1 (IGFBP1) during functional luteolysis (first 12h after PTGF injection) in time-defined CL classes.

MATERIAL AND METHODS

Cows (n=4-5 per group) in the mid-luteal phase (days 8-12) were injected with the PTGF-analogue (cloprostenol) and CLs were collected by transvaginal ovariectomy at 0h, 0.5h, 2h, 4h, 12, 24h, 48h and 64h after PTGF injection. The mRNA expression was analyzed by a quantitative real-time PCR (Rotor-Gene 3000), and the protein concentration was evaluated by enzyme immunoassay (EIA) or radio immunoassay (RIA). We characterized in our study the mRNA patterns of PGR, IGF-1, IGFBP-1, and protein concentration of PGR, OXT and IGF-1.

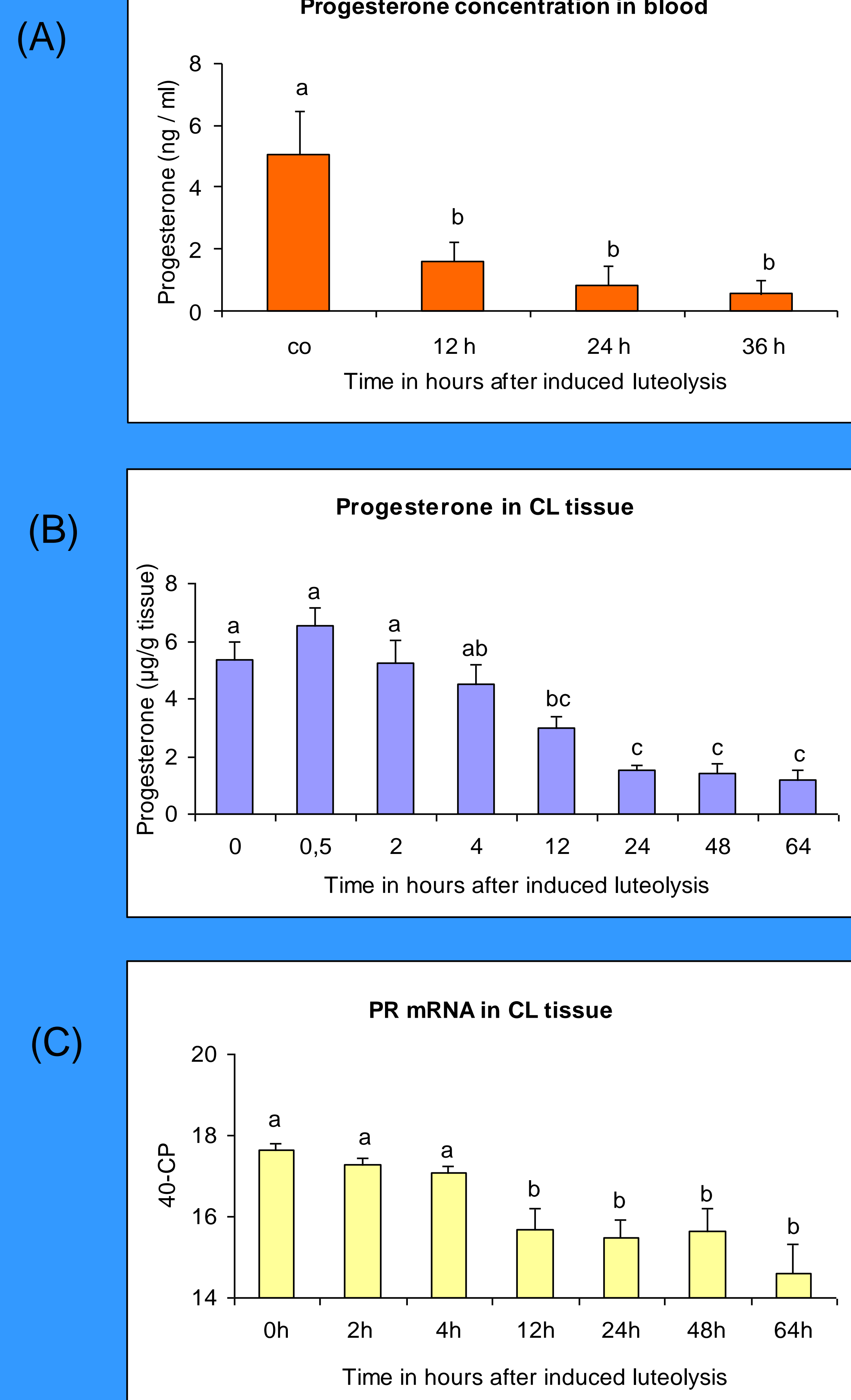


Figure 1. Protein concentration of (A) progesterone in blood plasma, (B) progesterone in CL tissue and (C) PR mRNA in CL tissue after PTGF induced luteolysis in cow (n=5-12 animals per group). Different superscripts denote statistically different values (P<0.05).

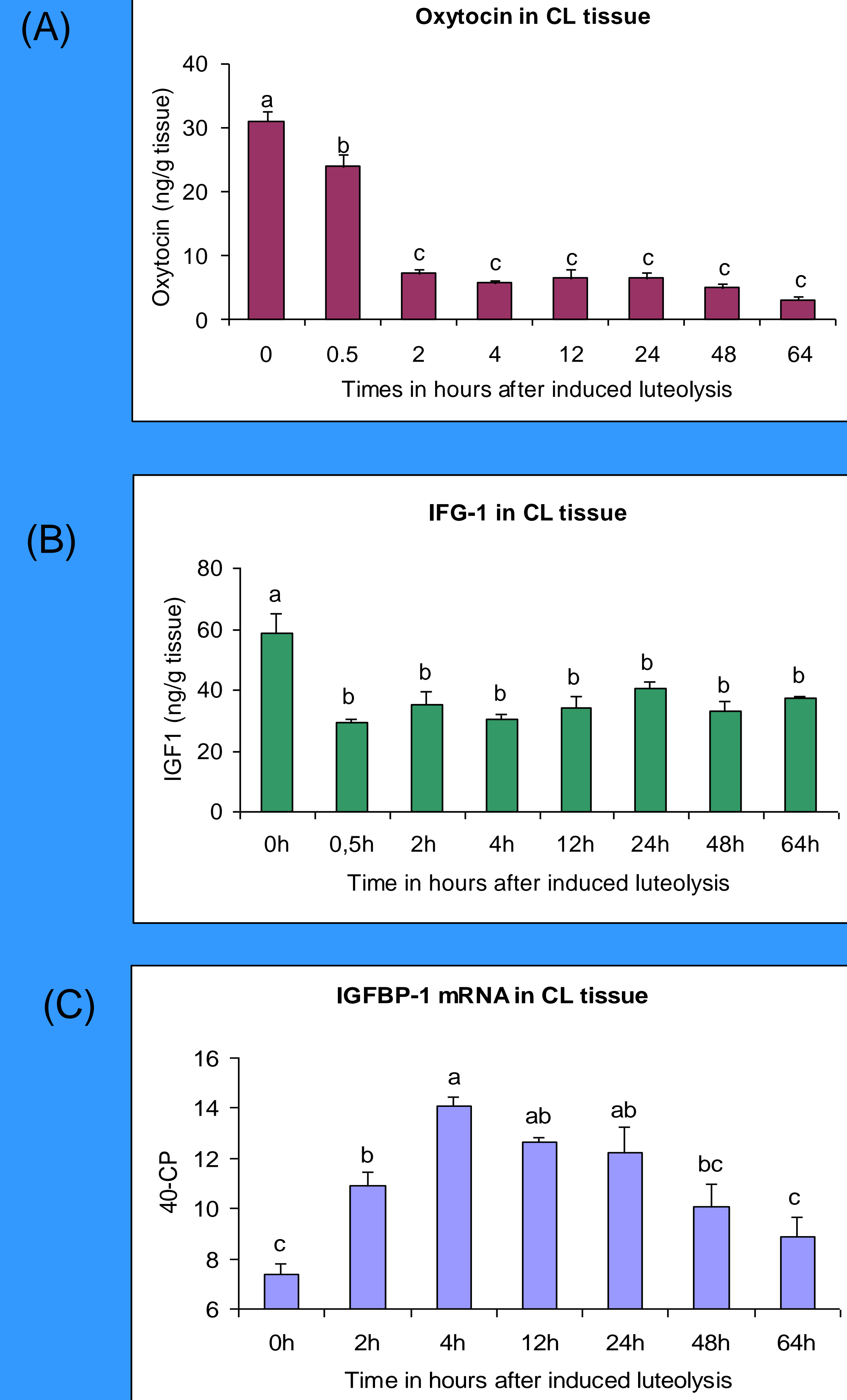


Figure 2. Protein concentration of (A) oxytocin, (B) IGF-1 in CL tissue and (C) IGFBP-1 mRNA in CL tissue after PTGF induced luteolysis in cow (n=5-12 animals per group). Different superscripts denote statistically different values (P<0.05).

RESULTS AND DISCUSSION

Progesterone concentration in blood serum and in CL tissue as well as mRNA expression of progesterone receptor in CL tissue were significantly downregulated at 12h after PTGF (Fig. 1). Oxytocin and IGF-1 peptide concentrations rapidly declined after 0.5 h and remained at low level afterwards. The IGF binding protein-1 (IGFBP-1) mRNA was strongly upregulated with the maximal level at 4 h after PTGF (Fig. 2). This may cause further reduction of bioactive free IGF-1 in tissue. The VEGF protein decreased also at 0.5 h, with a synchronous acute and temporal increase of ANPT-2 peptide concentrations (0.5 h and 2 h after PTGF, data not shown). The results suggest that the acute decrease of the local luteotropic factors (progesterone, oxytocin, IGF1) and of the angiogenic factor VEGF may play a key role during the early step of functional luteolysis.