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How to cite:

Pemberton, R.M.; Hart, J.P.; Pickard, Amanda; Velasco-Garcia, M.N. and Mottram, T.T. (2002). Studies towards automated ovulation prediction in the pig industry: an electrochemical immunosensor for oestradiol in saliva [poster presentation]. In: 7th World Congress on Biosensors, 15-17 May 2002, Kyoto, Japan.

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Studies Towards Automated Ovulation Prediction in the Pig Industry: An Electrochemical Immunosensor for Oestradiol in Saliva.

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Accurate ovulation prediction in pigs could lead to considerable reduction in losses incurred through failed artificial insemination, poorly controlled litter sizes and unnecessary culling of inaccurately diagnosed "barren" sows. The aim of this work is to predict the onset of oestrus in pigs by monitoring oestradiol levels in saliva. An automated method is proposed, for use outside the laboratory, based on single-use screen-printed electrochemical immunosensors. This approach follows on from previous work by the same authors towards an automated electrochemical progesterone monitor (Refs 1, 2). This paper will describe the preparation of oestradiol sensors by the immobilisation of monoclonal antibody onto the carbon electrode surface. Use of the sensors will be described in a competitive immunoassay format, where oestradiol (in buffer or saliva) competes against alkaline-phosphatase-labelled antigen for surface binding. Introduction of the enzyme substrate 1-naphthyl phosphate results in hydrolysis to produce the electrochemically active product, 1-naphthol. Electrochemical oxidation of 1-naphthol, measured amperometrically at an applied potential of +300mV vs Ag/AgCl, produces a current response which can be used to quantify the oestradiol by use of a calibration plot. The approach used to obtain saliva samples and to achieve an automated system capable of measuring down to picogram/ml levels of oestradiol will be discussed.

Keywords: oestradiol, screen-printed carbon electrode, immunosensor, pigs.

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