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UTERINE MYOELECTRICAL ACTIVITY IN THE PERIPARTAL EWE

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Studies on the myoelectrical activity of the gastrointestinal smooth muscle have contributed significantly to our understanding of the physiological factors governing motility and the rate of passage of digesta under various nutritional conditions (Bueno *et al.*, 1975; Ruckebusch, 1970). On the other hand, myometrial activity has been studied largely as a function of changes in uterine pressure and blood hormone concentration as related to the onset of parturition (Rawlings and Ward, 1978). Recently electromyographic activity of the uterus at different stages of the oestrous cycle has been studied by implanting electrodes on the uterine wall (Ruckebusch and Bayard, 1975; Naaktgeboren *et al.*, 1973). No information is available on uterine myoelectrical activity during the parturient period when the uterus is subject to the action of several hormones. This study was undertaken to record the electrical and mechanical activities of the ovine uterus in the peripartal period.

Material and Methods

Seven Dorset ewes with synchronized oestrous cycles were bred and used in these experiments. The feed consisted of 1300 g of cubed alfalfa hay per head per day. At 110-125 days of pregnancy, anaesthesia was induced in the ewes by intravenous administration of thiopental sodium and maintained with halothane. The uterus was exposed through midline laparotomy and paired electrodes (platinum or nichrome; diameter, 250μM; length, 10-15 mm; inter-tip distance, 3 mm) were inserted through the serosa of the myometrium at the uterotubular junction and/or on the body near the bifurcation. The electrode leads were connected to a Grass (Model 7P) polygraph multichannel recorder at a chart speed of 25 mm/minute. Simultaneously uterine pressure changes were monitored by introducing open ended tygon tubes into the amniotic cavity and connecting them through a Statham P25 pressure transducer to the polygraph. Bipolar electromyograms and intrauterine pressure changes were recorded daily until 2-5 days post-partum.

Results

Basically 3 kinds of myoelectrical activities were observed in this study. Trains of action potential were predominant during late gestation (fig. 1). They were usually of low amplitude and exhibited either a diffuse or regular rhythmic pattern. The interval between them gradually decreased as gestation progressed. Spike bursts exhibiting

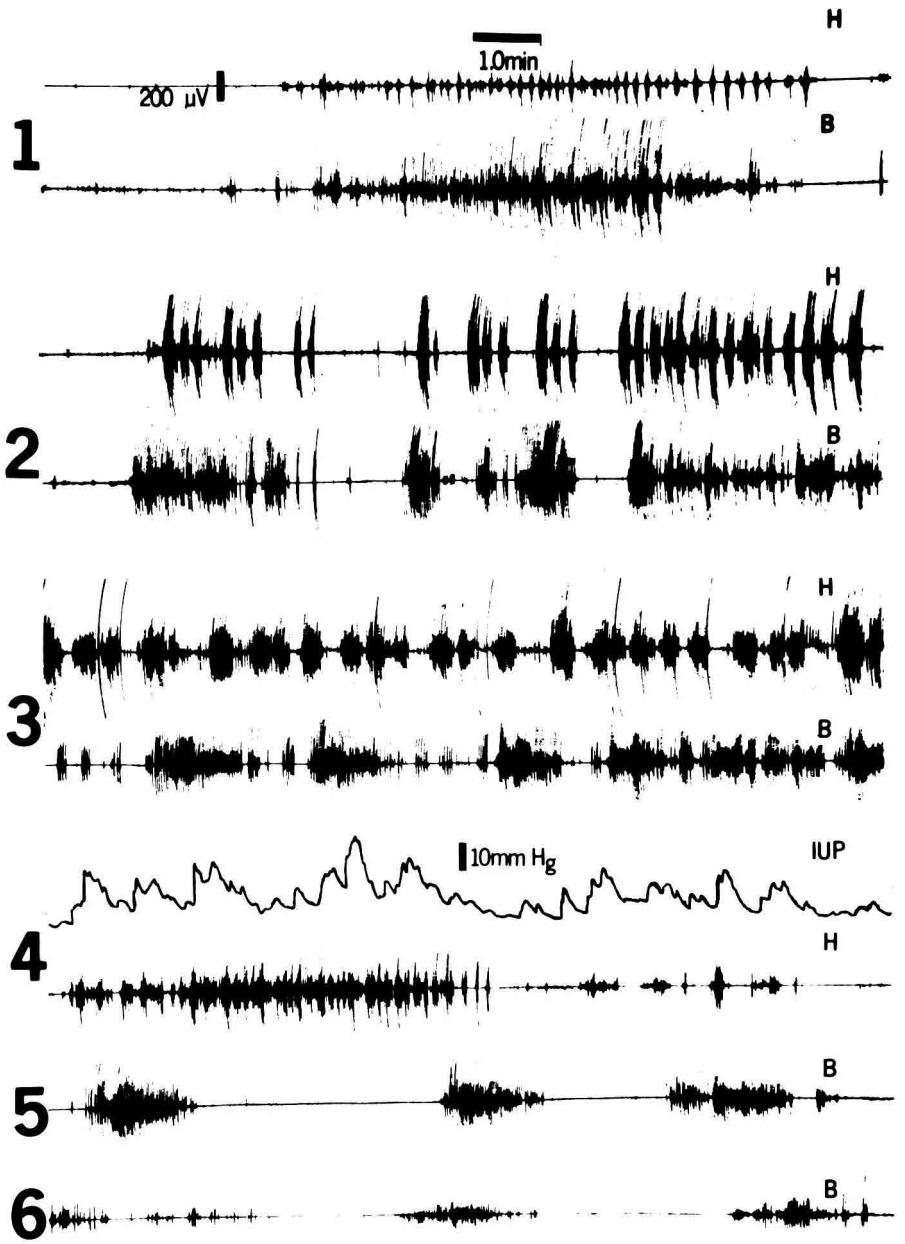

Fig. 1. — Trains of action potential, 2 days prepartum (H = horn; B = body).
Fig. 2. — Spike bursts, 2 hours prior to parturition.
Fig. 3. — Combination of trains and spike bursts during labour.
Fig. 4. — Relationship between electrical activity and uterine pressure change.
Fig. 5. — Combined trains of potential and spike bursts, 2 hours post-partum.
Fig. 6. — Electromyogram, 3 days post-partum.

regular or irregular rhythmic patterns were noticed just prior to parturition (fig. 2). The frequency of these spike bursts increased as parturition approached. During labour a third kind of myoelectrical activity was observed which consisted of a combination of trains of action potentials and spike bursts lasting for 2-10 minutes (fig. 3). The duration, frequency and amplitude of these activities were markedly higher during this period indicating that they represent the integrated contractions of the entire myometrium.

The relationship between the electrical activities and uterine pressure changes is depicted in fig. 4. Immediately following parturition the prolonged phases of trains and spike bursts decreased in amplitude (fig. 5) but the activities continued for 3-5 days. A recording at 3 days post-partum is shown in fig. 6.

Conclusions

Electromyographic activities of the ovine uterus before, during and after parturition are described in this paper. The technique described is suitable for recording uterine, ruminal or intestinal myoelectric activity.

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