

Lack of correlation between the electrical conductivity of milk and the blood progesterone levels in cows

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ABSTRACT

A study was conducted to investigate the possibility of measuring the electrical conductivity (EC) of cow's milk as a practical and cost-effective means of determining oestrus in cows. Prostaglandin injections were used to synchronise the oestrous cycle of 15 cows. From the onset of oestrus, milk and blood samples were collected from each cow every 2nd day over a period of 22 days. A portable, commercially available instrument was used to measure the EC of the milk. The blood progesterone levels were determined by means of an enzyme immuno-assay method. No correlation was found between the EC of milk and the blood progesterone levels of the cows tested. Electrical conductivity measurements of milk are of no value in determining the onset of oestrus in cows.

Key words: cow, electrical conductivity, milk, oestrus, progesterone.

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One of the significant reasons for reduced reproductive performance in dairy cows is a low rate of oestrus detection. If the efficacy of the method used to determine oestrus is below 50 % then the pregnancy rate decreases and the herd's productivity is also reduced. A number of methods have been developed for detecting oestrus in dairy cows, for example observation of clinical signs, teaser bulls, ultrasonography, rectal examination, evaluation of cervical mucus, measurement of electrical resistance in the vagina, monitoring of body temperature and various electronic methods to measure blood and milk progesterone and the physical activity of cattle^{2,4,5,9,13,15}.

The electrical conductivity (EC) of milk is used to screen cows for possible sub-clinical mastitis, for which a number of portable instruments are commercially available^{4,6–8}. EC is based on the concentrations of sodium and chlorides in the milk. The EC of milk can vary due to a number of factors such as nutrition, age, breed, oestrous cycle, stage of lactation and climatic conditions^{3,12,14}.

A few studies have been carried out regarding the use of EC for detecting cows in oestrus. Varying results have been reported regarding the relationship

between blood progesterone values and the EC of milk during the course of oestrous cycle^{1,10,11}.

The aim of this study was to determine the relationship between the blood progesterone and the EC of milk during the oestrous cycle of cows.

Fifteen cows between 4 and 7 years of age from the Firat University Research Farm were used in this study. The oestrous cycles were synchronised by injecting the cows with a commercial prostaglandin preparation according to manufacturer's instructions (Dinolytic, Eczacibasi, Istanbul). From the onset of oestrus, milk and blood samples were collected

Table 1: Values of blood progesterone and milk EC during the oestrous cycle.

Days	Progesterone (ng/ml)*	EC (mS/cm)*
0	0.71 ± 0.89	5.6 ± 1.4
2	0.74 ± 1.33	5.8 ± 1.4
4	0.88 ± 0.92	5.5 ± 1.1
6	1.23 ± 1.22	5.3 ± 1.1
8	1.92 ± 1.40	5.4 ± 1.0
10	2.31 ± 1.77	5.7 ± 1.2
12	2.44 ± 2.08	5.6 ± 0.9
14	2.57 ± 2.00	5.5 ± 1.0
16	2.52 ± 2.47	5.7 ± 1.1
18	1.71 ± 1.84	5.8 ± 1.0
20	1.14 ± 1.77	5.7 ± 1.1
22	0.94 ± 2.06	5.6 ± 1.1

*Values expressed as arithmetic mean ± standard deviation; n = 15 cows.

from each cow every 2nd day over a period of 22 days. The EC of the milk was determined by means of Milk Checker (Eisai, Tokyo, Japan). Using standard laboratory procedures, the serum progesterone levels were measured by means of the enzyme immuno-assay method (EIA Kit, Diagnostic System Laboratories, Texas, USA). For each test day the arithmetic mean and standard deviation was calculated for the 2 parameters measured in the case of all 15 cows (Table 1). Cows were regarded as being in oestrus when the progesterone value was below 1 ng/ml.

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