Acta vet. scand. 1987, *28*, 249–250.

Brief Communication

Whole Milk Progesterone Analysis used for Pregnancy Diagnosis in Beef Cattle

In Finland the routinely used method to determine milk progesterone level is based on whole milk analysis (Progesterone RIA-kit for Veterinary Diagnostic use, Farmos Group ltd.). The method is standardised for milk samples which are taken from the udder just after the cow has been milked. This kind of aftermilk sample contains a high percentage of fat and – as progesterone is lipidofil – also large, sexual-cycle correlated, variability in milk progesterone.

In beef cows it is practically impossible to get this type of milk samples as they are not accustomed to milking. But it does not require too much effort to take a 10 ml sample of milk from the beef cow – for example compared with taking a blood sample. The problem is how to evaluate the progesterone results.

In this investigation the progesterone results were retrospectively compared to heat observations and rectal pregnancy diagnosis. As progesterone has high affinity to fat, the fat percentage was determined for each milk sample.

The material consists of 28 milk samples which were collected from 22 pure and crossbred Hereford suckling cows for pregnancy diagnosis during an embryo transfer program.

Most samples (25/28) were taken 21–23 days after the heat which preceded the embryo transfer. The rest of the samples (3/28) were taken 5 days after a prostaglandin (Estrumate, ICI) injection.

All the cows were heat detected at 4–8 h intervals over 1–4 days after the second prostaglandin injection or PRID removal. Embryo transfer was done 7 ± 1 days after the onset of a standing heat. Most of the cows were heat detected at the same manner also on 19th–23th days after the previous heat.

The effect of pregnancy, milk fat and day (21, 22 or 23) from the previous heat on the progesterone concentration in milk was analyzed by least squares analysis (SAS).

Fat percentage was higher and more consistent than expected. Fat percentage varied from 2.4 to 5.7, mean 4.1 and SD 0.6. It seems that the fat percentage of this kind of sample represents an average taken over one 'milking'. The fat percentage did not have a significant effect on the progesterone value. There was no significant difference in progesterone value of sample taken on day 21, 22 or 23 after the onset of the standing heat.

In this material all the cows returning to heat had a progesterone value lower than or equal to 6 nmol/l (mean 3.8 and SD 1.4). The pregnant ones had a progesterone value higher than or equal to 11 nmol/l (mean 26.1 and SD 10.5). Pregnancy affected the progesterone concentration significantly ($p < 0.01$). A brief summary of the results is presented in Table 1.

Using t-distribution it can be calculated that with 99 % probability the progesterone value of cows that have returned to heat will not exceed 7 nmol/l during the period studied and with 95 % probability the progesterone value of a pregnant cow is greater than or equal to 8 nmol/l.

Table 1. Whole milk progesterone in a sample taken 21–23 days after heat from pure and crossbred suckling Hereford cows.

Milk progesterone (nmol/l)	Rectal pregnancy diagnosis	Heat observed on 21th–23th day after previous heat	No. cases	Remarks
< 6	–	yes	7	
< 6	–	no observations made	6	
> 11	–	no	1	Embryonal death? not included in the statistical analysis
> 11	+	yes	1	A pregnant cow seen on standing heat
> 11	+	no	13	

One cow did not show heat during the second observation period but was not pregnant on rectal examination. Its milk progesterone was 25 nmol/l. This cow was excluded from the statistical analysis – although it probably had been pregnant at the time of the milk sample.

This trial shows that the progesterone determination used can tell which suckler cow is pregnant (or more accurately: in luteal dominance) and which has returned to heat.

Vesa Rainio,
Department of Animal Breeding,
Agricultural Research Centre, Jokioinen, Finland.

References

Heap PB, Laing JA: Pregnancy diagnosis in cows; progress report on the use of progestagen concentration in milk. British Cattle Breeders' Club Digest 1974 (*29*) Pp. 27–29.

Laitinen J: Raportti Äpyli-projektista – Karjatalouden maidontuotannon kausivaihtelun fysiologinen tasaaminen: Maidon progesteronimääritys lehmän kiiman ja tiineyden toteamisessa. (Milk progesterone determination in diagnosing heat and pregnancy in the cow). Kuopio, Kuopion korkeakoulun fysiologian laitos 1982, 75 p.

Laitinen J, Remes E, Tenhunen M, Hänninen O, Alanko M: Lehmän kiiman varmistaminen ja tiineyden toteaminen rasvattoman ja kokomaidon progesteronimäärityksellä. (Oestrus confirmation and pregnancy diagnosis of dairy cows by defatted and whole milk progesterone assays). Suomen Eläinlääkärilehti 1982, *88,* 519–529.

(Received February 9, 1987).

Reprints may be requested from: Vesa Rainio, University of Kuopio, Veterinary Research Station, Box 6, SF-70211 Kuopio, Finland.