Acta vet. scand. 1980, *21*, 454—456.

Brief Communication

INFLUENCE OF AN ELECTRODE CHANGE ON REFERENCE VALUES FOR COW SERUM IONIZED CALCIUM

In 1978 we reported a reference range for serum ionized calcium (Ca_F) for cows (*Kvart & Larsson* 1978). Since then the sensors (electrodes) used in the Orion SS-20 have been modified, giving 0.18 mmol/l higher values for human samples (*Öhman & Larsson* 1978). As the old type of sensor is not available now, a direct comparison between Ca_F readings for cow serum between the two types of sensors is no longer possible. Instead we have established a new reference range for cow serum Ca_F. Hence serum samples were taken from 50 healthy Swedish red and white breed cows and analysed as previously described (*Kvart & Larsson*). The distribution of Ca_F values are shown in Fig. 1. The mean value was 1.16 mmol/l and the sample standard deviation 0.049 mmol/l, which gave the reference range 1.06 to 1.26

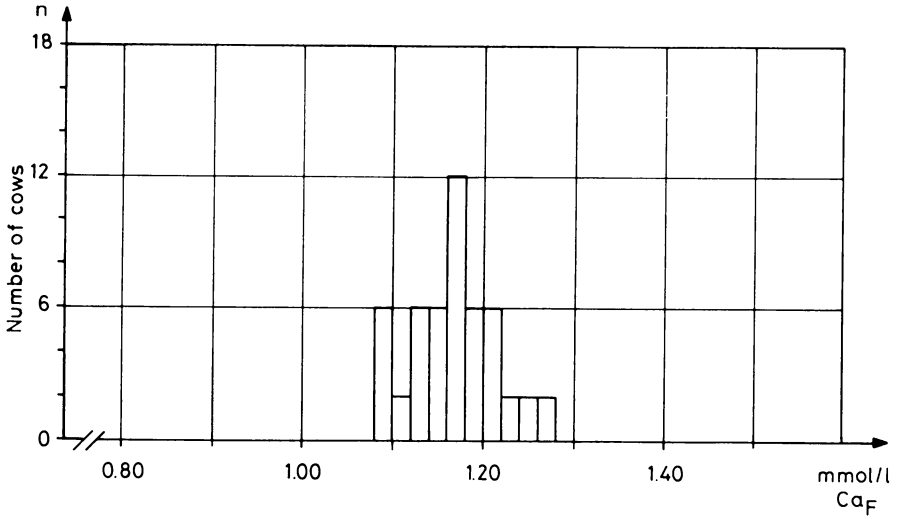

Figure 1. The distribution of serum ionized calcium concentration in 50 healthy Swedish red and white breed cows. Mean value = 1.16 mmol, standard deviation = 0.05 mmol/l.

mmol/l (mean ± 2 s). The mean value was 0.07 mmol/l higher that for the old type of sensor.

For human serum Ca_F we use the reference range 1.10 to 1.30 mmol/l. This range is until now based on 167 normal human beings, and the distribution of Ca_F is very close to Gaussian as tested with the chi-square goodness of fit method (*Larsson & Öhman* 1979) (chi-square = 4.02, d.f. = 9, P = 0.91). This means that the reference limits are very good estimators of the 2.5 and 97.5 percentiles. However, for cow serum Ca_F the distribution deviated considerably from the Gauss curve (chi-square = 19.19, d.f. = 12, P = 0.08) as tested on the 111 samples earlier reported (*Kvart & Larsson*). Testing on the present 50 samples gave similar results (chi-square = 8.46, d.f. = 6, P = 0.21).

We cannot yet explain why human serum Ca_F is normally distributed but not cow serum Ca_F. However, several factors might change the distribution of a variable as Ca_F, i.e. age, stage of lactation and feeding. Our reference cow population had a narrow age distribution, while our human reference population had a considerably wider age range. Concerning the lactation stage our reference population was selected so that it covered all stages in a way that this probably excluded possible influence on the distribution. Different types of feeding are known to influence calcium concentrations (*Jones & Luthman* 1978) and this might be of importance for the distribution. A practical consequence of our findings is that the reference limits are less well established for cows than for humans.

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REFERENCES

Jones, B. & J. Luthman: Feeding-induced hypocalcemia. Studies on the uptake of ^{47}Ca from the gastrointestinal tract of sheep. Acta vet. scand. 1978, *19*, 204—214.

Kvart, C. & L. Larsson: Studies on ionized calcium in serum and plasma from normal cows. Its relation to total serum calcium and the effects of sample storing. Acta vet. scand. 1978, *19*, 487—496.

Larsson, L. & S. Öhman: Serum calcium ion activity. Some aspects on methodological differences and intraindividual variation. Clin. Biochem. 1979, *12*, 138—141.

Öhman, S. & L. Larsson: Higher values for ionized calcium with a new type of electrode for Orion SS-20. Clin. Chem. 1978, *24*, 2070—2071.

(Received August 11, 1980).

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