

Post insemination milk progesterone concentration and embryo survival in dairy cows

A.J.H. Stronge^{1,2}, D.G. Morris¹, M.G. Diskin¹, D.A. Kenny² and J.M. Sreenan¹
Teagasc Research Centre, Athenry, Co. Galway, Ireland. ²Faculty of Agriculture, University College Dublin, Belfield, Dublin 4, Ireland

Introduction

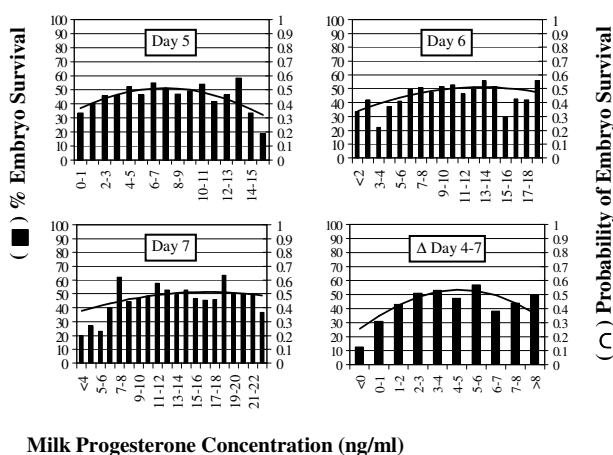
There is increasing evidence of an association between the systemic concentration of progesterone and embryo survival but not all studies are in agreement on the timing of this association. The objectives of the present study were to establish, in spring calving dairy cows, the relationships between the concentration of milk progesterone on days 4, 5, 6 and 7 post insemination and between the rate of change in the concentration of milk progesterone from days 4 to 7 inclusive and early embryo survival.

Materials and Methods

Milk samples were collected from each cow following a total of 871 inseminations to spring calving dairy cows on 6 individual farms. The day of insemination was designated as day 0 and samples were collected on days 1, 4, 5, 6 and 7 post insemination. The concentration of progesterone in each sample was measured by enzyme-immunoassay. Day 1 samples were used to confirm oestrus. Pregnancy diagnosis was carried out between day 30 and 50 post insemination by transrectal uterine ultrasonography. Logistic regression analysis was used to evaluate the relationship between the post insemination concentration of progesterone and embryo survival.

Results and Discussion

There was a negative linear association ($P < 0.01$) between the concentration of milk progesterone on day 4 post insemination and embryo survival indicating that too high a concentration of progesterone on that day is detrimental to embryo survival / conception rate.



Milk Progesterone Concentration (ng/ml)

Figure 1. Frequency distribution and logistic regression curve of the relationship between milk progesterone concentration on days 5, 6 and 7, respectively, and between the rate of change in progesterone concentration between days 4-7 inclusive and embryo survival.

The association between progesterone concentration and embryo survival rate for days 5, 6 and 7 and the change in concentration between days 4 to 7 is shown in Fig 1. There was a positive linear and quadratic relationship ($P < 0.05$) between milk progesterone concentration on days 5, 6 and 7 and between the rate of change in progesterone concentration between days 4-7 inclusive and embryo survival rate. This indicates that there is an optimum concentration of progesterone above or below which embryo survival / conception rate is reduced.

A retrospective analysis of the data showed that a high proportion of the dairy cows had concentrations of progesterone on days 5 to 7 post AI that were sub-optimal for high embryo survival /conception rate and these are presented in Fig 2.

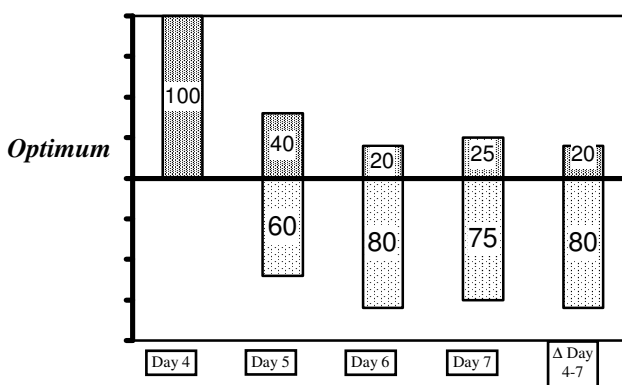


Figure 2. Proportions of cows with concentrations of progesterone greater than or less than the optimum value consistent with maximum embryo survival rate.

Conclusions

High concentrations of progesterone on day 4 after AI appear detrimental to embryo survival rate. There were significant linear and quadratic relationships between progesterone on days 4 and 7 post insemination and subsequent embryo survival rate. An optimum range in progesterone concentration within which embryo survival was maximised was evident on days 5, 6 and 7. Concentrations above and below these ranges appear detrimental to embryo survival. Furthermore, progesterone insufficiency rather than excess appear to be the main problem on these days. From the current study it would appear that between 60 and 80% of dairy cows have too low a concentration of progesterone on days 5-7 after AI that compromises conception rate.

Acknowledgements

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