

An investigation on the effect of management factors and contemporary group definition on the genetic evaluation of Calving Interval in British Limousin cattle

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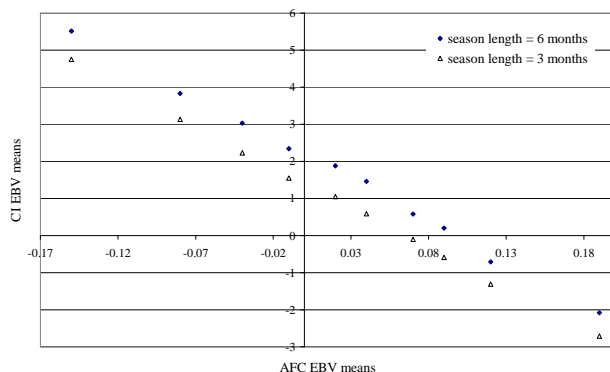
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Introduction Female fertility is an important component of a beef production system. In the British Limousin genetic evaluation there are several female fertility traits recorded (Coffey *et al.* 2007). Two of these traits are calving interval (CI) and age at first calf (AFC). In British beef breeds, Roughsedge *et al.* (2005) estimated moderate negative genetic correlations between CI and AFC; early maturing animals (low AFC) had longer CI because of genetic factors. However, it has also been suggested that management factors could be increasing the CI EBV of early maturing animals. For example, does the CI EBV account for heifer's that calve early for the first calf, but then are not given the opportunity to re-mate when they first return to oestrus, and therefore, may have a longer raw CI record. There were two aims of this work 1) to investigate if CI EBVs produced by the British Limousin genetic evaluation were affected by management decisions applied to early maturing animals (i.e. low AFC) and 2) to assess if reducing the season slice (i.e. reducing the chance of directly comparing early and late calvers) for the CI contemporary group (CG) improved the CI model.

Materials and methods CI was defined as the number of days between a heifers first and second recorded calf. EBVs were produced using the software Mix99 (Lidauer and Strandén, 1999) that is based on Best Linear Unbiased Prediction. The model consisted of the CG, birth month of the first calf and the Limousin breed proportion as fixed effects, the linear and quadratic effect of the raw AFC and the heifer fitted as a random effect. The CI CG was defined by the herd, year and season of the first calf's birth, with season being a six month time period. CI records were considered to be invalid if the CI interval was less than 290 days or greater than 630 days, or if the animal was in a single record CI CG. In this study two models were considered. The first is described above and was used for the Limousin British genetic evaluation. The second model was the same as the first, except that the season slice in the CG was reduced from six to three months.

Results Decreasing the CI CG season slice to three months reduced the number of animals per CG from three to two, and increased the number of single record CGs. This meant that the number of animals with CI information differed between the models. There were 23 073 and 19 814 animals with valid CI and AFC records when the season slice was six and three months, respectively. In both data sets, the heifers average raw AFC was 992 days (range=548 to 1278 days) and the raw CI records were similar at 403 and 401 days, respectively when the season slice was six and three months.



AFC EBVs.

When the top and bottom 10% of animals based on the raw AFC were compared, a difference of 2.12 days ($P < 0.01$) and 4 days ($p = 0.04$) was observed for the CI EBV and raw value, respectively. These differences were not unexpected given the moderate negative genetic correlation. However, the difference in the raw CI was not large enough to suggest that early calvers across the population were being penalised by management decisions - such as delayed re-mating - that may affect CI.

It can be seen in Figure 1 that reducing the season slice did reduce the CI EBVs. However, this reduction was uniform across the population and there was no relationship with the

Figure 1 The relationship between calving interval (CI) and age at first calf (AFC) EBVs when season length in the CI contemporary group definition varied. Data points represent 10 percent of the population ranked on the AFC EBV

Conclusions These results suggest that across the British Limousin cattle population, any bias against early maturing heifers from management decisions did not adversely affect the CI EBVs. Within individual herds and CG, there may be bias against early calvers. However, with limited information recorded it is difficult to identify these CG and account for differences in mating appropriately. With the small CG sizes despite a broad CG definition, this study highlighted the small amount of information available for maternal traits. As more information is recorded, reducing the length of the season slice may improve the CI EBVs but in this study, reducing the season length did not appear to improve the CI EBVs.

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