CALVING DIFFICULTY IN RUBIA GALLEGÁ BREED AND ITS GENETIC IMPROVEMENT

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SUMMARY

Principal causes and their correlationated consequences of calving difficulties in Rubia Gallegá beef cattle breed are commented.

Present status of selection objectives and the criteria used are presented, as well as some problems related to the current selection index.

Finally, restriction of birth weight as a solution is criticized and some sire evaluation alternatives are cited.

CAUSES AND CONSEQUENCES OF CALVING DIFFICULTIES

A review was recently carried out by Meijering (1984). The principal cause of calving difficulty is a foeto-maternal incompatibility, that means that the size of the foetus is excessively big in relation to the maternal pelvic canal at the end of gestation.

The calves' size and the measurements related to maternal pelvic canal evolution in Rubia Gallegá are presented in table 1. The high increase of birth weight from 60's to 80's is evident, although iliac and coxo-femoral width do not increase. This evolution tends to increase the probability of foetus-maternal incompatibility.

The relationship between calving ease and dam size is low, as Meijering and Postma (1984) showed, and the birth weight can explain 40-50 per cent of variability in calving difficulty and pelvic opening explains about 10 per cent (Menissier et al., 1981).

The increase of calving difficulties in Rubia Gallegá (Sanchez, personal communication) has induced drastic changes in management.
as consequence of high attention needed on date of birth. An economic reduction of incomes is another consequence because of the following causes:
- increase of veterinary assistance costs: caesarean, forced extraction that lead to a low fertility in the following gestation.
- increase of neonatal mortality. Although management change and veterinary assistance represent a high cost, the calf price can compensate. But a high incidence of neonatal mortality would eliminate this theoretic advantage.
- reproductive problems: increase of calving interval as consequence of: decrease of fertility after forced extraction or caesarean and; longer anoestrus post-calving.

PRESENT STATUS AND OBJETIVES OF SELECTION

The Rubia Gallega breed is considered by the Ministery of Agriculture as a paternal breed in the specialised line aspects. The election of the sires has been for 15 years, carried out in such a way that the increase in body size, in an alometric sens, does not suppose an increase in tranversal measures, pelvic width principally (table 1).

On the other hand, a selection index has been used for 8 years to rank sires in testing stations, based on individual performance and which includes the following variables in the selection objectives: yearling weight, average daily gain, food conversion rate (kg. of concentrate/kg. live weight) (Ministerio de Agricultura, 1981). This selection index leads to a correlated increase in birth weight mantaining it at a high average (Cañon and Dunner, 1985).

The bulls of this breed are frequently mated with dams of others breeds, Holstein-Friesian principally, to obtain a calf with a higher economic value for meat production. Although the calving difficulty is more frequent when sires mate into Rubia Gallega breed, mating with Holstein-Friesian dams still means a higher cost as if using Friesian sires, even with the good calving ability of Holstein-Friesian dams.

To get the metioned objective we can consider different selection criteria (Dickerson et al., 1974).
Calving difficulty or calving ease classified in few categories of responses (4) to which we assign a score or not using an objective procedure (Gianola and Norton, 1981; Tong, Wilton and Schaeffer, 1977; Schaeffer and Wilton, 1977) or not (Berger and Freeman, 1978; Burfening et al., 1979; Pollak and Freeman, 1976; Tong, Wilton and Schaeffer, 1976; Schaeffer and Wilton, 1976). As categorical traits, calving ease or calving difficulty is dependent on frequency heritability with low values between 0.1 and 0.15 (Philipsson, 1976; Pollak and Freeman, 1976). These traits have been used frequently as criteria to increase calving ability and to rank sires in high or low-risk categories (Berger and Freeman, 1978; Schaeffer and Wilton, 1976).

Other traits have been considered to try to improve calving ease as, e.g., gestation length, but due to its low correlation with calving difficulty and the risk that its modification from fixed level would have an incidence on livability of calves, in spite of its moderate heritability (Burfening et al., 1981), its use is not recommended (Foulley and Menissier, 1982).

Calf birth weight appears in that way as a criterium for calving ease by indirect selection because of its moderately high heritability, 0.2-0.45 (as a calf and as a sire’s trait) (Philipsson, 1976; Philipsson et al., 1978) and, because, on the other hand, the genetic correlation of birth weight with calving difficulty is > 0.9 (Philipsson, 1976; Burfening et al., 1981).

PROBLEMS ON CURRENT SELECTION INDEX

The sire selection procedure in Rubia Gallega, is based, at the present, on a selection index as we mentioned before, and some problems related with its construction have been discussed by Cañon and Dunner (1985). The two principal problems are the following: the parameters used to calculate the regression coefficients can be far from true values and are out of the parameter space and the correlation between the index and birth weight leads to a correlated increase of this trait.

THE RESTRICTION OF BIRTH WEIGHT AS A SOLUTION

The use of restricion procedures in livestock has been frequent
since Kempthorne and Nordskog (1959) gave the methodology to restrict the genetic change of a trait.

The principal problem in using restriction procedures is the reduction of genetic gain for the other traits in the index. This reduction of genetic gain can be drastic and it will be necessary to evaluate carefully the rate benefit/cost obtained when restriction is applied.

Cañon and Dunner (1985) studied the effect of total restriction on birth weight considering two cases: birth weight is not included in the index and; birth weight is included as a variable in the index. We did not take account of intermediate restriction because of the high mean of birth weight up to 50 kg. Our principal conclusions concerning restriction of birth weight was: a drastic reduction in genetic gain, nearly 70% when BW is not included and; 30% when BW is included (table 2).

These conclusions lead us to study different sire evaluation alternatives:
- to evaluate the sires by their progeny with adequate number of descendants,
- to construct a selection index combining birth weight and commercial weights (Persson, 1978),
- to consider different stages of selection with different information sources for selection indexes and computing the weights using Niebel's multiple restricted index procedures (Niebel, 1979; Niebel and Van Vleck, 1982, 1983).

These alternatives are not necessarily independent nor exclusive.

REFERENCES


Table 1. Evolution of birth weight and two body measurements.

<table>
<thead>
<tr>
<th></th>
<th>1960</th>
<th>1970</th>
<th>1980</th>
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<tbody>
<tr>
<td>Birth weight</td>
<td>36.5 (1.7)</td>
<td>43.07 (0.94)</td>
<td>54.6 (0.92)</td>
</tr>
<tr>
<td>Iliac width (dams)</td>
<td>53.6 (0.29)</td>
<td>53.1 (0.17)</td>
<td>53.6 (0.40)</td>
</tr>
<tr>
<td>Coxo-femoral width (dams)</td>
<td>49.1 (0.29)</td>
<td>49.5 (0.17)</td>
<td>50.9 (0.42)</td>
</tr>
</tbody>
</table>

de la Fuente et al. (1985).
( ) Standard Error.

Table 2. Weighting factors and expected genetic gains for unrestricted and completely restricted indexes in case 1 (BW not included in index) and case 2 (BW is included in index).

<table>
<thead>
<tr>
<th>Trait</th>
<th>Unrestricted</th>
<th>Restricted</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Weight, Factor</td>
<td>Expect, gain*</td>
</tr>
<tr>
<td></td>
<td>1  2  1  2</td>
<td></td>
</tr>
<tr>
<td>YW</td>
<td>1.7 1.6 5.0 5.1</td>
<td>-0.49 0.94 -1.4 2.95</td>
</tr>
<tr>
<td>ADG</td>
<td>0.8 0.76 8.9 9.1</td>
<td>0.15 0.60 3.4 6.50</td>
</tr>
<tr>
<td>CR</td>
<td>-4.1 -6.9 -1.9 -1.9</td>
<td>-26.30 -7.71 -8.7 -2.90</td>
</tr>
<tr>
<td>BW</td>
<td>--- 8.2 2.2** 2.7</td>
<td>152.4***-20.03 0.0 0.00</td>
</tr>
<tr>
<td>Dummy</td>
<td>71.45***</td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>0.77 0.78</td>
<td>0.22 0.54</td>
</tr>
</tbody>
</table>

* expressed as percent of the mean
** is the correlationated expected genetic gain as percent of mean
*** is the weighting factor of dummy variable
r is the correlation coefficient between index and breeding objective