THE NELORE CATTLE BREEDING PROGRAM : GENERAL ASPECTS

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INTRODUCTION

The Nelore Cattle Breeding Program (NCBP) was settled around 1988 when some Nelore beef farmers requested the Head of the Animal Breeding Group of the Department of Genetics of FMRP-USP to design a breeding program to improve fertility and growth rate of their herds. According to the circumstances, operational feasibility and expectations of farmers, it was designed a genetic evaluation program for weight and fertility traits (based on weights and scrotal circumference measures at standard ages). In addition to the annual genetic evaluation and release of the results in the form of an animal summary, the database of the program has been used for the development of several MSc and PhD theses and studies of interest of the program. The main research topics are listed furthermore.

Brazil is a country of continental dimension with 8,500,000 km² with a cattle herd (beef, dairy and double purpose) of 156,986,365 heads, with an annual off take rate of 21% and a projected meat production of 7,3422,00 ton in 2000 (Anualpec, 2000). From the total herd, 72% are Zebu and crossbreeds (Zebu x European). Among the Zebu breeds, the Nelore has become the main beef breed in the last decades in Brazil due its adaptation capacity under extensive grazing systems and different production circumstances.

At present, there are 7 breeding programs involving this breed in Brazil, most of them resulting from the interest of groups of farmers on the technical support from Research Institutions in terms of breeding to their herds. Most of programs interact among themselves in order to standardize as much as possible evaluations and to increase the database. According to Rosa (1999), 1,272 herds were involved in genetic evaluations of these programs in 1998 (12,674 sires, 378,418 dams, 987,472 products were evaluated and 1,118,153 animals were in the relationship matrix).

MATERIALS AND METHODS

Program Description. As a routine, 4 weightings are recorded per year, January, April (beginning of dry season) ; July (beginning of calving season and very dry) and October (beginning of rainy season). All young animals (males and females), with ages between 0 and 18 months are weighted. The mothers are also weighted around weaning. From these weights, the program calculates the standardized weights at 120, 365 and 450 days. The weaned males with age up to 18 months have the scrotal circumferences measured as well and these measures are also standardized for 365 and 450 days. The participant farmers receive periodically reports on the performance of their herds and once a year they receive special reports with details and comments on the genetic evaluation, the situation of each herd.
compared to the whole population involved in the program, the evolution of EPDs for each trait (expected progeny differences, given by half of the breeding value), as well as other useful information to aid management and breeding decisions.

The genetic evaluation is carried out using an animal model with a two-trait analyses including the trait under evaluation and W120. This practice may provide some information on selection based on animal own performance and so it can avoid bias in genetic evaluation due to selection. Contemporary groups are based on sex, herd-year-season and management/feeding system (FS): FS1=extensive; FS2=extensive plus supply during dry season; FS3=feedlot.

The program use a index, called Total Genetic Merit (TGM), which is obtained as 0.15 for EPDW120M; 0.20 for EPDW120; 0.20 for EPDW365; 0.20 for EPDW450; 0.125 for EPDSC365 and 0.125 for EPDSC450.

Management. As most of Zebu production systems in Brazil (extensive grazing systems) the farms participating of NCBP keep their animals on pastures the whole year. Depending on the necessity, some roughage or concentrate supplementation is provided during the very dry months. The animals are split in categories for management purposes.

Males and females start reproduction around 24 months. Average age at first calving is 40 months (CV=15%). 90% of farms adopt breeding seasons for reproduction (3 months, on average), usually during the rainy season (October-March). During this period, cows kept in groups, in a proportion of 30-50 for each bull (natural service). 60% of farms use AI. The average percentage of AI use is 70% within herds. The average conception rate is around 80%. The calves are kept on pastures with their mothers and are weaned around 7-8 months of age. For the purpose of contemporary grouping for the genetic evaluation, the animals are classified according to 3 feeding systems (FS): FS1=exclusively extensive grazing (94% of animals); FS2=extensive grazing with any sort of supplementation (5% of animals) and FS3=feedlots (2% of animals).

RESULTS AND DISCUSSION

Programmed Reproduction. The programmed reproduction (PR) consists in the planned use of young bulls selected on the basis of EPDs (expected progeny differences, given by half of the breeding value) obtained from their relative's information (no progeny information), with the aim of improving the connectability between herds and contemporary groups, as well to increase the average accuracy of all animals in the evaluation and to reduce generation interval.

Candidate animals belong to the participants of NCBP. For PR 2001/02, the following criteria are used to define which animals will be submitted to the fertility and visual evaluation: age between 12 and 30 months, animals with weight information at 120 and 365 days; animals with TGM >1.11; animals with EPDW120M and SC365 >0, and minimum accuracy for EPDW365 > 0.70. Around the age of 18-21 months the pre-selected animals are submitted to fertility and visual evaluation. The selected animals are send to AI Centers where 300 doses of semen of each animal are collected. The semen is distributed over the farms in such way that each farm
receives 30 doses of at least 6 animals and each animal will be tested in at least 3 farms. A percentage (10%) of cows of the participating herds is supposed to be inseminated with semen of PR young bulls. From 23,265 males born in 1999, 594 were pre-selected and out of this, 30 animals will be tested in 2001/02.

At the end of the first round of evaluation, 1000 doses of semen will be destined to the NCBP and 50% of it will be used in commercial herds for carcass traits evaluation.

Towards Safe Food. NCBP will be significantly improved with the inclusion of new disciplines, in its content, as the introduction of techniques for Sustainable Agriculture Development and the Traceability Process (the capability of tracing back the animals of the program). Traceability is used to be defined as the capability to find (trace back) the historical of the use or location of a product through registered identification.

In fact, this system must assist every element, in every step of the traceability process, integrating in real-time, breeders, slaughterhouses, controllers, supermarkets and end users. Project BrastrO has developed a prototype to exercise traceability techniques. This prototype will be used as base to the NCBP traceability design.

Year 2001 Summary. Table 1 shows the genetic change of evaluated traits, for maternal and direct effects. The genetic trend was expressed as the average of genetic values per birth year of animals. These genetic trends show the increase in the values for the traits under evaluation between 1994 and 2000. From the 147 herds in evaluation, only 98 presented information in the period analyzed. From these, 76 (77%) showed positive genetic trend in the last 7 years. Although small, these genetic changes are relevant for most of traits, taking into account that NCBP is in a expanding process (170 herds at the moment).

Table 1. Genetic gain of evaluated traits, for maternal and direct effects

<table>
<thead>
<tr>
<th>Trait (a)</th>
<th>1994</th>
<th>2000</th>
<th>Total Change</th>
<th>Rate</th>
<th>% (b)</th>
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<tbody>
<tr>
<td>W120M</td>
<td>0.27</td>
<td>0.48</td>
<td>0.21</td>
<td>0.034</td>
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<td>W120D</td>
<td>1.02</td>
<td>2.20</td>
<td>1.18</td>
<td>0.197</td>
<td>0.16</td>
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<td>W365</td>
<td>2.35</td>
<td>5.43</td>
<td>3.08</td>
<td>5.140</td>
<td>0.22</td>
</tr>
<tr>
<td>W450</td>
<td>2.28</td>
<td>5.61</td>
<td>3.34</td>
<td>0.556</td>
<td>0.21</td>
</tr>
<tr>
<td>SC365</td>
<td>0.04</td>
<td>0.08</td>
<td>0.05</td>
<td>0.008</td>
<td>0.04</td>
</tr>
<tr>
<td>SC450</td>
<td>-0.10</td>
<td>-0.03</td>
<td>0.08</td>
<td>0.013</td>
<td>0.06</td>
</tr>
</tbody>
</table>

a) Weights in kg ; SC in cm and TGM in units of genetic standard deviation ; b) percentage of the average of each trait

Market, Products, Prices and Costs. Commercial herds not always keep the animals until slaughter. They can be only "raisers" and sell the animals around 12 months of age (average price : US$ 121.30) to "intermediate" farmers who buy these animals and keep them for another year to sell them as "thin steers" (average price: US$ 178.15) to "fattener" farmers who buys the "thin steers" and keep them up to slaughter ("fat steers", average price: US$ 275.40).
Of course "raisers" and "intermediate" can keep animals until slaughter, depends on they way the farms are organized, the availability of feed resources (pastures), prices, etc.

In average animals are slaughtered at 30-36 months, around 450 kg and with an average dressing percentage of 54%. There are no payment for carcass quality yet. However, there are some Governmental programs which stimulate farmers to improve precocity. According to the number of teeth and to the carcass weight they have a reduction in taxes. The costs to produce 1 kg of meat under a extensive system with Nelore cattle vary from US$ 0.78 to US$ 1.00, according to the size of herd and category of animal commercialized (yearling calves, thin steers, fat steers). The average price paid by 1 kg of meat is US$ 1.13, so the margin ranges from 13% to 45% (ANUALPEC, 2000).

The economic return or benefit of participating in the program comes from the selling of animals and semen. Paneto et al. (2000) analyzed the effect of the EPD for the weight at 550 days (W550) on the price of animals in auctions from 5 farms participating in NCBP. Information on EPDs of animals were provided during the auction. The authors found that for each kg of EPD W550 it was expected an increase of US$ 48.50 (R$ 88.00).

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REFERENCES