INTRODUCTION

In recent years the increased exchange of genetic material among countries strengthened the competition among artificial insemination studs and stressed the role of selection schemes. Selection decisions in dairy cattle have been mostly based on estimates of animal breeding values for production traits, because of their relevance for the economics of production. However, the interest for inclusion of functional traits in selection schemes for dairy cattle has gradually increased (Strandberg et al., 1996). The term “functional traits” recognizes traits, such as health, fertility and body condition score, useful for increasing economic efficiency through a reduction of producing costs. Moreover, concern of consumers for animal welfare and safety of animal products stresses the importance for increasing health status of dairy cattle, thus reducing suffering of animals for diseases and disorders. The importance of functional traits in breeding schemes for dairy cattle has been a matter of discussion in many countries (Torstein and Sehested, 1999). This paper aimed to describe the Superbrown project, a new breeding program currently running for selection of Italian Brown cattle reared in alpine areas of Italy.

PROCEDURES

The Superbrown consortium was established by the Federation of Italian Brown breeders of Trento and Bolzano-Bozen, was joined by 4.500 dairy farmers with a total of about 60.000 animals and 40.000 dairy cows registered in the herdbook. Yearly, at least 40 bulls are progeny tested and currently 185 bulls (74 still alive) are waiting for genetic evaluation. The progeny testing program enrolls herds within and outside Italy.

The breeding program. The milestones of the current project are to maximize the profit of farmers in mountain area and to increase the competitiveness of genetic material produced within the scheme. This project pays particular attention to animal welfare and to the opportunity of supporting consumer acceptance of animal products, focussing on a system aimed to produce “healthy food from healthy animals well integrated within the mountain area”. The scheme is based mainly on the reduction of the generation interval of sire and dam of bulls and of sire of cows and on the individual recording of additional phenotypic information related to health and functional traits of cows. Sires and dams of bulls are selected on the basis of estimated breeding values for milk yield and content and of a longevity index. The Superbrown selection scheme is an open dispersed nucleus scheme, where the daughters from matings between bull dams and sires are distinguished from commercial population as a dispersed nucleus of elite cows (Figure 1).
Figure 1. The Superbrown selection scheme

Nearly 80% of progeny tested bulls are generated by the nucleus program and come from 50 herds of high genetic and management level which are located in the Trentino Alto-Adige-Südtirol region (Figure 2). Specific mating plans between top heifers or primiparous cows from nucleus herds and top young proven bulls (first proofs) from all around the world are arranged by sire analysts. An additional source of genetic resources is the use of the best embryos obtained from top heifers and cows outside the region. Nucleus program relies on specific agreements with farmers for rearing the daughters of all nucleus elite cows up to the second lactation and for breeding them with bull sires proposed by sire analysts. Male calves born within the program are recruited for the progeny testing program.

Data recording program. Phenotypic data of nucleus cows are recorded at 4-week interval considering: i) “traditional traits” as milk yield, fat and protein content, somatic cell count, calving date and culling date; ii) “additional traits” as body condition score (BCS) (Edmonson et al., 1989), displaced abomasum, mastitis and lameness, dystocia, retained placenta, mammary oedema, digestive disorders, milkability (recorded using chronometers), reasons of culling and suckling ability of calves. Such information are collected on periparturient heifers, lactating and dry cows. Moreover, a detailed questionnaire on farm characteristics (location, size, management and feeding practices, stables, milking machinery and destination of milk) is filled in yearly with the aim of describing the feature and farm production system. In addition, to evaluate satisfaction of farmers in relation to the characteristics (producing ability, fertility, feet and legs soundness, milking speed, mammary system and general performance) of daughters of Superbrown bulls a questionnaire is filled in by the farmers.
Figure 2. The Superbrown nucleus scheme

RESULTS AND PERSPECTIVES
Starting from October 2001, the Superbrown project is producing an open data base with continuous updating of records and animals. The interest for recording functional traits is mainly to define better selection indexes and management practices for Italian Brown dairy cattle reared in mountain areas.

Description of the database. Currently, the database contains 3,546 records from nearly 1,806 females (75% lactating cows, 17% dry cows, 8% periparturient heifers), reared in 48 herds with an average size of 27 lactating dairy cows, 6 dry cows and 2 periparturient heifers. Average milk yield is 25.6 ±7.6 kg/d, and average fat and protein content are 4.24 ±0.74 and 3.70 ±0.37 %, respectively. Average body condition score is 3.14 (±0.52) for lactating cows, 3.47 (±0.50) for dry cows and 3.47 (±0.47) for heifers. With respect to lactating cows, 10% of animals showed a wide mammary oedema and 5% exhibited calving difficulty. The suckling of calves was spontaneous for 42% of calves, was assisted by farmer for the 49% of calves and was induced with oesophageal probe for 9% of calves. The percentage of involuntary culling rate was 38% of total culled cows. About health traits, somatic cell count resulted on average 289,000 cells/ml, with 14% records with more than 400,000 cells/ml and retained placenta and milk fever occurred in 14% and 5% of calvings, respectively.

CONCLUSION
The Superbrown project is a breeding scheme aimed to maximize profit of farmers in mountain area and to increase the competitiveness of genetic material produced within the scheme. The data collected within the project will allow the study of selection indexes taking into account
production and functional traits in dairy cattle and will provide useful tools for modern management practices for dairy herds in the mountain area.

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