

European Linear Type Traits Harmonisation in Brown Swiss Dairy Cattle

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The need of an international harmonisation among countries in the field of type data collection is known. The lack of information about type proofs in dairy sires is a well known factor that limits the exchange of semen among different countries.

On the other hand the need of a strong co-operation among countries is even more important in medium to small size populations where the need of using the very best genetics available is a key factor in the genetic improvement of the breeds. In smaller breeds the probability of being “self –sufficient” in terms of genetic opportunity is very low and any factor that limits the migration of good genes from one population to another should be studied carefully.

The Brown Swiss International Organisation

The European federation of BS breeders was founded in 1964. The committee of the directors and presidents take place 2 to 3 times per year to discuss and take actions towards better co-operation and development of concerted actions. Since 1994 the European federation promote and organise a European joint progeny testing program.

The world conference was established in 1982. The committee take place once every 1 or 2 years.

What is Type? / What is Type for?

Since 1993 one of the most important matters on the agenda of the European committee has been the development of a standard way to collect type data on European Brown Swiss cattle. The linear method was proposed originally in the US and adopted officially in Italy for Brown Swiss in 1985. Since then at

European level Italy has been, for some time, the only country using this method while other countries were using other methods of type classification, mostly non linear..

In 1993 the European committee laid down a path to harmonisation on this topic with the goal of develop a Euro method before the end of 1995.

From late 93 to late 95 several meetings were organised with some basic points in mind:

- 1) comparison of methods used in different countries
- 2) feasibility of scientific studies on data sets collected using different methods
- 3) analysis of experiences on this field by different countries
- 4) need to keep separate the method of data collection from the use in selection schemes of the type information: in some sense not to confuse the question “What is type” with “what is type for?”

The countries being part of this group were AUT, CHE, DEU, FRA, ITA and SLO.

The final outcome of the discussion can be summarised as follow:

- a) the linear system has been preferred over any other non linear systems for the possibility of analysing data collected with standard statistical methods.
- b) No discussion was done about how important in general is type for selection. Even if that is a strategic question worth consideration it was not relevant for the discussion about harmonisation
- c) The data collection structure of each country has been compared in order to standardise the cows classified in each population (e.g. first calvers vs. all)

The more theoretical meetings were followed with practical workshops about the application of the linear system done by 2 leading data collector by each country comparing their views about field cases.

Type Data Selection

The main topic of discussion, after the linear approach was defined, was the selection of a common set of type traits to be used by everyone. Each country can collect data about additional traits but is obliged to collect data of the common traits.

The selected set of traits is as follows

Stature (withers)	Rump angle	Toes	Udder cleft
Width (thurl)	Rear legs (side view)	Fore Udder	Udder depth
Body depth	Hocks quality	Rear udder width	Teats length
Top line	Pasterns	Rear Udder height	Teats direction

Data Collection

Data collection with a linear system started in different times in some countries from 1985 (ITA) to 1997 (AUT, DEU). Since 1998 all the countries are collecting data following the common set of rules.

- The extreme of the scale should correspond to biological extremes in the population. The extremes should be actually represented, even from a limited number of cows.
- The middle score should be given to animals representing the average expression of the trait in the population.

Data Analysis

Following the decisions taken at data collection level some meeting were organised among geneticists of the different countries in order to develop a set of common guidelines for data analysis of type data. In Feb 96 an official set of guidelines were approved at technical level and passed through the director's and president's level for formal approval. Following is the set of recommendation.

Feb 96 Recommendations

It is recommendable to put emphasis on linear type traits compared to final scores or breakdowns.

Only linear traits will provide data acceptable for joint analysis and conversion studies.

Trait Definition

For each trait a scale should be defined as follows:

Data Collection

- The linear system works with description and not with evaluations: the classifier never has to mentally correct for any factor influencing any linear score. The Linear description must be a "picture" of what the classifier see on that day, at that time, in that situation. The classifiers should be trained to use the whole scale, extremes included.
- It is strongly recommended to classify all the first calvers not selecting them in any way (e.g. only daughters of young bulls, only daughters of best bulls or similar are NOT recommended)
- If a trait is measured on all cows then the original measure should be used as trait without conversion to linear scale

Methodology

A BLUP Animal Model using only first calvers data is recommended.

Model Definition

- A stage of lactation effect (usually expressed in months from calving to classification date) should be included in the model
- An age at calving effect (usually expressed in months from birth to calving) should be included in the model
- A classifier fixed effect should be included in the model
- A time component linked to classifier should be included in order to better take into account both the evolution of each classifier skills and the possible changes in scale or trait definition
- An elapsed time from last milking fixed effect should be included to take into account the changes of the udder shape due to the quantity of milk in it

Expression of the Proofs

- A clear definition of genetic base should be given
- A clear definition of the proof expression parameters should be given (mean and s.d of proofs)
- The publication of the accuracy and the number of daughters in the analysis should be considered mandatory
- The publication EBV of the 16 traits defined as in common in European countries should be considered mandatory
- The genetic parameters used for the EBV estimation for the 16 common traits should be given
- A clear definition of the rules for publication of non linear-defects should be given

A proposed Model of Analysis

Following the discussion about data analysis a model of analysis has been proposed as a reference point for countries analysing type data. The model is as follow:

$$y_{ijklmn} = \mu + mg_i + a_j + age_k + stage_l + cly_m + time_n + e$$

where

mg	=	management group
age	=	age at calving in months
stage	=	stage of lactation at classification, in months
cly	=	classifier* year interaction
time	=	time elapsed from last milking to classification , in hours

The models used in all the countries involved in the harmonisation follow the principle summarised by this model

Future Development

The issue of an INTERBULL service for type also for BSW and possibly for other breeds has been brought to attention both at the SC INTERBULL meeting and to the European Brown Swiss federation. It will be discussed at the Brown Swiss World Association level in October this year as well.

The European federation has confirmed the interest for an INTERBULL service for type recently during a committee held in Germany in the last week of April 2000.

It has been agreed that a preliminary work on data analysis for type should be performed under the control of the European or World association sharing experiences with the Interbull Centre.

The geneticists group of the brown Swiss European federation has discussed the topic and we are exploring the different options for this preliminary work.

In Italy a working group from the Italian national association (ANARB) and the University of Milan has been established in order to exploit the possible approaches to the problem:

- 1) Traditional MACE approach
- 2) Borderless joint evaluations

In a near future this group will present a formal research proposal at European and World Brown Swiss level in order to check the feasibility of the project.