Interbull Scientific Advisory Committee (SAC)

Annual report (2003-2004) to the Interbull Steering Committee (SC)

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The objective of this report is to inform the Interbull SC of the SAC activities during 2003-2004 and provide views on pertinent scientific issues.

Background

The formation of the Interbull SAC was announced during the 2003 annual meeting of Interbull (August 28-30, 2003; Rome, Italy). At the same time, Jean-Claude Mocquot (Interbull SC Chairman), Jan Philipsson (Interbull Secretary), Ulf Emanuelson (then Interbull Center Director) and Georgios Banos (Interbull SAC convener) met to discuss the SAC mandate, lay out the modus operandi and establish the main focus and expectations of the group. At that first meeting, the group input to the following topics was sought: views on the Interbull research portfolio, genetic correlations among countries, data validation, and impact of molecular genetics results (e.g. QTL identification) on international genetic evaluations.

Since then, Interbull SAC members communicated with each other mainly by means of electronic mail. The first physical meeting of the Interbull SAC took place on January 20, 2004, in Uppsala, Sweden.

Interbull Research Portfolio

All Interbull SAC members reviewed and commented on the Interbull research portfolio as it appears on the Interbull web site. The following areas were particularly discussed:

1. Trait dependent studies: The group felt that, with yield, conformation and udder health traits already on offer and calving performance, fertility and survival (longevity) on the way, the list of traits of global interest is pretty much covered. There is very little scope in expanding beyond these traits to others whose economic value is geographically limited. Caution should be exercised when dealing with survival that, due to its particular nature (censored data, variety of definitions, non-linearity), is a difficult trait to work with. However, it is a useful "residual" trait that accounts for just about anything else of importance in addition to the other individual traits in the Interbull service; furthermore, the world dairy industry and farmers seem to be very interested in its genetic evaluation.

2. Data validation and quality assurance: This represents the most crucial area regarding acceptability of Interbull services. The group feels that the key to guaranteeing good results is to continue improving the international genetic evaluation model i.e., make it less prone to easily violable assumptions and more robust to dubious input data. Focus areas should include genetic parameter estimation, genetic groups, and model definition (reduced-rank models, structural models, MT-MACE). Secondly, simulation tools can be used to look for evidence, but not proof, of input data quality. This could entail simulated data (performance records and true breeding values) to be sent to national genetic evaluation centers and analyzed with their programs. Estimated and true breeding values would then be compared. Data should be generated according to the model used for national evaluation in each case (e.g. test-day or lactation records, fixed effects etc). Caution should be exercised not to overstretch the outcome of such study; results may suggest that national genetic evaluation models yield the expected breeding values, but no inference on the validity or even sensibility of the models themselves

can be made. Finally, <u>changes of imported and domestic bull proofs could be monitored</u> across all genetic evaluation runs, for each country, as means of additional checks on data quality. Currently such comparisons are made between consecutive genetic evaluations only.

3. International animal model: There is obvious scope for such service to be offered, in the first instance, to numerically small breeds. The need to evaluate cows and facilitate bull-dam selection at the international level is recognized. Issues of record pre-adjustment and size of (co)variance matrix need to be thoroughly addressed.

4. Genotype-by-environment (GxE) interaction: Some SAC members expressed skepticism about replacing country definitions with some other environmental indicator. More insight into which environmental factors actually cause GxE seems to be needed.

5. Monitoring role of Interbull: Interbull already compiles pedigree data from various countries to create an international sire pedigree file. Interbull should make sure a complete global pedigree file is maintained that will facilitate monitoring current inbreeding levels, as well as inbreeding of future matings, in each breed. Also the pedigree file will enable the assessment of crossbreeding levels as this may be practiced in various countries.

Following these comments, a summary of suggested research priorities was prepared and is given in Appendix I.

Genetic correlations among countries

All members of the Interbull SAC participated in an Interbull workshop and extended Interbull Technical Committee meeting held in Uppsala, Sweden (January 19-20, 2004). Vincent Ducrocq, Mike Goddard and Georgios Banos (on behalf of the SAC) made presentations on issues related to genetic correlation estimation. The Interbull Technical Committee was meeting at the end of the workshop to set the operational priorities.

Molecular genetics results

The potential use of molecular information (markers, QTLs) in genetic evaluations raises legitimate concern regarding its impact on international comparisons. However, there will likely be limited access to such information (data) at national level, when and if this methodology applies to routine evaluation of dairy cattle. Pertinent data and information may become available if, for example, a QTL is patented. Its impact on true data may then be assessed. Until that time, Interbull research resources should rather be placed on other topics.

Closing, we feel that Interbull services and activities are well received worldwide and congratulate the SC and the Interbull Center for good work so far!

> May 11, 2004
>
> On behalf of the Interbull SAC
>
>
> Georgios Banos
> Convener

APPENDIX I

Suggested Research Priorities for Interbull

A. Highest priority

1. Genetic correlation estimation aiming at improving current service:
    a. Data structure/methodology as per outcome of technical workshop in Uppsala (January 19-20, 2004).
    b. Change of genetic correlations over time for conformation traits.

2. Data quality control aiming at increasing service acceptability:
    a. Improve the robustness of the international genetic evaluation model.
        i. Genetic parameters
        ii. Genetic groups
        iii. Revised robust models (reduced-rank, structural models)
    b. Validation of input data
        i. Simulate data according to country specification and send to individual national or regional evaluation centers to run with their software.
        ii. Monitor domestic and import bull proof changes over time.
    c. Validation of output data (MACE breeding values).

3. Trait-specific research aiming at developing new services:
    a. Fertility studies with a view to include at least an interval and an insemination related trait in the service portfolio.
    b. Calving performance studies considering calving ease, stillbirth rate and conformation traits.
    c. Longevity studies subject to favorable cost/benefit analysis.

B. Lowest priority:

1. Trait-specific research on traits other than the ones mentioned above.

2. Conversion equations.

3. Evaluation of various statistical packages.