

European Union Reference Laboratory for Zootechnics Work Plan 2012

INTERBULL CENTRE, Department of Animal Breeding and
Genetics, SLU (Uppsala, Sweden)

8/31/2011



**European Union Reference Laboratory for Zootechnics
(Bovine Breeding)**

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European Union Reference Laboratory for Zootechnics (Bovine Breeding) Work Plan 2012

The following work plan refers to items 1-18 of the 2011 Programme Objectives for the period January to December 2012. Most activities are of a continuous operational nature and follow previous work plans and activity reports. Only comments related to changes and developments under each item are therefore given. An estimated percentage of the total resources needed are given for each activity provided the laboratory is fully financed.

Developments on genomic evaluations have been the major topic on the dairy cattle breeding industry. Since many countries are already applying the new genomic tools in selection and genetic evaluation, Interbull has invested significant resources to discuss and develop methodologies and strategic issues related to the incorporation of genomic information on international genetic evaluations of dairy cattle since 2009. In an effort to provide guidance to importing and exporting countries within and outside EU, Interbull has implemented the novel validation of genomically enhanced breeding values (GEBVs) in August 2010. This initiative establishes ground according to the requirements of the EC regulation 427/2006 for evaluation of the genetic merit and the correspondent reliability for young bulls without progeny which have been genomically evaluated. The procedure was officially acknowledged by communication from the Director Bernhard Van Goethem of October 25, 2010, to all member states (D1/SPG/eg (10) D/764080/Ars(2010)789624) and has been instrumental for the commercialization of semen from genomically proven bulls within Europe.

Another major genomic-related area that the EURLZ is involved with is the development of tools that can handle genomic data coming from many different sources and in different formats (item 9). This has been referred to as genomic multi-trait across country evaluations (GMACE), which is a modification of the method used by the EURLZ for international comparisons of conventional breeding values. Two pilots were already carried out with the participation of countries approved in the official genomic validations, and there is a great expectation that the remaining technical issues can be addressed soon and a full international comparison of GEBVs may be implemented already in 2012.

The pilot project referred to as "Intergenomics" has the objective of creating an international genotype database for cattle at the Interbull Centre and improving the prediction ability of the genomic equations which is particularly important for minor breeds, since genomic predictions are highly dependent on the size of the reference populations. The Brown Swiss breed is being used as the pilot population given the diligent cooperation established among the breed representatives worldwide, and the routine international genomic evaluations for Brown Swiss cattle are expected to start already on the fall of 2011. This is a key project to enable the EURLZ to continue providing guidance and cutting-edge methodologies to access genetic value of breeding livestock.

There has been a clear evolution on the concept of sharing genotypes internationally, and most countries recognize now the need of a common repository of bovine genotypes at the Interbull Centre as the means to:

- Reduce costs and optimize investments on genotyping bovine animals
- Improve reference populations for prediction of genomically enhanced genetic merit, especially for low heritability health and functional traits, such as somatic cell count, mastitis, calving difficulty, longevity and female fertility.

- Make it possible to screen large populations for recessive alleles detection (recent study from North America identified 5 lethal recessives using this type of data – VanRaden et al., 2011¹)
- Maintain a worldwide parentage verification data base, using the SNP based methods that are about to be officially recommended by ISAG and ICAR
- Use the genomic data to study diversity within the bovine populations in a more complete way than is possible with the methods based on pedigree information only.

A three-year ICAR project to develop a system for international evaluations of beef breeds and traits commenced in 2007 and ended in May 2010 (item 14). A new compromise to ensure the continuation of the research and development project has just been established between ICAR, SLU and the participating countries. This system will be operating at the Interbull Centre before the end of 2011.

All the above activities have basically doubled the amount of work and also the responsibilities of the EURLZ in an extremely short period of time (3 years). **It is important to notice that all the activities existent prior to the “genomic revolution” are still taken place, meaning that this is not a simple update in methods, but in fact 100% additional services.** The conventional MACE evaluations that have been provided by the EURLZ over the years as a means for international comparisons, have actually acquired a more strategic importance than ever before, since they provide the only means for countries to utilize information on foreign animals in their reference populations. In other words, national genomic evaluations are highly dependent on the international breeding values regularly supplied by the EURLZ.

Following the recommendations from the external evaluation to assess the current performance of the EURLZ in 2009, a quality assurance program has started with the assistance of a consultancy firm (QP Projects AB, Stockholm, Sweden) and aiming to reach ISO 9001 certification still in 2011 or beginning of 2012. This was the only point stressed in the review and has been addressed.

The additional support received by the EURLZ in 2010 and 2011 has been extremely instrumental in developing the new methods and infrastructure (data base and genotype exchange harmonization). At this stage, although important steps of the new developments are completed, there are still fundamental questions to be addressed for the adoption of genomic technologies in animal breeding schemes and assure that international trading of bovine genetics can count on sound methodologies and unbiased comparisons between cattle population within Europe and with other continents. The EC funding plays a key role to make these advances possible, since development costs cannot be directly transferred into service fees.

Therefore, the EURLZ is **requesting the maintenance of the financial support of € 150,000 for 2012**, in order to assure the minimum leverage needed to establish and maintain the necessary framework to quickly respond to the novel technologies being applied in bovine breeding worldwide.

Table 1 – Programme objectives for the European Union Reference Laboratory for Zootechnics (Bovine Breeding) in 2012.

| Item | Objective | Comment | Resources needed |
|------|---|---|------------------|
| 1. | Receiving, storing and validating results | Continuous activity – now includes also genomic evaluations | 6% |
| 2. | Routine international evaluations | Regularly performed activity that takes place three times per year for production, conformation, udder health, longevity, calving, female fertility and | 14% |

¹ VanRaden et al. Reporting of Haplotypes with Recessive Effects on Fertility. Proc. Interbull Meeting, Stavanger, Norway, August 26-28, 2011. http://www.interbull.org/images/stories/Vanraden_copy_copy.pdf

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| | | workability traits | |
| 3. | Distribution of results | Regular activity that follows the evaluations of April, August, and December | 3% |
| 4. | Publishing statistics | Regular activity, as for item 3 - results are also published on the Interbull web site (www.interbull.org) | 2% |
| 5. | Test evaluations | Test evaluations are routinely run twice a year (in January and September) as an integral part of the service in preparation for following routine evaluations | 15% |
| 6. | International seminar | Prepare programme and working documents for the annual meeting in May 28 to June 1, 2012, which will take place in Cork, Ireland. Collect and edit material for a report covering the meeting. At least 150 participants from more than 30 countries are expected to participate. | 3% |
| 7. | International workshop | A fourth workshop on developing a framework for international genomic evaluations is planned for the first week of February, 2012, in Verona, Italy. Prepare programme and working documents for the meeting. Collect and edit material for a report covering the meeting. | 3% |
| 8. | Development of information system | Development of the Interbull web site is a continuous activity. A data base system for managing pedigrees of all countries and breeds is fully operational and the functionality for handling national breeding values is to be launched in early 2012. Additionally, an international database for bovine genotypes is under construction. | 11% |
| 9. | Development of methodologies and harmonisation | Continuous activity, but special attention is given to evaluation models that utilize more pedigree information, models that accounts for genomic selection and models based on individual performance data. Novel international genomic evaluations using a common across country reference population for the Brown Swiss breed has been developed and is expected to be provided as a regular service already in 2011. | 12% |
| 10. | Development of control protocols | Development of validation procedures and programming of auditing tools - special emphasis on validation of genomic evaluations will be given | 3% |
| 11. | Investigation of problems in harmonisation of methods | Continuous activity - special emphasis on methods for genomic evaluations will be given | 4% |
| 12. | Assist Member States | All actions benefit all member states indistinctively. Additionally, customized advisory services are given to member states as requested, but amount of work depends on resources available. Portugal was the last member state to join the evaluations (2011). | 2% |
| 13. | Harmonisation of evaluations for health, reproduction and other functional traits | Continuous activity – particular assistance is being offered to the World Guernsey Federation | 3% |
| 14. | Genetic evaluation of beef cattle. | Development of a system for international evaluations of beef traits and breeds, in cooperation with French | 9% |

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| | evaluations of bulls and cows | and Irish scientists. The system utilizes individual performance data. | |
| 15. | Assist countries which have become members of EU | Activity depends on the demand. Increased support activity pending on finances. | 1% |
| 16. | Publishing results from development work | Interbull Bulletins are printed and distributed, but also made available on the Interbull web site | 2% |
| 17. | Attend international meetings and conferences | Interbull is co-hosting seminars with ICAR in Cork, Ireland, May 2012. | 2% |
| 18. | Quality assurance | The Interbull Centre has started to implement ISO 9001 certification in 2011 and will hopefully go through official auditing before the end of the year. A consulting company has been hired to orient the process. | 5% |

Uppsala, August 31st, 2011.



João Walter Dürr
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