

International Genetic Evaluations the French Perspective

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Summary

French Breeding companies are very pleased with the work of breeding value comparisons carried out by Interbull. However they regret that the proof distribution phase in each country obeys rules that are so unlike each other that they are not comparable and often work to the disadvantage of foreign sires. On the beef side (Interbeef project) they hope for an international assessment service per breed. With the development of genomic selection, the Breeding companies reassert that Interbull must continue to produce unbiased breeding values from phenotypic data in order to maintain populations of international benchmark animals and must invest in evaluations combining genomic evaluations. Very recently Interbull provided validation procedures for genomic indexing of the different countries which had been impatiently awaited. Now we must see that they are implemented at grass roots level. The French Breeding companies think that support to some international breeds to construct their genomic selection tool or the implementation of a genotyping platform are the concern of special service provisions which must not slow down the implementation of priority actions.

Introduction

Since 1995, and the first international proof comparisons in the Holstein breed, Interbull has become an essential authority for the comparison of the breeding values of breeding bulls evaluated in different countries. France participates regularly in genetic evaluation in the Holstein and Simmental breeds (with the Simmental and Montbéliarde breeds) and the Brown Swiss breed. It actively participates in the Steering Committee, in the Scientific Advisory Committee and in the business meeting via its fundamental and applied research structures and its representatives in the artificial insemination sector.

In addition France has made enormous investments in genomic selection and marker-aided selection in dairy cattle. Moreover it has been a mainspring of Eurogenomics to reinforce the size of its benchmark population and that of its partners.

With the appearance of genomic selection and the growth of international trade, the French Breeding companies have given thought to the present and future positioning of Interbull. It is these thoughts which are

reported here, giving consideration to the international evaluations themselves and to the changes engendered by the appearance of genomic selection.

Interbull contributions to international evaluations and points to be improved

Interbull’s main contribution is as a neutral body making objective comparisons of the breeding values of sires by combining data from a maximum of countries. This comparison is made with a concern to provide maximum accuracy, in particular checking the validity upstream of the evaluations of each of the countries presenting data. The mobilization of a large number of countries (Mattalia and Minery, 2006a) has also vastly improved the validation of the Interbull evaluation results.

On the one hand, the number of available traits has increased, in particular by integrating the functional traits. Nevertheless, differences in the definition of traits such as fertility harm the comparability of the proofs between sires

from different countries (Minery *et al.*, 2008). What is more, even though the number of traits is very high in the Holstein breed, we regret that morphology traits are not the subject of an international evaluation in the Simmental breed in spite of regularly repeated demands for this.

On the other hand, the weakness of the present system lies in the publication rules at the level of each country. They are very different from one country to another and only very rarely provide good visibility of the range of foreign sires, as underlined three years ago by the Institut de l’Elevage team (Mattalia and Minery 2006b). Improvements have been proposed that give a better description of the procedures implemented in each country. But these measures do not yet seem sufficient. The latest studies carried out in France (Minery, personal communication, 2009) confirm that the publication rules of some countries still impose very strict limits on the appearance of foreign bulls in their prize-winners list as shown in table 1 for the best French sires.

Table 1. Appearance in foreign prize-winner lists of the 20 best French Holstein bulls on the French total merit index “ISU” (Interbull, August 2009).

taureau	père	nais	cd	lait	isu	USA TPI 100	USA TPI 1000	ITA PFT 100	NLD NVI	DEU RZG	DNK S-index	GBR PLI	CAN LPI 500
						dom et etr (cd lait 80 ou 85% en génomique)	(Dairybull.com) taureaux testés	dom et etr (cd lait >=80% et filles en ITA)	classement étranger (814 taureaux)	300 (cd lait >75) classement dom et etr	100 classement dom et etr	classement dom et etr (512 taureaux)	classement étranger cd >=70%
VIA THELO	O-MAN JUST	2004	80	188			68 (cd 70)		43		11	14	
VIVIO	O-MAN JUST	2004	77	183									
USONET FIN	FINLEY	2003	90	183			159 (cd 78)				13	36	107
VAUCLUSE	O-MAN JUST	2004	80	181			43 (cd 71)		31		29		
REVIVIEN	JOCKO BESN	2000	88	173			186 (cd 77)		66				157
TUFFIAC	FORD	2002	91	173			692 (cd 79)		400				
ROUMARE	JOCKO BESN	2000	88	171			89 (cd 77)		52		63	89	108
SAVER	JOCKO BESN	2001	89	168			470 (cd 78)		73				200
VUCLAIR	O-MAN JUST	2004	75	167									
VOSAC MAN	O-MAN JUST	2004	84	167			150 (cd 74)		25			38	139
VOLEN MAN	O-MAN JUST	2004	84	167			407 (cd 74)						
TEUFFEUR	DUTCH BOY	2002	88	166			775 (cd 77)						313
VOLCAIN OK	OKENDO	2004	84	166									375
STOL JOC	JOCKO BESN	2001	91	165			265 (cd 79)		93			94	215
VISITEUR	O-MAN JUST	2004	76	164									
VELD MAN	O-MAN JUST	2004	84	164			190 (cd 74)						224
URBIEL	GARTER	2003	84	163			859 (cd 74)						247
SHORT	JOCKO BESN	2001	90	163			991 (cd 78)						
VOUSTER	O-MAN JUST	2004	86	163			917 (cd 76)		138				
SKIEUR	DONOR	2001	92	163			900 (cd 79)						
TROTSKY GP	TRENT	2002	91	163									
OLADI MAN	O-MAN JUST	2004	82	163			163 (cd 72)		167				
THOIRY	JESTHER	2002	84	163			518 (cd 74)		166				113

The French industry is militating for greater transparency. The post treatment rules of Interbull proofs must be clearly described and known by all. The publication rules for the proofs of foreign bulls must as far as possible be harmonised between countries. They should be based more on the clauses of minimum level of accuracy necessary for importing the semen of these bulls than on national publication rules. All sires with official proofs in a given country should be accessible from the website of the organisation in charge of publishing the proofs.

If it proves impossible to implement such provisions for the publication of each country's proofs, it would seem right and proper to study a centralised system of proof publication in the databases of each country. This evolution in the Interbull positioning is fully justified if it is wished to implement publications using the CMACE approach proposed by Liu. This makes it possible to classify sires on the scale of a country which does not participate in Interbull by as far as possible combining sire proofs on the different national scales of participating countries.

Finally, during the past 5 years France has widely contributed, financially and by the methodological contribution of the INRA, to the development of international genetic evaluations in beef from untreated performances (Venot *et al.*, 2009). It is interesting to note that the investment in these new evaluations has been the opportunity for dairy cattle to benefit from improvement in the management databases of pedigrees and from the information exchange system (Interbull, 2009a). The standardisation of these pedigree data has made an important contribution to easing their exchange between countries.

The French Breeding companies hope that this work will culminate in an international breed indexing which integrates the information provided by cross-bred products. It is also hoped that this evaluation will soon be centred on the largest possible number of traits.

Requests from French breeding companies to Interbull in the context of genomic selection

In the context of genomic selection, Interbull plays an essential role: to calculate purely polygenic proofs to make it possible to maintain multi-country benchmark populations. In this context it is indispensable for Interbull to make investments to develop the present calculation of the MACE and integrate the short-listing of males on genomic information, which is a source of serious biases (Patry and Ducrocq, 2009), relying on methodologies which are beginning to be proposed (Ducrocq and Liu, 2009) or to be specifically developed.

After nearly a year of work, in February 2010 Interbull provided a method for validating the calculations of genomic proofs (Interbull, 2010). This tool is indispensable to allow international recognition of the different evaluation systems that exist. The validation results for the first countries are expected in the next few weeks. In spite of everything, additional developments are necessary to refine the validation criteria.

A genetic evaluation combining all available sources of information (genotyping and phenotypes) also seems indispensable, in particular for countries that are only users of Interbull proofs. Here too, the selected method will have to be chosen with care and France will be very attentive to the preliminary results of the tests of the GMACE approach (Sullivan and Van Raden, 2009).

Interbull gave a positive response to the request from the European Federation for the Brown Swiss Breed who wanted help in constructing a benchmark population of a sufficient size combining information from several countries whose size did not allow them individually to access a reliable genomic evaluation (Interbull, 2009a). Recently, the USA decided to adopt this project. This new service, called Intergenomics, consists in a first stage of calculating the genomic component of bulls from a common benchmark population of about 3,000 individuals. In a second stage, each country combines this genomic

component with polygenic information at their disposal. This new Interbull approach validated by its steering committee, while beneficial to the Brown Swiss breed, poses other questions: must Interbull, on its own strengths, invest in genomic research? If so, to what level? Are these new missions not carried out to the detriment of the certification mission of genomic evaluation methods and other priority missions of Interbull?

Finally, Interbull's proposal to offer the provision of a genotyping exchange platform (Interbull, 2009b) are more the concern of a specific service provision than of the core mission of INTERBULL, even if it can greatly contribute to easing and standardizing exchanges of information.

Conclusion

Over the past fifteen years, Interbull has been a wonderful tool for the development of international exchanges of dairy semen on the basis of objective comparisons of breeding values. It is indispensable to maintain this tool, whilst adapting it to the needs of genomic selection. The French genetic improvement sector will support Interbull's activity in this dimension of furthering objective competition between countries.

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