Results from a Joint Progeny Testing Program in Simmental

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1. Introduction

There is a large number of European countries where Simmental are kept as a dual purpose breed and represent a large proportion of the recorded cows (Table 1). In Austria, Czech Republic, Slovenia, Romania and Croatia, Simmental can even be regarded as the main breed. In France, there are two distinct populations, Simmental and Montbéliarde, respectively, with the latter putting more emphasis on milk production. In Switzerland, Simmental is divided in several sections based on the percentage of Red Holstein genes. Table 1 shows that the Simmental populations in Europe vary largely with respect to population size as well as with respect to average milk yield.

In the past the exchange of semen or animals between countries has been very low except for neighbouring countries (e.g., Austria and Germany). Until the early 1990's there was almost no exchange with the Eastern European populations.

In 1993, a program for a simultaneous progeny testing in several countries with Simmental populations was initiated by the European Simmental Breeders Association (EVF). The objectives of the EUROTEST program were:

- to improve the cooperation between Simmental countries
- to increase the number of genetic ties between countries in order to obtain more accurate conversion formulae for breeding values for milk production
- to make national genetic evaluation systems more comparable (through an improved cooperation)

The EUROTEST program was not intended to be a competition between populations in order to rank populations according to their genetic level for milk production. The first bulls from this program were tested in 1994. To date, 57 bulls from seven countries were tested simultaneously. Meanwhile there are 30 bulls with proofs in the latest Interbull evaluation for production traits (May 2003). In 2002, a survey was conducted in order to get an overview of achievements, problems and future plans for the EUROTEST program. The results of the survey, along with some analyses based on the Interbull evaluation, are presented here.

2. The EUROTEST program

Since the start of the EUROTEST program eight countries have participated:

- Austria (AUT)
- Switzerland (CHE)
- Germany (DEU)
- France (Montbéliarde, FRM)
- Italy (ITA)
- Slovenia (SLO)
- Czech Republic (CSK)
- Slovakia (SVK)

CHE participated only from 1994 to 1997. AUT joined the program in 1998. SLO has not yet contributed bulls to the program.

Bulls for the EUROTEST program are selected at the annual EVF board meeting. In advance to the meeting each country has provided pedigree information of the bulls it considers to be suited for the program and has made sure that at least 4,000 doses of semen are available. Table 2 shows that most of the bulls have come from DEU, FRM and ITA.

There is no designed test plan as to which bull is tested in which country. The bulls are not necessarily tested simultaneously in all countries. A country may decide to test only a few of the available bulls. Especially for countries with relatively small populations it is almost impossible to test all the bulls that are

offered each year (usually six). Per bull and country 400 doses of semen are distributed to produce between 40 and 50 recorded daughters.

Even though bulls are not assigned to countries the distribution of the bulls across countries is fairly randomly. Most of the bulls are tested simultaneously in at least four countries. Smaller countries try to test bulls from a different subset of EUROTEST countries every year. There is only one country that seems to prefer bulls from certain other countries.

At the beginning of the EUROTEST program there were problems in starting the testing period simultaneously. Either countries started testing the domestic bulls too early or it was difficult to get the semen from the other countries in time because of, e.g., veterinary regulations that were different across countries. But according to the largest difference between the beginning of the testing period of the same bulls in different countries (Table 3) the situation has improved in recent years. The length of the testing period has also been successfully reduced. Table 3 shows that over the years the percentage of semen distributed in the first three months of the testing period has increased from around 50% to around 70%, thus ensuring that bulls get their proofs in the different countries at about the same time.

3. Results and Discussion

In Table 4 number of common proven bulls from the EUROTEST program (n=30) for each pair of country are presented. AUT and DEU are considered as two populations even though since November 2002, these countries have a joint genetic evaluation. DEU, FRM, ITA and CSK share most of the bulls since these countries participated each year. Table 5 shows the number of common bulls for each pair of countries among bulls with less than 25% Red Holstein genes in the Interbull evaluation from May 2003. Austria and Germany were considered as one population (DEA). SVK is not included in the table because it does not participate in the Interbull evaluation. French Simmental (FRA) and Hungary (HUN) shared few bulls with other countries. However, when looking at the number of common bulls the total number of bulls with proofs in the respective countries has to be taken into account. There are even pairs of countries that do not have common bulls, e.g., FRM and FRA. The number of common bulls for SLO with other countries should improve through the EUROTEST program.

The importance of the EUROTEST program for genetic ties between Simmental populations is shown in Table 6. There are no bulls with proofs in more than seven of the nine populations in the Interbull evaluation. A considerable number of bulls with proofs in four or more countries are EUROTEST bulls. For example, ten out of 25 bulls with proofs in five countries are EUROTEST bulls. There are seven bulls with proofs in each of the six EUROTEST populations, and all these bulls were tested in the program. Through EUROTEST connections between countries without a lot of genetic ties have greatly improved. For example, more than 50% of the common bulls between DEA and FRM and more than one third of the common bulls between FRM and ITA are EUROTEST bulls. In some cases the EUROTEST program is the only way for country pairs to have common bulls, e.g., SLO-CHE and SLO-FRM.

While the EUROTEST program was originally designed to improve the derivation of conversion formulae, it is now very helpful for the estimation of genetic correlations for the Interbull evaluation. According to Jorjani (1999), the variances of estimated parameters as well as the convergence rates depend on the number of bulls with multiple proofs. Jorjani (1999) also stated that 'the ultimate solution to the problem of estimating genetic correlations is more simultaneous progeny testing of young bulls in several countries'.

In the survey conducted in 2002 among participating countries, it was suggested that it would be helpful to have more Simmental populations included in the EUROTEST program, e.g., French Simmental and Croatia. It was also suggested to increase the efficiency of the program by testing more bulls in fewer countries. A first attempt was made this year when ten bulls were tested instead of the usual five or six bulls with AUT, DEU, FRM and ITA each contributing two bulls. On the other

hand, some of the countries reported that it becomes more and more difficult to distribute semen of bulls from countries with a lower genetic level. As could have been expected such bulls tested in the early years had relatively low proofs. Therefore, young bulls from countries with a lower genetic level are less well received by A.I. stations as well as by producers. This has not been a problem in Brown Swiss, where Austria, Germany, France, Italy and Switzerland have a similar program since 1993. The Brown Swiss populations from these countries are much more homogeneous than the Simmental populations.

The EUROTEST program does not only increase the number of bulls with multiple proofs in several countries. It also improves the connections between regions in countries with regionally operating A.I. stations. Even though the number of young bulls owned jointly by two ore more A.I. stations has increased these bulls are mostly being tested in one region only. France has acknowledged this problem by recommending a planned progeny test design for the Holstein, Normande and Montbéliarde breeds (Mattalia, 2002). Germany has established a program in the Holstein breed where young bulls are tested simultaneously in two regions (Feddersen, 2003). In most of the countries participating in the EUROTEST program, there is more than one A.I. station per country. Usually the EUROTEST bulls are tested simultaneously by all of the stations. In Germany, there are eleven A.I. stations taking part and they rotate on a yearly basis with usually four of them testing the bulls simultaneously.

In addition to the EUROTEST program, the cooperation between Simmental populations has been improved by trying to harmonize other traits. For example, a working group for the harmonization of conformation traits was established. This group meets annually and discusses the number of traits as well as its definitions. The work of this group has resulted in a joint genetic evaluation for conformation for AUT, DEU and ITA. In the future, the EUROTEST program could contribute to the harmonization of beef and functional traits across countries.

Besides establishing genetic ties and harmonization of traits, the cooperation between countries through the EUROTEST program is also important to strengthen the Simmental breed with respect to the international competition among breeds.

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Table 1. Characteristics of European Simmental populations in 2000 (ICAR, 2002).

Country/ Population	Number of lactations	Percentage of all lactations	Milk yield (305 days, kg)	Fat (%)	Protein (%)
Austria	218,375	70.3	5,720	4.15	3.42
Switzerland (FT)	92,698	25.3	6,346	4.10	3.22
Switzerland (SI)	18,461	5.0	5,446	3.99	3.27
Switzerland (Montbél.)	2,724	0.7	7,005	3.86	3.28
Czech Republic	210,951	59.8	5,447	4.31	3.41
Germany	932,751	26.6	5,849	4.10	3.46
France (Simmental)	13,522	0.5	5,022	3.98	3.33
France (Montbéliarde)	385,056	14.1	5,836	3.86	3.24
Croatia	22,443	76.8	5,020	3.89	3.36
Hungary	6,673	3.7	4,801	4.02	3.39
Italy	30,587	3.9	5,734	3.88	3.37
Poland	3,711	1.0	4,068	3.94	3.32
Romania	80,770	36.0	3,370	3.71	-
Slovakia	20,664	14.0	3,902	4.12	3.35
Slovenia	24,327	44.6	4,405	4.17	3.38

Table 2. Origin of bulls in the EUROTEST program (proven bulls).

Year of test	Country of origin								
	AUT[a]	CHE[b]	DEU	FRM	ITA	SLO	CSK	SVK	Total
1994	-	1	1	1	1	-	-	-	4
1995	-	1	1	1	1	-	-	-	4
1996	-	1	1	1	1	-	1	-	5
1997	-	1	1	1	1	-	1	1	6
1998	1	-	1	1	1	-	-	1	5
1999	1	-	1	1	1	-	1	1	6
2000	1	-	1	1	1	-	1	1	6
2001	1	-	1	1	1	-	1	1	6
2002	1	-	1	1	1	-	-	1	5
2003	2	-	2	2	2	-	1	1	10
Total	7	4	11	11	11	-	6	7	57

[a]participates since 1998
[a]participated from 1994 - 1997

Table 3. Characteristics of begin and length of testing periods (results based on a survey conducted in 2002; countries included: AUT, DEU, CSK, ITA).

Year of test	Largest difference (days) between dates of first insemination	Percentage of semen distributed in the first 3 months
1994	250	61
1995	266	47
1996	240	48
1997	226	51
1998	368	52
1999	248	71
2000	118	68
2001	75	67

Table 4. Numbers of common bulls from the Eurotest program (proven bulls).

Country	AUT	CHE	DEU	FRM	ITA	SLO	CSK	SVK
AUT[a]	10	1	10	9	8	4	8	6
CHE[b]		17	15	16	16	8	16	13
DEU			27	26	25	11	24	21
FRM				28	25	11	25	21
ITA					27	11	25	19
SLO						11	9	9
CSK							27	18
SVK								21

[a]participates since 1998
[b]participated from 1994 - 1997

Table 5. Numbers of common bulls (Interbull evaluation May 2003, %HOL<25).

Country	CHE	DEA	FRM	ITA	SLO	FRA	CSK	HUN	NLD
CHE	364	35	88	38	8	4	48	1	28
DEA		10,395	50	200	43	52	161	17	15
FRM			2,097	73	11	-	85	1	49
ITA				612	27	31	68	9	17
SLO					299	10	15	4	-
FRA						179	13	5	-
CSK							3,511	7	22
HUN								90	1
NLD									54

Table 6. Number of proofs per bull (countries in the EUROTEST program, Interbull evaluation May 2003, %HOL<25).

Number of proofs per bull	Number of EUROTEST bulls	Number of all bulls (from the six EUROTEST populations)	Number of all bulls (from nine populations)
1	-	16,182	16,339
2	1	339	341
3	5	66	81
4	7	23	32
5	10	17	25
6	7	7	14
7	-	-	-
8	-	-	-
9	-	-	-