

Statistics of European Embryo Transfer Activity in 2015

Collected by Marja Mikkola, Finland

National data collectors 2015

| Country | Collector | N° of approved ET teams | N° of ET teams providing data | N° approved IVP teams providing data |
|--------------------|--|-------------------------|-------------------------------|--------------------------------------|
| Austria | Friedrich Führer | 5 | N/A | 0 |
| Belgium | Peter Vercauteren & Isabelle Donnay | 9 | 8 | 0 |
| Bosnia Herzegovina | Teodor Markovic | 1 | 1 | 0 |
| Croatia | Mario Matkovic | N/A | N/A | 0 |
| Czech Republic | Pavel Bucek | N/A | 1 | 0 |
| Denmark | Henrik Callesen | 13 | 13 | 0 |
| Estonia | Jevgeni Kurykin | 1 | 1 | 1 |
| Finland | Seija Vahtiala | 4 | 3 | 1 |
| France | Serge Lacaze | 19 | 15 | 3 |
| Germany | Hubert Cramer | 39 | 22 | 2 |
| Greece | Foteini Samarzi | 2 | 2 | 3 |
| Hungary | Ferenc Flink | 5 | 3 | 0 |
| Ireland | Patrick Lonergan | 6 | 3 | 0 |
| Italy | Giovanna Lazzari | N/A | N/A | 1 |
| Latvia | Vita Antane | 1 | 1 | 0 |
| Lithuania | Giedrius Palubinskas, Vytuolis Žilaitis, Jonas Kutra | 1 | 1 | 0 |
| Luxembourg | Marianne Vaessen | 2 | 2 | 0 |
| Macedonia | Toni Dovenski | 1 | 1 | 0 |
| The Netherlands | Helga Flapper | 10 | 6 | 3 |
| Norway | Eiliv Kummen | 2 | 2 | 0 |
| Poland | Jędrzej M. Jaśkowski | 8 | 8 | 0 |
| Portugal | João Nestor Chagas e Silva | 10 | 5 | 0 |
| Russian Federation | Denis Knurov | 6 | 6 | 1 |
| Slovakia | Dalibor Polak | 1 | 1 | 1 |
| Slovenia | Janko Mrkun | 1 | 1 | 1 |
| Spain | Santiago Fuentes Ibanez | 21 | 10 | 2 |
| Sweden | Renee Båge | 14 | 7 | 0 |
| Switzerland | Rainer Saner | 7 | 5 | 1 |
| Turkey | Ebru Emsen | 2 | 1 | 0 |
| Ukraine | Victor Madison | 1 | 1 | 0 |
| Total | | 180 | 124 (69%) | 20 |

Bovine *in vivo* embryo production 2015

| Country | N° of embryo collections | N° of embryos collected | N° of transferable embryos | N° of transferable/ collection | Collections with sexed semen (%) | Dairy (%) | Beef or other (%) |
|--------------------|--------------------------|-------------------------|----------------------------|--------------------------------|----------------------------------|-------------|-------------------|
| Austria | 257 | 2788 | 2032 | 11.4 | 7.4 | 52.5 | 47.5 |
| Belgium | 1155 | 7694 | 5917 | 5.1 | 0.9 | 21.7 | 78.3 |
| Czech Republic | 8 | 105 | 41 | 5.1 | | 0 | 100 |
| Denmark | 593 | 6001 | 4335 | 7.3 | | 88.7 | 11.3 |
| Finland | 333 | 3300 | 2139 | 6.4 | 12.0 | 100 | 0 |
| France | 6926 | 64948 | 40132 | 5.8 | 13.5 | 81.5 | 18.5 |
| Germany | 3011 | 30571 | 19752 | 6.6 | | 74.1 | 25.9 |
| Greece | 3 | 22 | 15 | 5.0 | | 100 | 0 |
| Hungary | 73 | 774 | 543 | 7.4 | 103 embryos | 20.5 | 79.5 |
| Ireland | 420 | 4032 | 2562 | 6.1 | | N/A | N/A |
| Italy | 2012 | 22646 | 16226 | 8.1 | | 97.8 | 2.2 |
| Lithuania | 80 | 563 | 420 | 5.3 | | 86.3 | 13.8 |
| Luxembourg | 219 | 2620 | 1529 | 7.0 | 18.7 | 97.7 | 2.3 |
| The Netherlands | 3519 | 20505 | 20365 | 5.8 | | N/A | N/A |
| Norway | 16 | 118 | 86 | 5.4 | | 37.5 | 62.5 |
| Poland | 162 | 1407 | 1037 | 6.4 | 12.3 | 100 | 0 |
| Portugal | 88 | 925 | 544 | 6.2 | 9.1 | 100 | 0 |
| Russian Federation | 447 | 4375 | 2546 | 5.7 | 14.3 | 64.7 | 35.3 |
| Slovenia | 7 | 21 | 12 | 1.7 | | 100 | 0 |
| Spain | 492 | 4937 | 2869 | 5.8 | 25.6 | 88.4 | 11.6 |
| Sweden | 198 | 1629 | 1097 | 5.5 | 0.5 | 98.0 | 2.0 |
| Switzerland | 473 | 5665 | 3769 | 8.0 | 16.7 | 95.3 | 4.7 |
| Ukraine | 5 | 18 | 12 | 2.4 | | 0 | 100 |
| Total | 20497 | 185664 | 127980 | 6.2 | 6.6% | 79 % | 21% |

Countries reporting no activity in bovine embryo collections:

Bosnia Herzegovina, Croatia, Estonia, Latvia, Macedonia, Serbia, Slovakia, Turkey

Bovine *In vitro* production, OPU

| Country | Total | | | Stimulated | | | Non-stimulated | | |
|--------------------|-----------------|--------------|---------------|-----------------|-------------|---------------|-----------------|--------------|---------------|
| | N° OPU sessions | N° oocytes | N° of embryos | N° OPU sessions | N° oocytes | N° of embryos | N° OPU sessions | N° oocytes | N° of embryos |
| Austria | 8 | 80 | 17 | 8 | 80 | 17 | 0 | 0 | 0 |
| Finland | 148 | 1084 | 235 | 0 | 0 | 0 | 148 | 1084 | 235 |
| France | 256 | 2441 | 778 | 212 | 2203 | 716 | 44 | 238 | 62 |
| Germany | 1631 | 13663 | 2244 | N/A | N/A | N/A | N/A | N/A | N/A |
| Italy | 730 | 9258 | 1481 | 0 | 0 | 0 | 730 | 9258 | 1481 |
| The Netherlands | 5818 | 45395 | 8727 | N/A | N/A | N/A | N/A | N/A | N/A |
| Spain | 55 | 668 | 103 | 54 | 614 | 83 | 1 | 54 | 20 |
| Russian Federation | 446 | 1808 | 195 | 0 | 0 | 0 | 446 | 1808 | 195 |
| Total | 9092 | 74397 | 13780 | 274 | 2897 | 816 | 4543 | 12442 | 4237 |

Bovine *In vitro* production, abattoir derived oocytes

| Country | N° of oocyte donors | N° of oocytes collected | N° of transferable embryos |
|-----------------|---------------------|-------------------------|----------------------------|
| Germany | 24 | 889 | 165 |
| Italy | 10 | 428 | 108 |
| Lithuania | 3 | 9 | 0 |
| The Netherlands | 28 | 1146 | 161 |
| Total | 65 | 2472 | 434 |

Bovine Embryo Technologies

| Country | N° of sexed embryos (via biopsy) | | N° of genotyped embryos | |
|--------------|----------------------------------|------------|-------------------------|-----------|
| | In vivo | In vitro | In vivo | In vitro |
| France | 984 | | 634 | |
| Germany | 865 | 154 | 371 | 38 |
| Netherlands | | | 90 | |
| Hungary | 24 | | | |
| Total | 1873 | 154 | 1095 | 38 |

Bovine Embryo Transfer

| Country | N° of transferred embryos | | | | | | Total | N° of exported |
|--------------------|---------------------------|-----------------|----------------|-----------------|-----------------|----------------|---------------|----------------|
| | <i>In vivo</i> | | | <i>In vitro</i> | | | | |
| | Fresh | Frozen domestic | Frozen foreign | Fresh | Frozen domestic | Frozen foreign | | |
| Austria | 456 | 759 | 28 | 12 | 5 | 0 | 1260 | 0 |
| Belgium | 1275 | 3869 | 1007 | 0 | 0 | 0 | 6151 | 146 |
| Czech Republic | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 0 |
| Denmark | 2238 | 1007 | | 0 | 0 | 0 | 3245 | 91 |
| Finland | 762 | 1544 | 496 | 66 | 43 | 0 | 2911 | 4 |
| France | 18837 | 17200 | 1042 | 251 | 297 | 0 | 37627 | 220 |
| Germany | 8017 | 12546 | 0 | 1684 | 358 | 0 | 22605 | 0 |
| Greece | 5 | 0 | 25 | 0 | 0 | 0 | 30 | 0 |
| Hungary | 289 | 212 | 106 | 0 | 0 | 0 | 607 | 10 |
| Italy | 6003 | N/A | N/A | 328 | 1337 | 0 | 7668 | N/A |
| Ireland | 720 | 750 | 0 | 0 | 0 | 0 | 1470 | 0 |
| Lithuania | 54 | 36 | 0 | 0 | 0 | 0 | 90 | 0 |
| Luxembourg | 736 | 791 | 0 | 0 | 45 | 0 | 1572 | 50 |
| The Netherlands | 4072 | 16406 | 0 | 7287 | 899 | 0 | 28664 | 1115 |
| Norway | 22 | 45 | 55 | 0 | 0 | 0 | 122 | 0 |
| Poland | 608 | 588 | 0 | 0 | 0 | 0 | 1196 | 0 |
| Portugal | 124 | 450 | 35 | 0 | 0 | 0 | 609 | 16 |
| Russian Federation | 104 | 1510 | 482 | 0 | 5 | 1630 | 3731 | 0 |
| Slovenia | 10 | 2 | 2 | 0 | 0 | 0 | 14 | 0 |
| Spain | 869 | 1130 | 138 | 171 | 76 | 8 | 2392 | 56 |
| Sweden | 768 | 329 | 263 | 0 | 0 | 0 | 1360 | 0 |
| Switzerland | 950 | 1969 | 523 | 0 | 0 | 0 | 3442 | 72 |
| Ukraine | 12 | 0 | 25 | 0 | 0 | 0 | 37 | 0 |
| Total | 46919 | 61148 | 4202 | 9799 | 3065 | 1638 | 126808 | 1780 |

Countries reporting no activity on bovine embryo transfers:

Bosnia Herzegovina, Croatia, Estonia, Latvia, Macedonia, Serbia, Slovakia, Turkey

Embryo Activities in other Species

| Country | Sheep & goat | | | | |
|----------------|----------------|--------------------|---------------------|-------------|------------|
| | N° collections | N° embryo produced | N° embryo transfers | Fresh | Frozen |
| Greece | 3 | 18 | 18 | 18 | 0 |
| Hungary | 3 | 12 | 9 | 9 | 0 |
| Norway | | | 250 | | 250 |
| Spain | 7 | 41 | 57 | 9 | 48 |
| Sweden | | | 125 | | 125 |
| Turkey – sheep | 6 | 90 | 90 | 0 | 90 |
| UK | 504 | 4691 | 4405 | 4258 | 147 |
| Total | 523 | 4852 | 4954 | 4294 | 660 |
| Turkey – goat | 9 | 72 | 72 | 0 | 72 |

| Country | Horse | | | | |
|-------------------------------|----------------------|----------------------|---------------------|------------|----------|
| | N° collections | N° embryos produced | N° embryo transfers | Fresh | Frozen |
| France | 845 | 510 | 510 | 510 | 0 |
| Hungary | 7 | 4 | 4 | 4 | 0 |
| Poland | 25 | 21 | 21 | 21 | 0 |
| Sweden | 28 | 16 | 16 | 16 | 0 |
| Switzerland | 81 | 43 | 16 | | |
| Total (<i>In vivo</i>) | 986 | 594 | 567 | 567 | 0 |
| | N° OPU-ICSI sessions | N° oocytes collected | N° embryo produced | Fresh | Frozen |
| Italy (<i>In vitro</i>) | 594 | 6273 | 551 | 29 | 121 |

Overview

The data collection form was sent to 38 countries, of which 31 replied. The presented data are based on embryo transfer activities for breeding and commercial embryo production reported by these European countries (countries that have at least part of their country in Europe) in 2015. The presented data include numbers on embryo production (MOET and OPU-IVP) and transfers for bovine and other species (sheep, goat and horse). These data are included in the report of the International Embryo Technology Society (IETS Data Retrieval Committee) on embryo transfer activities worldwide.

Bovine in vivo embryo production

Out of the 31 countries returning the data collection form, eight countries reported that they had no activity in bovine ET. Among all countries reporting, there were 180 approved embryo collection teams, out of which 124 (69%) provided data. However, not all approved teams perform ET actively. It is estimated, that the data collected represents more than 69% of the total activity, because some of the non-replying teams are inactive.

The total number of embryo collections from superovulated donors was 20,497 (2014: 22,490). Of all collections, 79% were performed on dairy breeds and 21% on beef breeds. This resulted in production of 127,980 transferable embryos (2014: 138,418). The mean number of transferable embryos per collection was 6.24. Countries reporting embryo collections are presented in Figure 1 and the number of embryo collections on 2015 and previous years are shown in Figure 2.

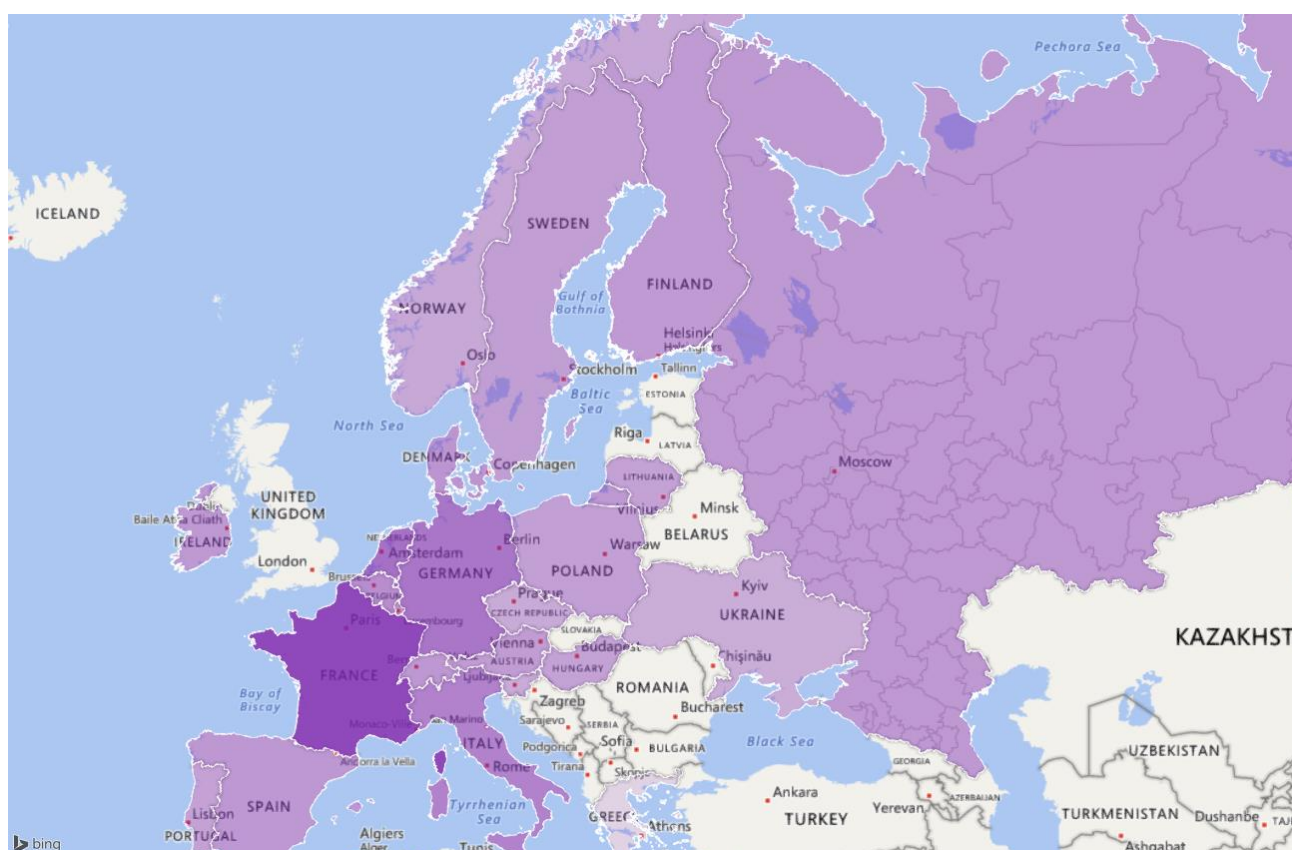


Fig. 1: Countries reporting and having activity in bovine *in vivo* embryo production (coloured).

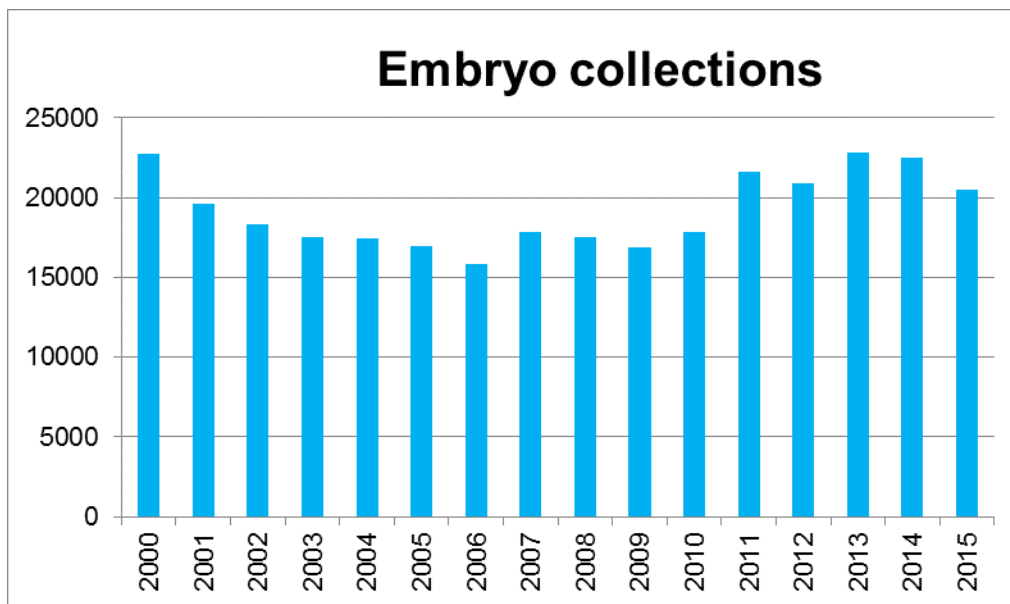


Fig. 2: *In vivo* embryo production in Europe (number of collections)

The number of embryo collections on dairy breeds in relation to the number of dairy cows in the country are presented in Table 1. The use of sex-sorted semen for superovulated donors was reported by 11 countries. Sex-sorted semen was used in 6.6% of collections.

Table 1: The number of embryo collections on dairy breeds per 1000 dairy cows.

| Country | Collections/ 1000 cows |
|-------------|------------------------|
| Luxembourg | 4,36 |
| Netherlands | 2,05 |
| France | 1,54 |
| Finland | 1,18 |
| Italy | 0,96 |
| Denmark | 0,92 |
| Switzerland | 0,78 |
| Sweden | 0,58 |
| Germany | 0,52 |
| Spain | 0,52 |
| Belgium | 0,47 |
| Portugal | 0,36 |
| Ireland | 0,34 |
| Austria | 0,25 |
| Lithuania | 0,23 |
| Poland | 0,08 |
| Slovenia | 0,06 |
| Hungary | 0,06 |
| Greece | 0,03 |

Bovine in vitro embryo production

Eight countries reported activity in bovine OPU in 2015 (Austria, Finland, France, Germany, Italy, The Netherlands, Russian Federation and Spain). The total number of OPU sessions was 9,092 (2014: 9,710). This resulted in a production of 13,780 transferable embryos (2014: 15,693). The mean embryo production was 1.5 embryos per session. In addition to bovine OPU, Italy reported activity in equine OPU, with 594 OPU-ICSI sessions. Bovine OPU-IVP sessions of 2015 and previous years are shown in Figure 3.

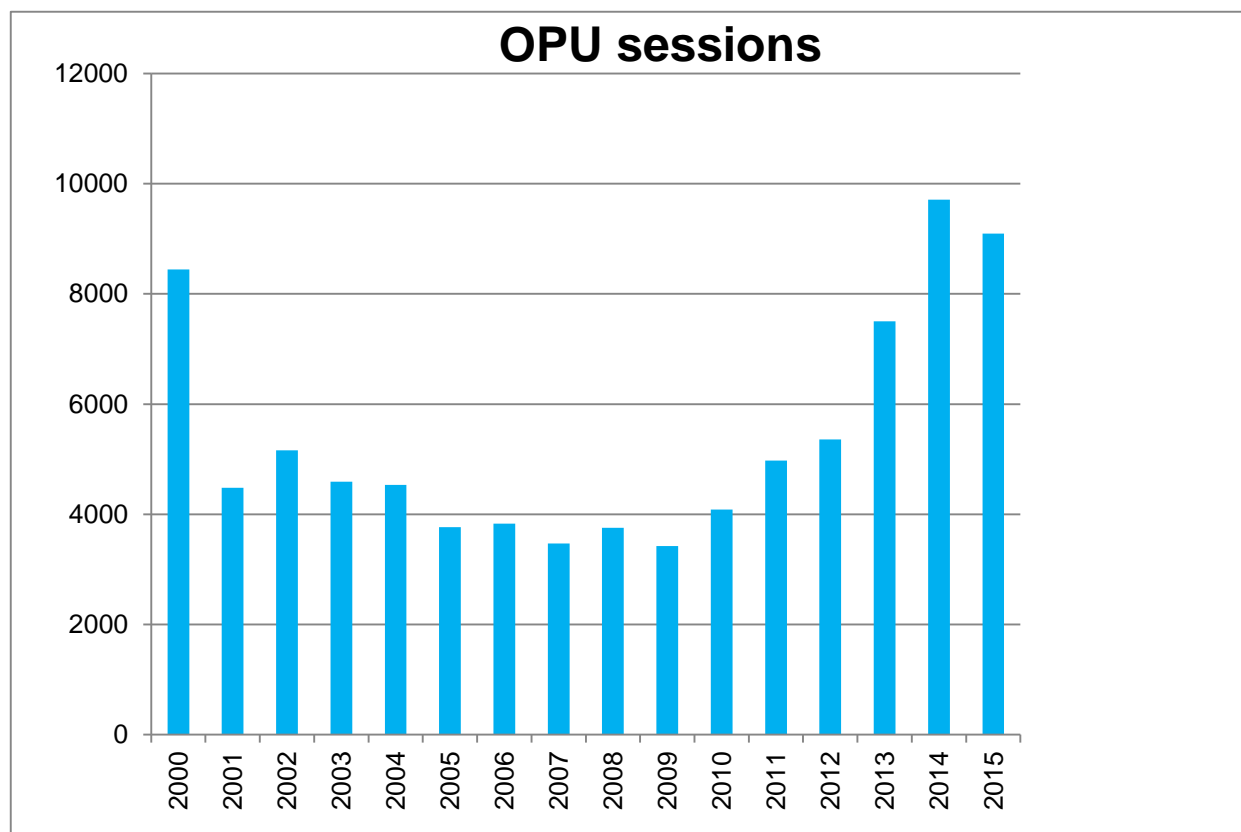


Fig. 3: In vitro embryo production in Europe (number of OPU sessions).

Embryo genotyping

Embryo biopsy for genotyping was applied in three countries (France, Germany and The Netherlands). A total of 1095 *in vivo* and 38 *in vitro* embryos were genotyped.

Embryo transfers

The number of embryos transferred amounts to 126,808 (2014: 137,802). The proportion of IVP embryos of all transfers was 11.4% (Figure 4). The proportion of frozen embryos was 51% and 32% for *in vivo* and *in vitro* embryos, respectively. Countries reporting more than 1000 embryo transfers are listed in Table 2.

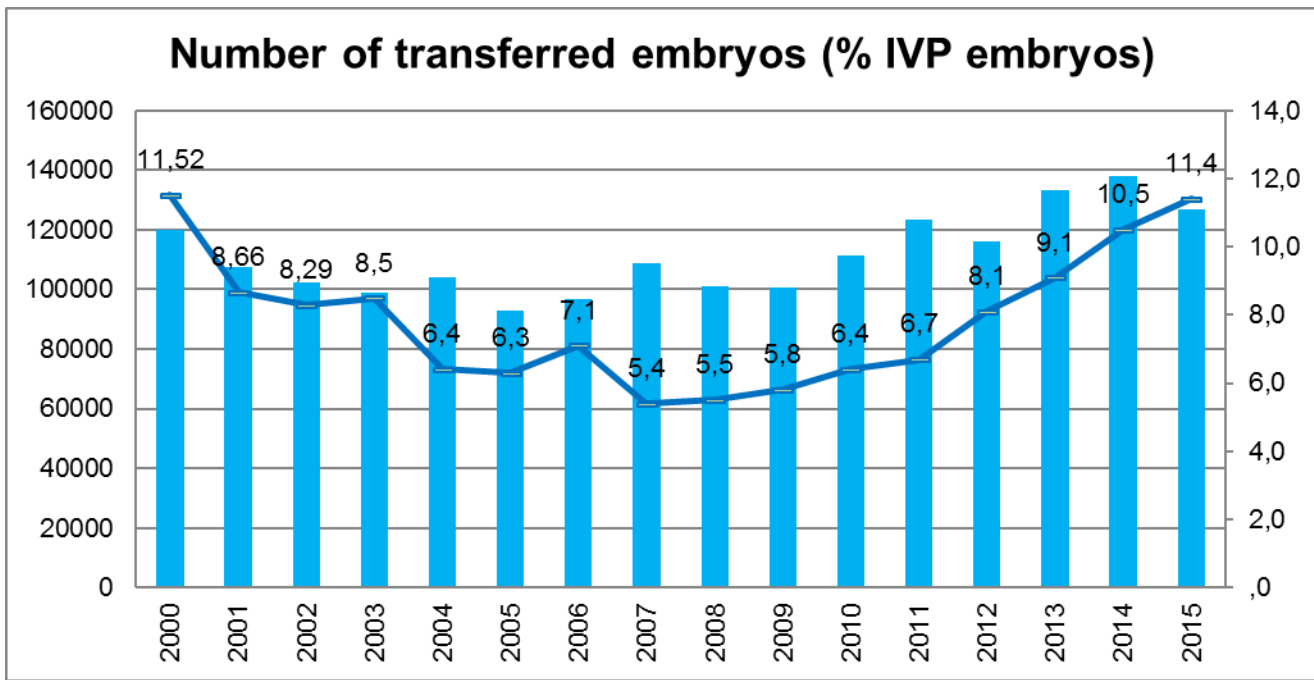


Fig.4: Total number of embryos transferred in Europe with the percentage of IVP embryos.

Table 2: Countries reporting >1000 embryo transfers

| Country | Total |
|--------------------|-------|
| France | 37627 |
| The Netherlands | 28664 |
| Germany | 22605 |
| Italy | 7668 |
| Belgium | 6151 |
| Russian Federation | 3731 |
| Switzerland | 3442 |
| Denmark | 3245 |
| Finland | 2911 |
| Spain | 2392 |
| Luxembourg | 1572 |
| Ireland | 1470 |
| Sweden | 1360 |
| Austria | 1260 |
| Poland | 1196 |

Other species

Data for embryo transfer activities in sheep, goat and equine are shown in Figure 5. There were no countries reporting on swine embryo production.

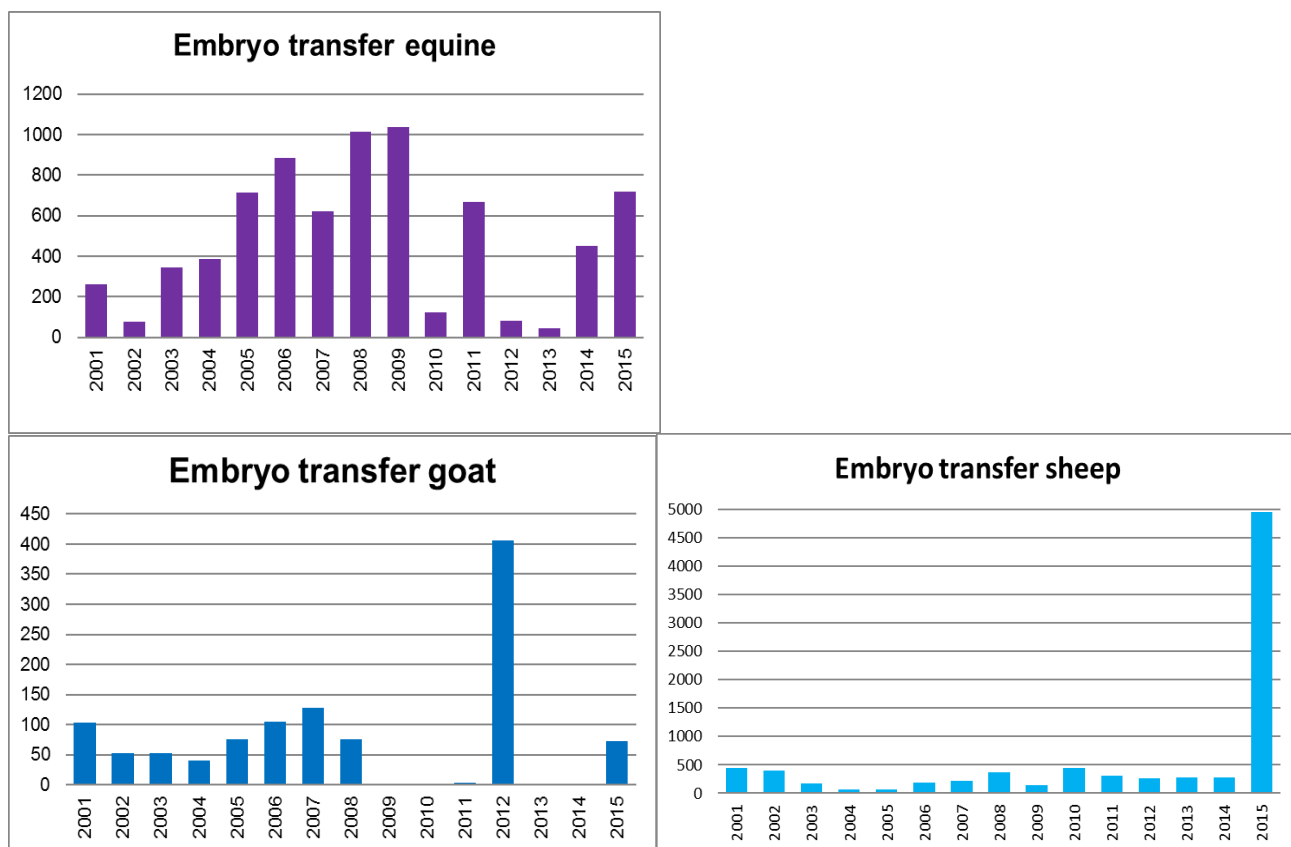


Fig. 5: Number of embryo transfers in other species.

Conclusions

- Data were collected from 31 countries, of which 24 reported of activity in bovine and/or other species. There were 180 approved embryo collection teams, out of which 124 (69%) provided data.
- The number of reported embryo collections and transfers in Europe decreased in 2015 compared to two previous years for *in vivo* embryos.
- For *in vitro* embryos, the number of OPU-sessions decreased slightly (6%), but there was a moderate increase on the number of IVP embryo transfers. The proportion of *in vitro* embryos of all transferred embryos has been increasing by approximately one percentage points during the last years.

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