

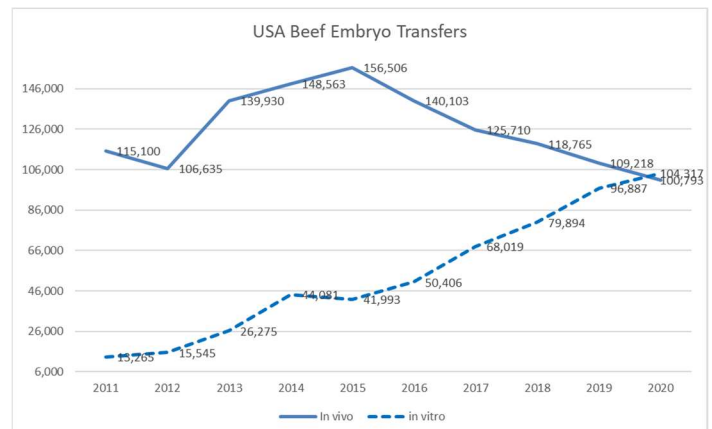
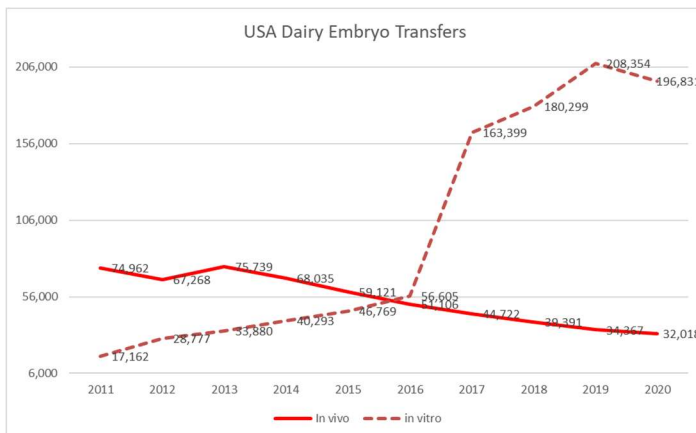
2021 STATISTICAL INFORMATION COMMITTEE REPORT (2020 DATA)

By Daniela Demetrio and Charles Looney

Data from 132 surveys including 223 embryo practitioners, 117 AETA certified Embryo Transfer Businesses (ETBs) are summarized below.

- 126 ETBs transferred embryos.
- 36 ETBs reported beef on dairy embryo transfers.
- 112 ETBs flushed cows.
- 42 ETBs performed OPUs.
- 45 ETBs exported 29,262 embryos to 49 countries (increase of 19% from 2019).
- 19 IVP labs (fertilized oocytes and cultured embryos *in vitro*) reported data (some companies have labs in different States but were reported as one).

The graphs below illustrate the number of Dairy and Beef *in vivo* and *in vitro* embryo transfers in the USA in the last 10 years.



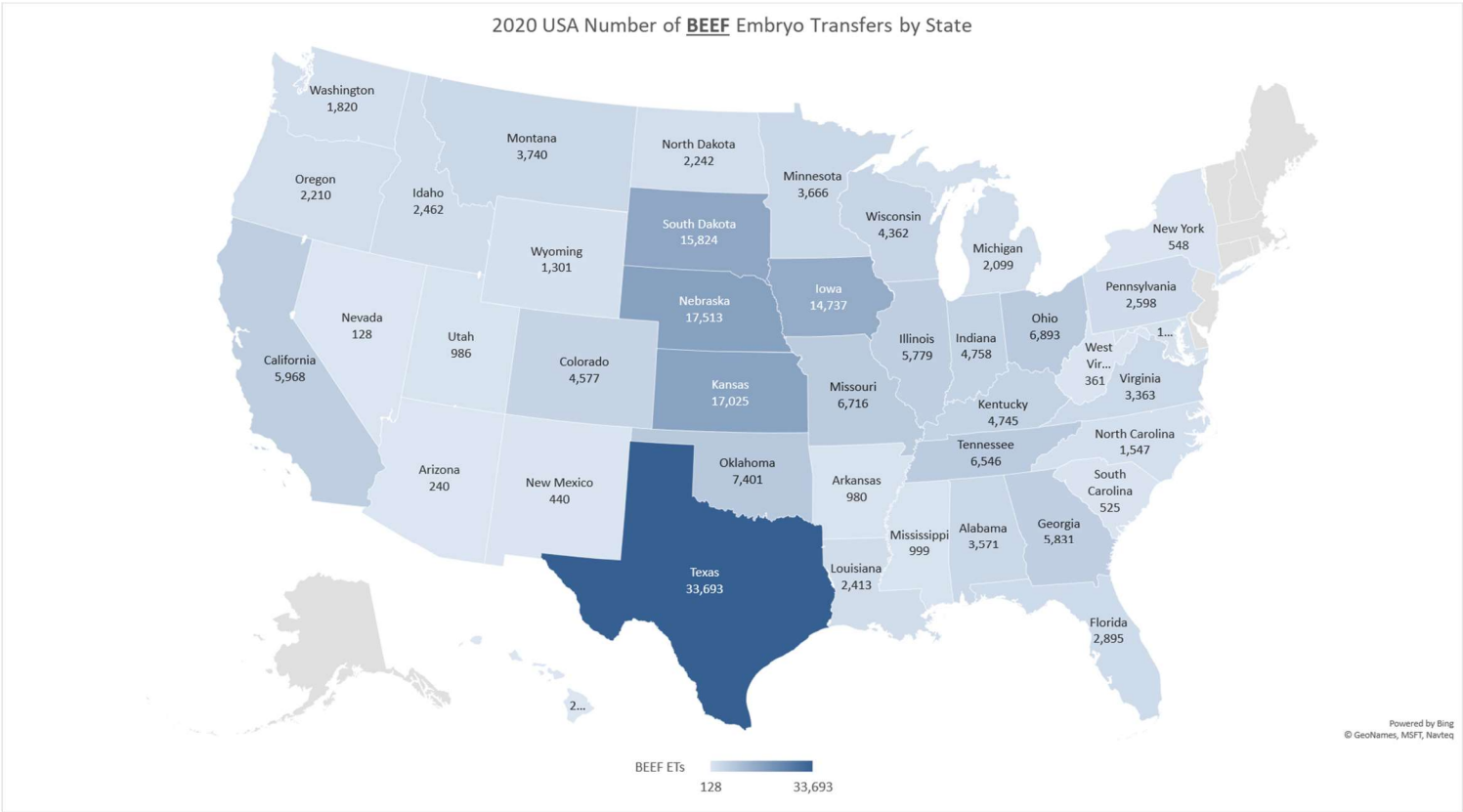
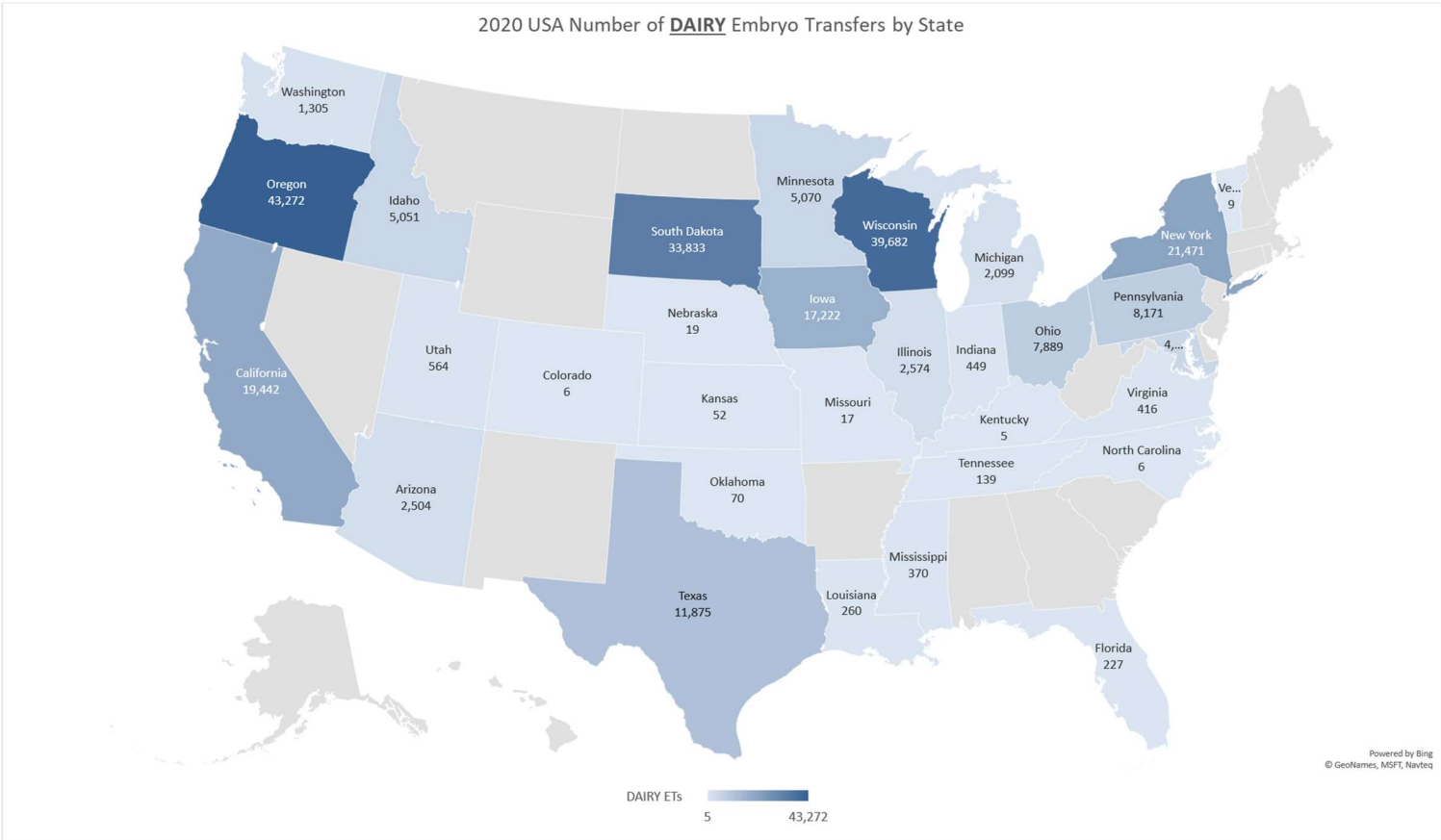
2020 USA BOVINE EMBRYO TRANSFERS

| | | IN VIVO | | | IN VITRO | | | TOTAL | | |
|--------------|--------------|----------------|---------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| | | FRESH | FROZEN | TOTAL | FRESH | FROZEN | TOTAL | FRESH | FROZEN | TOTAL |
| DAIRY | TOTAL | 17,310 | 14,708 | 32,018 | 140,508 | 56,323 | 196,831 | 157,818 | 71,031 | 228,849 |
| | % | 54% | 46% | 14% | 71% | 29% | 86% | 69% | 31% | 53% |
| BEEF | TOTAL | 30,378 | 70,415 | 100,793 | 37,112 | 67,205 | 104,317 | 67,490 | 137,620 | 205,110 |
| | % | 30% | 70% | 49% | 36% | 64% | 51% | 33% | 67% | 47% |
| TOTAL | TOTAL | 47,688 | 85,123 | 132,811 | 177,620 | 123,528 | 301,148 | 225,308 | 208,651 | 433,959 |
| | % | 36% | 64% | 31% | 59% | 41% | 69% | 52% | 48% | |

2020 USA BOVINE EMBRYO TRANSFERS BY STATE AND NUMBER OF ETBS

| STATE | DAIRY ETs | | | BEEF ETs | | | TOTAL ETs | |
|----------------|----------------|--------|------|----------------|--------|------|----------------|--------|
| | TOTAL | % | ETBs | TOTAL | % | ETBs | TOTAL | % |
| Alabama | | 0.00% | | 3,571 | 1.74% | 7 | 3,571 | 0.82% |
| Arizona | 2,504 | 1.09% | 1 | 240 | 0.12% | 1 | 2,744 | 0.63% |
| Arkansas | | 0.00% | | 980 | 0.48% | 4 | 980 | 0.23% |
| California | 19,442 | 8.50% | 6 | 5,968 | 2.91% | 8 | 25,410 | 5.86% |
| Colorado | 6 | 0.00% | 1 | 4,577 | 2.23% | 5 | 4,583 | 1.06% |
| Florida | 227 | 0.10% | 2 | 2,895 | 1.41% | 5 | 3,122 | 0.72% |
| Georgia | | 0.00% | | 5,831 | 2.84% | 7 | 5,831 | 1.34% |
| Hawai | | 0.00% | | 200 | 0.10% | 1 | 200 | 0.05% |
| Idaho | 5,051 | 2.21% | 3 | 2,462 | 1.20% | 6 | 7,513 | 1.73% |
| Illinois | 2,574 | 1.12% | 8 | 5,779 | 2.82% | 9 | 8,353 | 1.92% |
| Indiana | 449 | 0.20% | 4 | 4,758 | 2.32% | 11 | 5,207 | 1.20% |
| Iowa | 17,222 | 7.53% | 6 | 14,737 | 7.19% | 10 | 31,959 | 7.36% |
| Kansas | 52 | 0.02% | 1 | 17,025 | 8.30% | 8 | 17,077 | 3.94% |
| Kentucky | 5 | 0.00% | 1 | 4,745 | 2.31% | 9 | 4,750 | 1.09% |
| Louisiana | 260 | 0.11% | 1 | 2,413 | 1.18% | 3 | 2,673 | 0.62% |
| Maryland | 4,785 | 2.09% | 3 | 1,403 | 0.68% | 2 | 6,188 | 1.43% |
| Michigan | 2,099 | 0.92% | 4 | 2,099 | 1.02% | 4 | 4,198 | 0.97% |
| Minnesota | 5,070 | 2.22% | 6 | 3,666 | 1.79% | 6 | 8,736 | 2.01% |
| Mississippi | 370 | 0.16% | 1 | 999 | 0.49% | 1 | 1,369 | 0.32% |
| Missouri | 17 | 0.01% | 1 | 6,716 | 3.27% | 6 | 6,733 | 1.55% |
| Montana | | 0.00% | | 3,740 | 1.82% | 5 | 3,740 | 0.86% |
| Nebraska | 19 | 0.01% | 1 | 17,513 | 8.54% | 12 | 17,532 | 4.04% |
| Nevada | | 0.00% | | 128 | 0.06% | 1 | 128 | 0.03% |
| New Mexico | | 0.00% | | 440 | 0.21% | 2 | 440 | 0.10% |
| New York | 21,471 | 9.38% | 9 | 548 | 0.27% | 6 | 22,019 | 5.07% |
| North Carolina | 6 | 0.00% | 1 | 1,547 | 0.75% | 5 | 1,553 | 0.36% |
| North Dakota | | 0.00% | | 2,242 | 1.09% | 4 | 2,242 | 0.52% |
| Ohio | 7,889 | 3.45% | 9 | 6,893 | 3.36% | 14 | 14,782 | 3.41% |
| Oklahoma | 70 | 0.03% | 1 | 7,401 | 3.61% | 8 | 7,471 | 1.72% |
| Oregon | 43,272 | 18.91% | 4 | 2,210 | 1.08% | 5 | 45,482 | 10.48% |
| Pennsylvania | 8,171 | 3.57% | 11 | 2,598 | 1.27% | 9 | 10,769 | 2.48% |
| South Carolina | | 0.00% | | 525 | 0.26% | 3 | 525 | 0.12% |
| South Dakota | 33,833 | 14.78% | 1 | 15,824 | 7.72% | 7 | 49,657 | 11.44% |
| Tennessee | 139 | 0.06% | 1 | 6,546 | 3.19% | 8 | 6,685 | 1.54% |
| Texas | 11,875 | 5.19% | 3 | 33,693 | 16.43% | 15 | 45,568 | 10.50% |
| Utah | 564 | 0.25% | 3 | 986 | 0.48% | 3 | 1,550 | 0.36% |
| Vermont | 9 | 0.00% | 1 | | 0.00% | | 9 | 0.00% |
| Virginia | 416 | 0.18% | 4 | 3,363 | 1.64% | 7 | 3,779 | 0.87% |
| Washington | 1,305 | 0.57% | 3 | 1,820 | 0.89% | 4 | 3,125 | 0.72% |
| West Virginia | | 0.00% | | 361 | 0.18% | 3 | 361 | 0.08% |
| Wisconsin | 39,682 | 17.34% | 18 | 4,362 | 2.13% | 15 | 44,044 | 10.15% |
| Wyoming | | 0.00% | | 1,301 | 0.63% | 4 | 1,301 | 0.30% |
| TOTAL | 228,854 | | | 205,105 | | | 433,959 | |

Embryo transfer numbers per State were calculated based on the % of work provided by members on the survey. The 3 highest numbers per State in each category are highlighted.



2020 USA BOVINE IN VIVO EMBRYO PRODUCTION (SUPERVOVULATION/FLUSH)

| | COLLECTIONS | | | TOTAL OVA | | VIABLE EMBRYOS | | | FRESH ETs | | FROZEN | |
|--------------|-------------|---------------|---------------------|----------------|-------------|----------------|------------|------------|---------------|------------|----------------|------------|
| | ETBs | # | % using Sexed Semen | # | Average | # | Average | % | # | % | # | % |
| DAIRY | 66 | 8,415 | 45% | 67,398 | 8.0 | 41,928 | 4.8 | 60% | 16,700 | 40% | 25,232 | 60% |
| BEEF | 97 | 15,519 | 7% | 185,071 | 11.8 | 106,084 | 6.8 | 57% | 28,884 | 27% | 77,196 | 73% |
| TOTAL | 162 | 23,934 | 22% | 252,469 | 10.5 | 148,012 | 6.2 | 58% | 45,584 | 31% | 102,428 | 69% |

2020 USA BOVINE IN VITRO EMBRYO PRODUCTION (IVP)

| <i>All ETBs that performed OPU</i> | DAIRY | | | BEEF | | | TOTAL | | |
|---------------------------------------|-------------|----------|-----------|-------------|----------|---------|-------------|-----------|-----------|
| | WITHOUT FSH | WITH FSH | TOTAL | WITHOUT FSH | WITH FSH | TOTAL | WITHOUT FSH | WITH FSH | TOTAL |
| Number of ETBs | 10 | 26 | 36 | 11 | 28 | 39 | 12 | 30 | 42 |
| Total OPUs | 34,107 | 51,163 | 85,270 | 10,752 | 25,956 | 36,708 | 44,859 | 77,119 | 121,978 |
| Total Oocytes Recovered | 563,782 | 897,691 | 1,461,473 | 235,800 | 679,393 | 915,193 | 799,582 | 1,577,084 | 2,376,666 |
| Recovered Oocytes per OPU | 16.5 | 17.5 | 17.1 | 21.9 | 26.2 | 24.9 | 17.8 | 20.5 | 19.5 |
| % of OPUs fertilized with Sexed Semen | 82% | | | 34% | | | 68% | | |
| <i>ETBs with IVF labs only</i> | DAIRY | | | BEEF | | | TOTAL | | |
| | WITHOUT FSH | WITH FSH | TOTAL | WITHOUT FSH | WITH FSH | TOTAL | WITHOUT FSH | WITH FSH | TOTAL |
| Number of ETBs | 6 | 9 | 15 | 6 | 11 | 17 | 8 | 11 | 19 |
| Total OPUs | 33,877 | 45,435 | 79,312 | 9,489 | 24,340 | 33,829 | 43,366 | 69,775 | 113,141 |
| Total Oocytes Recovered | 561,741 | 800,017 | 1,361,758 | 209,113 | 648,323 | 857,436 | 770,854 | 1,448,340 | 2,219,194 |
| Oocytes per OPU | 16.6 | 17.6 | 17.2 | 22.0 | 26.6 | 25.3 | 17.8 | 20.8 | 19.6 |
| Fertilized Oocytes | 368,390 | 693,391 | 1,061,781 | 162,207 | 558,378 | 720,585 | 530,597 | 1,251,769 | 1,782,366 |
| Fertilized Oocytes per OPU | 10.9 | 15.3 | 13.4 | 17.1 | 22.9 | 21.3 | 12.2 | 17.9 | 15.8 |
| Total Viable Embryos | 87,177 | 215,803 | 302,980 | 41,106 | 182,705 | 223,811 | 128,283 | 398,508 | 526,791 |
| Viable Embryos per OPU | 2.6 | 4.7 | 3.8 | 4.3 | 7.5 | 6.6 | 3.0 | 5.7 | 4.7 |
| % Viable Embryos (Viable/Recovered) | 16% | 27% | 22% | 20% | 28% | 26% | 17% | 28% | 24% |
| % Viable Embryos (Viable/Fertilized) | 24% | 31% | 29% | 25% | 33% | 31% | 24% | 32% | 30% |
| Total Frozen (in the production lab) | 27,375 | 68,920 | 96,295 | 30,664 | 134,752 | 165,416 | 58,039 | 203,672 | 261,711 |
| % Frozen | 31% | 32% | 32% | 75% | 74% | 74% | 45% | 51% | 50% |
| Total Transferred Fresh or Discarded | 59,802 | 146,883 | 206,685 | 10,442 | 47,953 | 58,395 | 70,244 | 194,836 | 265,080 |
| % Transferred Fresh or Discarded | 69% | 68% | 68% | 25% | 26% | 26% | 55% | 49% | 50% |

The data for this table were divided in 2 categories: companies that predominantly use FSH for OPU cows (WITH FSH) or don't (WITHOUT FSH).

Fertilized oocytes – oocytes that went to fertilization or cleaved. Viable embryos – Day 6 embryos sent from the lab to a practitioner (not necessarily will be transferred or frozen on day 7) and/or Day 7 embryos transferred fresh, frozen, or discarded.

2020 USA BOVINE EMBRYOS EXPORTED BY COUNTRY

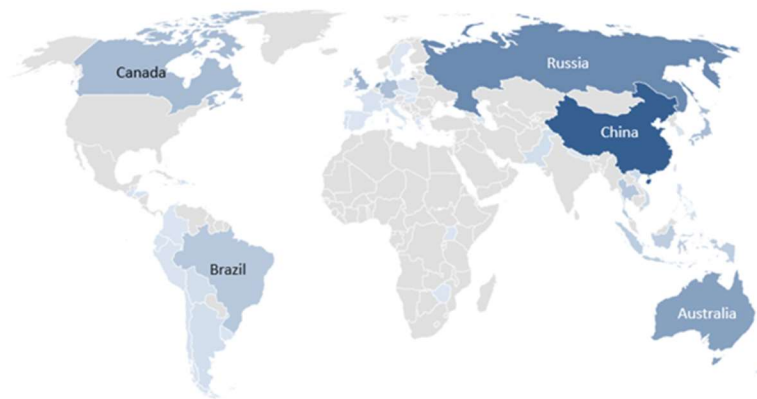
| COUNTRY | IN VIVO | | IN VITRO | | TOTAL |
|--------------------|---------------|--------------|--------------|--------------|---------------|
| | DAIRY | BEEF | DAIRY | BEEF | |
| Argentina | 69 | 174 | 62 | | 305 |
| Australia | 1,684 | 239 | 119 | 797 | 2,839 |
| Azerbaijan | 20 | | | | 20 |
| Bolivia | | | | 303 | 303 |
| Brazil | 598 | 608 | 14 | | 1,220 |
| Canada | 297 | 32 | 357 | 1,064 | 1,750 |
| Chile | | 108 | | | 108 |
| China | 5,153 | 418 | | | 5,571 |
| Colombia | 7 | | 52 | | 59 |
| Czech Republic | 28 | | 3 | | 31 |
| Denmark | 7 | 20 | 3 | 23 | 53 |
| Dominican Republic | 56 | | | 16 | 72 |
| Ecuador | 49 | | | 415 | 464 |
| European Union | 18 | | 35 | 3 | 56 |
| France | 63 | 27 | 27 | | 117 |
| Germany | 862 | 101 | 585 | 56 | 1,604 |
| Great Britain | | | | 6 | 6 |
| Greece | 12 | | | | 12 |
| Guatemala | | | 123 | | 123 |
| Honduras | | 29 | | 50 | 79 |
| Hungary | 28 | | | | 28 |
| Indonesia | | | 1,000 | | 1,000 |
| Ireland | 68 | | 62 | 15 | 145 |
| Israel | | 15 | | | 15 |
| Italy | 61 | | 18 | | 79 |
| Japan | 1,701 | 3 | | | 1,704 |
| Korea | 87 | | | | 87 |
| Nepal | 40 | | | | 40 |
| Netherlands | 1,757 | | 891 | 8 | 2,656 |
| New Zealand | 27 | 31 | 14 | | 72 |
| Pakistan | 327 | | | | 327 |
| Peru | 93 | | | | 93 |
| Philippines | 100 | 91 | | | 191 |
| Poland | | | 117 | | 117 |
| Portugal | | | | 75 | 75 |
| Puerto Rico | 9 | | | | 9 |
| Russia | 3,439 | | 79 | 250 | 3,768 |
| Scotland | | 19 | | | 19 |
| Slovakia | 20 | | 8 | | 28 |
| Spain | 1 | | | | 1 |
| Sweden | | 11 | | | 11 |
| Switzerland | 24 | 50 | 44 | | 118 |
| Taiwan | | 22 | | | 22 |
| Thailand | | 751 | | 492 | 1,243 |
| Uganda | | 50 | | | 50 |
| United Kingdom | 377 | 63 | 992 | 548 | 1,980 |
| Uruguay | 5 | | 58 | 16 | 79 |
| Vietnam | 66 | 437 | | | 503 |
| Zimbabwe | | 10 | | | 10 |
| TOTAL | 17,153 | 3,309 | 4,663 | 4,137 | 29,262 |

2020 USA BOVINE EMBRYOS EXPORTED BY BREED

| BREED | IN VIVO | IN VITRO | TOTAL |
|--------------------|---------------|--------------|---------------|
| Ayrshire | | 20 | 20 |
| Brown Swiss | 339 | 26 | 365 |
| Guernsey | 16 | 83 | 99 |
| Holstein | 16,588 | 3,350 | 19,938 |
| Jersey | 210 | 1,184 | 1,394 |
| TOTAL DAIRY | 17,153 | 4,663 | 21,816 |

| BREED | IN VIVO | IN VITRO | TOTAL |
|-------------------|--------------|--------------|--------------|
| Akaushi | 50 | | 50 |
| American Bucking | | 132 | 132 |
| Angus | 1,855 | 1,712 | 3,567 |
| Beef Master | 10 | 40 | 50 |
| Brahman | | 1,316 | 1,316 |
| Brangus | 606 | 25 | 631 |
| Charolais | 25 | 11 | 36 |
| Crossbred | 3 | 211 | 214 |
| Hereford | 22 | 74 | 96 |
| Limousin | | 11 | 11 |
| Red Angus | 10 | 147 | 157 |
| Santa Gertrudis | | 50 | 50 |
| Shorthorn | 7 | | 7 |
| Simmental | 397 | 14 | 411 |
| Speckled Park | 5 | 20 | 25 |
| Texas Longhorn | 10 | | 10 |
| Wagyu | 309 | 374 | 683 |
| TOTAL BEEF | 3,309 | 4,137 | 7,446 |

2020 USA Bovine Embryo Exports

**2020 EMBRYOS IMPORTED INTO THE USA**

| COUNTRY | BOVINE Dairy | BOVINE Beef | OVINE |
|--------------|--------------|-------------|-----------|
| Australia | 14 | 145 | |
| Canada | 117 | 55 | |
| Italy | | 7 | |
| New Zealand | | | 52 |
| Spain | | 160 | |
| TOTAL | 131 | 367 | 52 |

2020 USA Equine Embryo Transfer / In-Vitro Embryo Production

Number of Submissions: 7 (2 AETA Members)

| | |
|---|-------|
| Embryo recovery from mares via uterine flush (in vivo recovery) | |
| Number of recovery procedures performed | 1574 |
| Number of recovered embryos | 788 |
| Average | 0.5 |
| Transfer of IN-VIVO RECOVERED embryos to recipient mares | |
| Number of FRESH embryos (recovered at your facility or shipped to you by others) transferred to recipient mares at your facility | 1695 |
| Number of CRYOPRESERVED / warmed embryos (recovered at your facility or shipped to you by others) transferred to recipient mares at your facility | 185 |
| Total Transfers | 1880 |
| Oocyte recovery procedures (TVA, OPU, flank) for in vitro embryo production | |
| Number of oocyte recovery procedures performed | 1518 |
| Number of immature oocytes recovered (oocytes recovered from diestrus/subordinate follicles) | 13541 |
| Number of in vivo-matured oocytes recovered (recovered from the stimulated dominant follicle) | 541 |
| If separation by oocyte type is not possible) Number of mixed oocytes | 39 |
| Embryo production via ICSI at your facility | |
| Number of cases (mare aspiration sessions) on which ICSI was performed | 1099 |
| Number of oocytes on which ICSI was performed | 6292 |
| Number of transferrable IVP blastocysts produced via ICSI | 1126 |
| Transfer of IVP embryos at your facility | |
| Number of FRESH IVP blastocysts transferred to the uteri of recipient mares at your facility (including fresh shipped IVP blastocysts) | 438 |
| Number of CRYOPRESERVED /warmed IVP blastocysts transferred to the uteri of recipient mares at your facility (including shipped cryopreserved IVP blastocysts) | 96 |

A separate survey is conducted for Equine. Thanks to Dr Katrin Hinrichs (University of Pennsylvania) and Dr Robert Foss (Equine Medical Services, Colombia, MO), we were able to collect detailed equine embryo transfer data from practitioners that are not associated to the AETA. They created the questionnaire above and distributed to equine practitioners around the country.

2020 USA OTHER SPECIES *IN VIVO* EMBRYO PRODUCTION

| Species | ETBs | Collection data | | | | | | | Transfer Data | | |
|---------|------|-----------------|-----------|--------|-------------|----------------|----------|--------|---------------|--------|-------|
| | | Collections | Total Ova | Viable | Average Ova | Average Viable | % Viable | Frozen | Fresh | Frozen | Total |
| Ovine | 12 | 1,323 | 11,745 | 8,808 | 8.9 | 6.7 | 75.0% | 489 | 8,319 | 457 | 8776 |
| Caprine | 10 | 1,488 | 20,498 | 10,465 | 13.8 | 7.0 | 51.1% | 1,302 | 9,163 | 899 | 10062 |

2020 USA OTHER SPECIES *IN VITRO* EMBRYO PRODUCTION

| Species | ETBs | OPUs | Total Oocytes | Oocytes per OPU | Fertilized Oocytes | Viable Embryos | Embryos per OPU | % Viable | Frozen | Fresh ET |
|---------|------|------|---------------|-----------------|--------------------|----------------|-----------------|----------|--------|----------|
| Ovine | 1 | 33 | 311 | 9.4 | 308 | 141 | 4.3 | 45.8% | 48 | 93 |
| Caprine | 2 | 383 | 8,525 | 22.3 | 7,902 | 2,275 | 5.9 | 28.8% | 894 | 1381 |
| Cervine | 1 | 5 | 77 | 15.4 | 74 | 15 | 3.0 | 20.3% | 15 | 0 |

2020 USA MICROMANIPULATED EMBRYOS

| Type of Manipulation | ETBs | <i>In vivo</i> | <i>In vitro</i> |
|------------------------------|------|----------------|-----------------|
| Embryos biopsed for Sexing | 4 | 176 | |
| Embryos biopsed for Genomics | 1 | 39 | 35 |
| Bisected Embryos | 3 | 158 | |

Survey data is only as good as the quality and integrity of the data submitted by people. Before submitting your survey, please take a second look and make sure everything is correct. There are a lot of minor errors that can probably be fixed without us having to contact you for clarification. Thank you for taking the time to submit your data, it benefits the whole embryo industry. A special thanks to non-certified members and non-members that voluntarily submitted data.

All the submitted data is analyzed by the Statistical Information Committee members and combined with the other submissions to be summarized. Individual embryo productions remain confidential at all times.

For any questions or suggestions for next year's survey, please contact:

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