

2024 Statistical Information Committee Report (2023 Data)

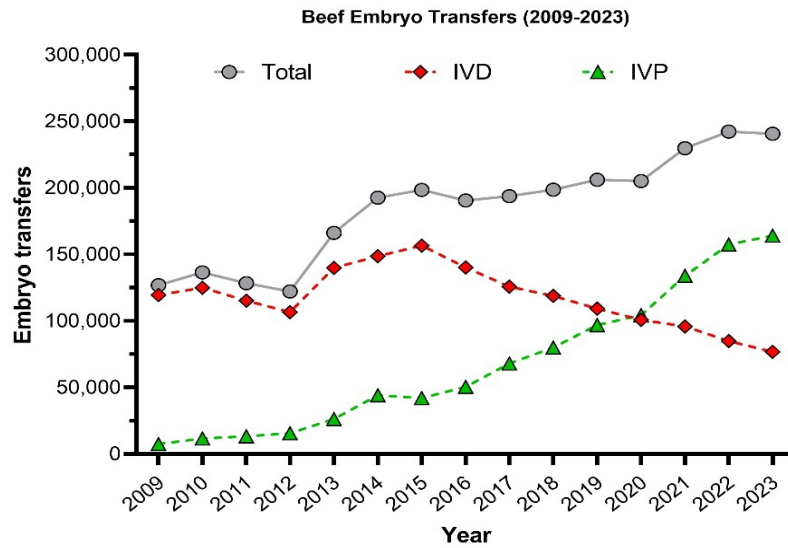
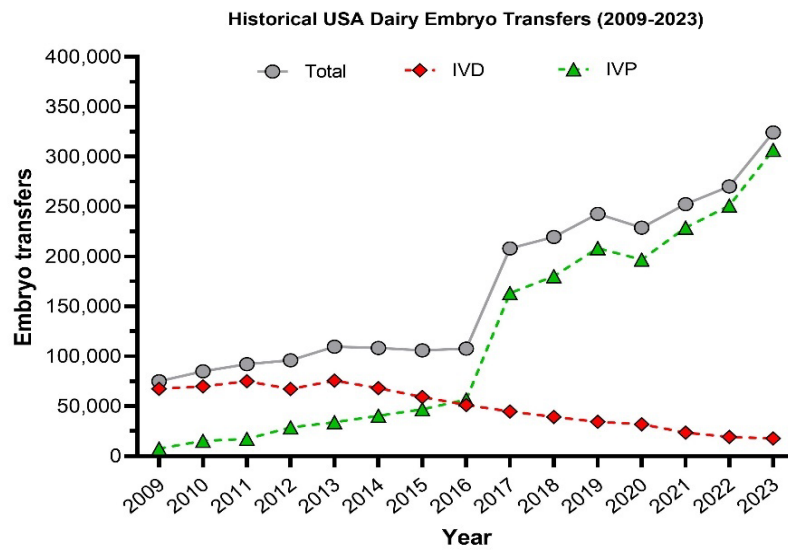
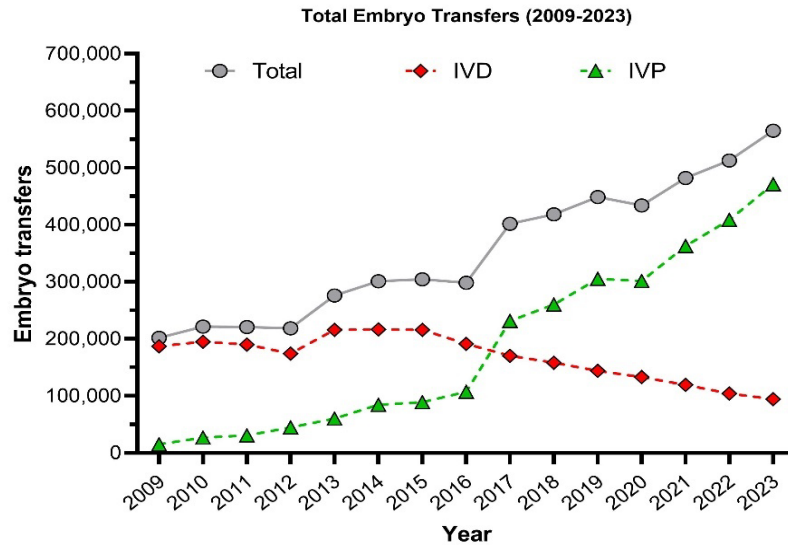
Charles R. Looney, Alvaro Garcia-Guerra, and Scott Larsen

- Summary from 117 surveys including 115 bovine practitioners, 112 Certified Embryo Transfer Business (ETBs):
- 115 ETBs transferred bovine embryos
- A total of 565,111 bovine embryos transferred (10% increase). In Vitro Produced (IVP) embryos transferred was 3.5 times greater than In Vivo Derived (IVD).
- 40 ETBs aspirated oocytes.
- 35 ETBs exported 24,114 bovine embryos to 38 countries. This was a decrease of 33% from last year.
- 31% of the embryos were exported to China, mainly dairy breeds.
- 13 IVP labs reported data.

2023 USA BOVINE EMBRYO TRANSFERS

		<i>IN VIVO</i>			<i>IN VITRO</i>			<i>TOTAL</i>		
		<i>FRESH</i>	<i>FROZEN</i>	<i>TOTAL</i>	<i>FRESH</i>	<i>FROZEN</i>	<i>TOTAL</i>	<i>FRESH</i>	<i>FROZEN</i>	<i>TOTAL</i>
DAIRY	<i>TOTAL</i>	8,678	8,945	17,623	215,378	91,420	306,798	224,056	100,365	324,421
	%	49	51	5	70	30	95	69	31	57
BEEF	<i>TOTAL</i>	27,180	49,474	76,654	62,699	101,337	164,036	89,879	150,811	240,690
	%	35	65	32	38	62	68	37	63	43
TOTAL	<i>TOTAL</i>	35,858	58,419	94,277	278,077	192,757	470,834	313,935	251,176	565,111
	%	38	62	17	59	41	83	56	44	

The graphs below illustrate the number of Total Dairy and Beef in vivo (IVD) and in vitro (IVP) embryo transfers in the USA from 2009 to 2023.

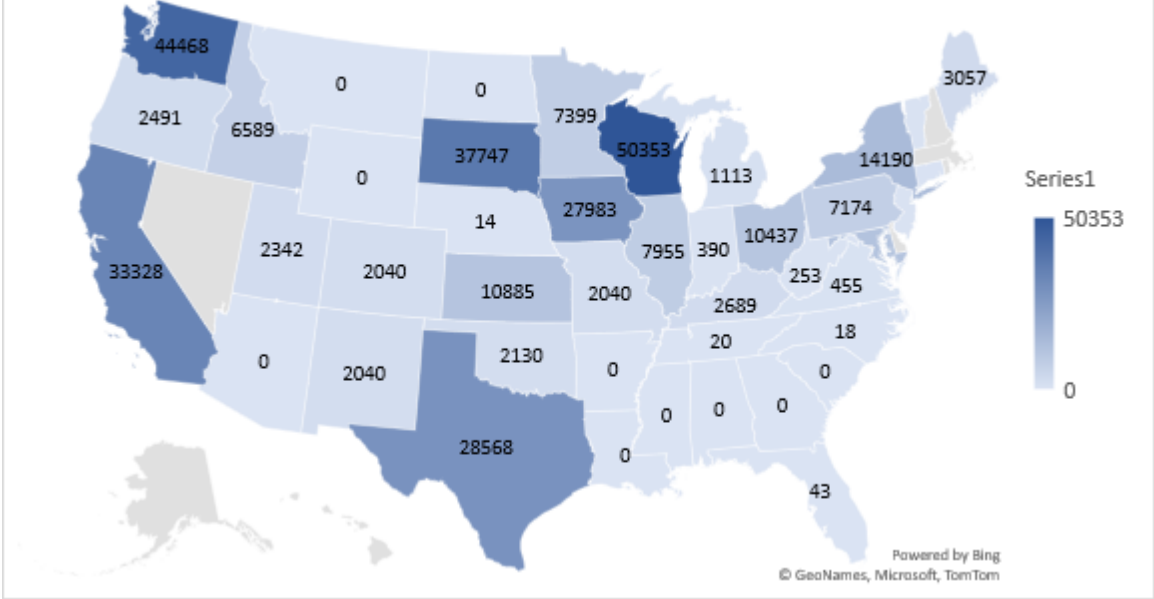


2023 USA BOVINE EMBRYO TRANSFERS BY STATE AND NUMBER OF ETBS

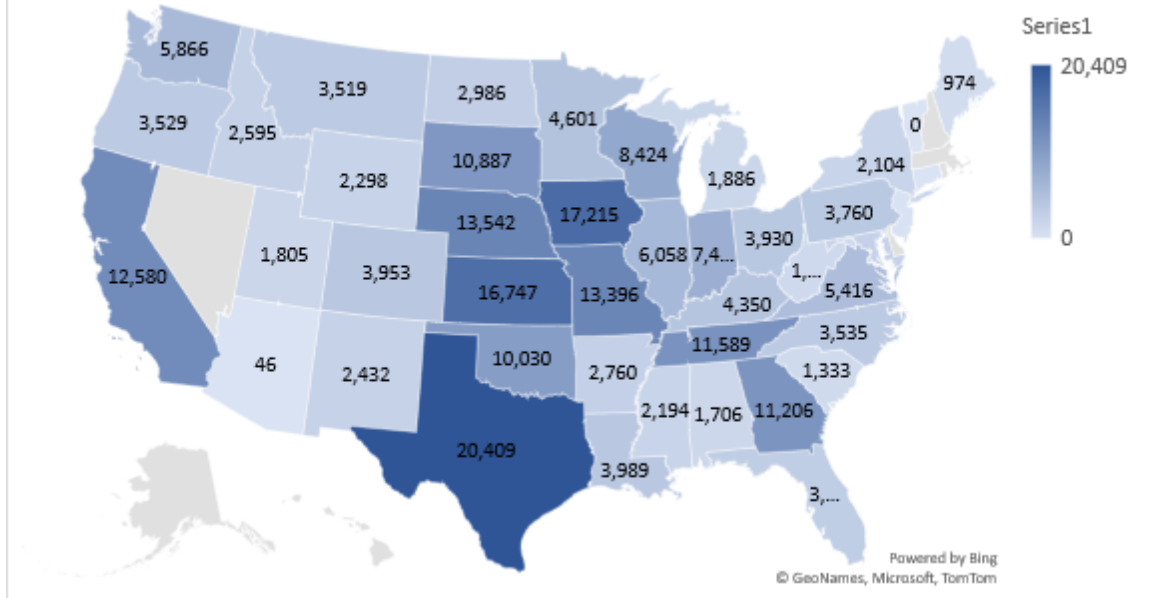
Embryo transfer numbers per State were calculated based on the % of work provided by members on the survey. The highest numbers per State in each category are highlighted (ETBs, Dairy or Beef).

STATE	ETB'S	DAIRY ET'S		BEEF ET'S		TOTAL	
		TOTAL	%	TOTAL	%	TOTAL	%
Alabama	6	0	00	1,706	.71	1,706	.30
Arizona	1	0	00	46	.02	46	.01
Arkansas	5	0	00	2,760	1.14	2,760	.49
California	19	33,328	10.27	12,580	5.23	45,908	8.12
Colorado	6	2,040	.63	3,953	1.64	5,993	1.06
Connecticut	2	188	.06	12	00	200	.04
Florida	7	43	.01	3,080	1.28	3,123	.55
Georgia	13	0	00	11,206	4.66	11,206	1.99
Idaho	8	6,589	2.03	2,595	1.08	9,184	1.63
Illinois	12	7,955	2.45	6,058	2.52	14,013	2.48
Indiana	11	390	.12	7,417	3.08	7,807	1.38
Iowa	14	27,983	8.63	17,215	7.15	45,198	8.00
Kansas	11	10,885	3.36	16,747	6.96	27,632	4.89
Kentucky	12	2,689	.83	4,350	1.81	7,039	1.25
Louisiana	3	0	00	3,989	1.66	3,989	.71
Maine	4	3,057	.94	974	.40	4,031	.71
Maryland	8	11,420	3.52	2,539	1.05	13,959	2.47
Michigan	7	1,113	.34	1,886	.78	2,999	.53
Minnesota	9	7,399	2.28	4,601	1.91	12,000	2.12
Mississippi	4	0	00	2,194	.91	2,194	.39
Missouri	6	2,040	.63	13,396	5.57	15,436	2.73
Montana	6	0	00	3,519	1.46	3,519	.62
Nebraska	11	14	00	13,542	5.63	13,556	2.40
New Jersey	2	349	.11	207	.09	556	.10
New Mexico	7	2,040	.63	2,432	1.01	4,472	.79
New York	11	14,190	4.37	2,104	.87	16,294	2.88
North Carolina	11	18	.01	3,535	1.47	3,553	.63
North Dakota	5	0	00	2,986	1.24	2,986	.53
Ohio	17	10,437	3.22	3,930	1.63	14,367	2.54
Oklahoma	8	2,130	.66	10,030	4.17	12,160	2.15
Oregon	8	2,491	.77	3,529	1.47	6,020	1.07
Pennsylvania	21	7,174	2.21	3,760	1.56	10,934	1.93
South Carolina	5	0	00	1,333	.55	1,333	.24
South Dakota	6	37,747	11.64	10,887	4.52	48,634	8.61
Tennessee	10	20	00	11,589	4.81	11,609	2.05
Texas	13	28,568	8.81	20,409	8.48	48,977	8.67
Utah	5	2,342	.72	1,805	.75	4,147	.73
United States	5	3,876	1.19	2,380	.99	6,256	1.11
Vermont	1	377	.12	0	00	377	.07
Virginia	11	455	.14	5,416	2.25	5,871	1.04
Washington	9	44,468	13.71	5,866	2.44	50,334	8.91
West Virginia	8	253	.08	1,405	.58	1,658	.29
Wisconsin	32	50,353	15.52	8,424	3.50	58,777	10.40
Wyoming	6	0	00	2,298	.95	2,298	.41
TOTAL		324,421		240,690		565,111	

2023 USA Numer of DAIRY Embryo Transfers by State



USA Number of BEEF Embryo Transfers by State



2023 USA BOVINE IN VIVO EMBRYO PRODUCTION

	COLLECTIONS			TOTAL OVA		VIABLE EMBRYOS			FRESH ETs		FROZEN ETs	
	ETB'S	#	% USING SEXED SEMEN	#	AVG	#	AVG	%	#	%	#	%
DAIRY	50	5618	37	74936	13.3	30536	5.44	41	8550	50	8658	50
BEEF	78	11888	5	138233	11.6	79128	6.66	57	24138	35	43874	65
TOTAL	128	17506		213169	12.5	109664	6.05	49	32688	43	52532	58

2023 USA BOVINE IN VITRO EMBRYO PRODUCTION

ALL ETBs that performed OPU	DAIRY	BEEF	TOTAL
Number of ETBs	37	38	40
Total OPUs	117,711	67,492	185,203
Total oocytes recovered	2,695,026	1,881,192	4,576,218
Recovered oocytes per OPU	22.9	27.8	24.7
% of OPUs stimulated with FSH	66.05	78.84	72.45
% of OPUs fertilized with sexed semen	61.7	29.58	45.64
ONLY ETBs with IVF labs	DAIRY	BEEF	TOTAL
Number of ETBs	12	13	13
Total OPUs	105,655	60,160	165,815
Total oocytes recovered	2,409,312	1,772,088	4,181,400
Oocytes per OPU	22.28	29.46	25.22
Fertilized oocytes	1,931,302	1,569,615	3,500,917
Fertilized oocytes per OPU	18.28	26.09	21.11
Total viable embryos	478,734	489,309	968,043
Viable embryos per OPU	4.53	8.13	5.84
% Viable embryos (viable/recovered)	19.87	27.61	23.15
% Viable embryos (viable/fertilized)	24.79	31.17	27.65
Total frozen (in the production lab)	150,565	78,507	229,072
% Frozen	31.45	16.04	23.66
Total transferred fresh or discarded	237,573	335,602	573,175
% Transferred fresh or discarded	49.63	68.59	59.21

2023 USA BOVINE EMBRYOS EXPORTED BY COUNTRY

COUNTRY	DAIRY		BEEF		TOTAL
	IN VIVO	IN VITRO	IN VIVO	IN VITRO	
Argentina	87	0	69	128	284
Australia	1,553	813	213	574	3,153
Belize	0	45	0	36	81
Brazil	646	303	53	94	1,096
Bulgaria	0	0	141	0	141
Canada	81	472	69	1,474	2,096
China	7,166	0	310	0	7,495
Columbia	0	5	0	0	5
Czech Republic	541	0	0	0	541
Denmark	0	8	0	0	8
England	112	0	0	0	112
Estonia	0	0	50	0	50
EU	35	0	0	0	35
France	106	494	96	0	696
Germany	455	789	182	0	1,426
Guatemala	0	0	0	115	115
Honduras	0	0	0	44	44
Hungary	16	0	36	0	52
Ireland	17	110	11	0	138
Italy	60	21	0	0	81
Japan	901	0	0	0	901
Mexico	0	0	0	40	40
Netherlands	858	2,088	25	5	2,976
New Zealand	99	0	0	0	99
Norway	0	0	15	5	20
Panama	0	0	0	30	30
Peru	0	0	30	0	30
Philippines	0	0	0	24	24
Russia	37	0	0	0	37
Slovakia	166	252	0	0	418
South Africa	0	0	18	0	18
South Korea	0	0	12	0	12
Spain	14	39	0	0	53
Switzerland	12	58	0	0	70
Thailand	0	0	0	40	40
UK	151	396	0	844	1,381
Uruguay	88	21	88	0	197
Uzbekistan	31	0	0	0	31
TOTAL	13,232	5914	1,418	3,457	24,017

2023 USA BOVINE EMBRYOS EXPORTED BY BREED

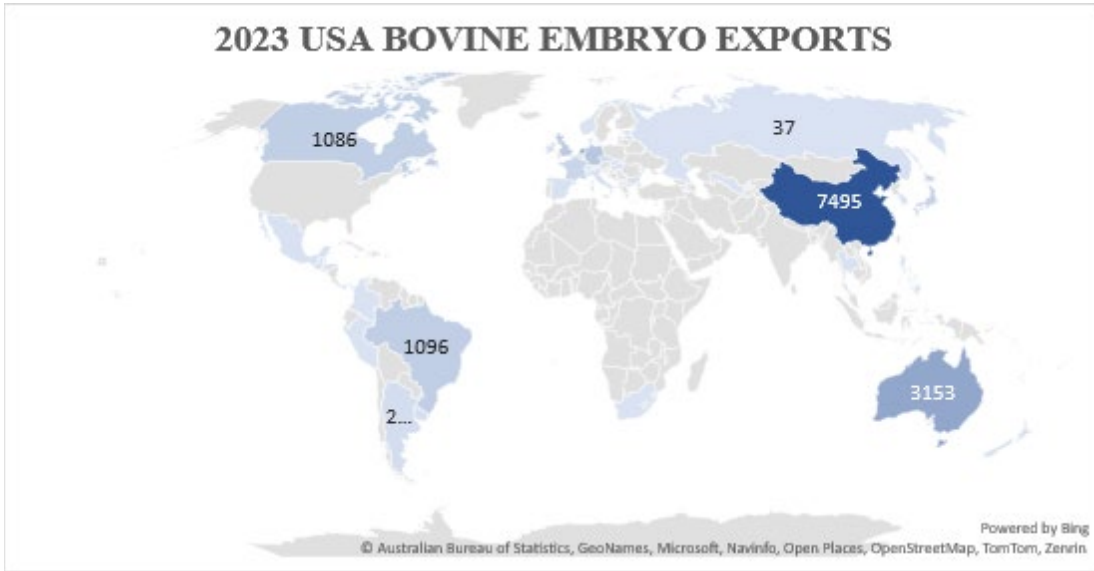
DAIRY BREEDS	IN VIVO	IN VITRO	TOTAL
Ayrshire	0	28	28
Brown Swiss	9	25	34
Guernsey	13	15	28
Holstein	13014	5,626	18642
Jersey	99	200	299
Nigerian Dwarf	95	0	95
Cross	0	20	20
TOTAL	13,232	5,914	19,146

BEEF BREEDS	IN VIVO	IN VITRO	TOTAL
Angus	634	1,248	1,882
Beefmaster	77	125	202
Brahman	0	47	47
Brangus	0	323	323
Bucking Stock	0	30	30
Charolais	0	96	96
Cross (XX)	34	846	880
Gelbvieh	0	20	20
GYR	0	5	5
Hereford	60	9	69
Limousin	20	8	28
Mashona	0	4	4
Miniature Hereford	12	0	12
Red Angus	35	91	126
Santa Gertrudis	0	44	44
Senepol	0	115	115
Shorthorn	4	0	4
Simmental	395	295	690
Speckle Park	0	8	8
Texas Longhorn	5	0	5
Wagyu	142	139	281
TOTAL	1,418	3,453	4,871

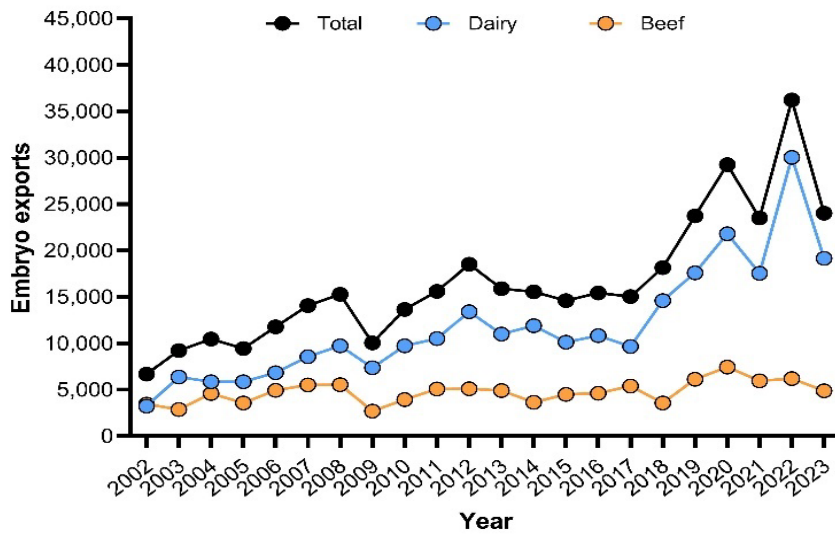
2023 EMBRYOS IMPORTED INTO THE USA

COUNTRY	BOVINE DAIRY	BOVINE BEEF
Australia	0	80
Canada	5	0
Germany	37	0
New Zealand	0	48
Switzerland	15	0
United Kingdom	0	20
TOTAL	57	148

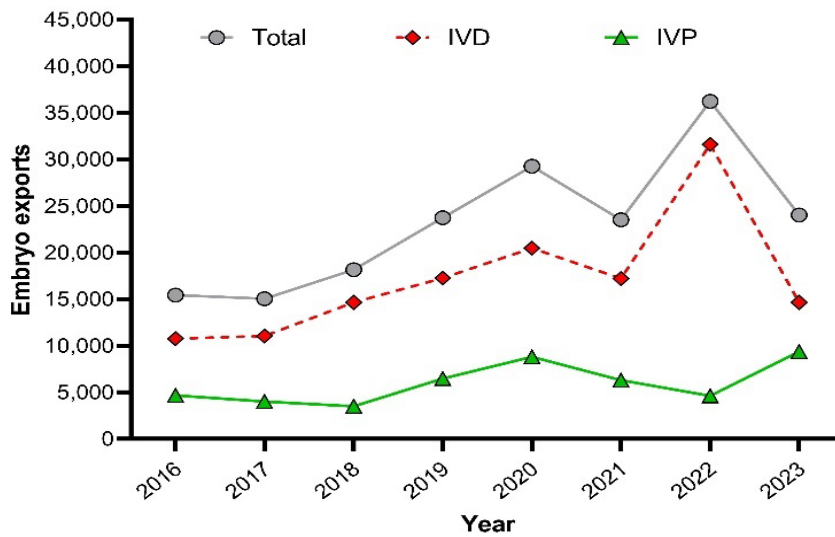
2023 USA BOVINE EMBRYO EXPORTS



USA Bovine Embryo Exports - Dairy vs. Beef - (2002-2023)



USA Bovine Embryo Exports - IVD vs. IVP - (2016-2023)



2023 USA EQUINE EMBRYO ACTIVITY

- Summary from 10 equine practitioners
- *In vivo* embryo collections down by 47% relative to 2022
- ET of in vivo produced embryos remains relatively stable.

Number of Submissions: 10 (3 AETA Members)

Embryo recovery from mares via uterine flush (in vivo recovery)	
Number of recovery procedures performed	876
Number of recovered embryos	556
Average	0.6
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	877
Number of CRYOPRESERVED / warmed embryos (recovered at your facility or shipped to you by others) transferred to recipient mares at your facility	42
Total Transfers	919
Oocyte recovery procedures (TVA, OPU, flank) for in vitro embryo production	
Number of oocyte recovery procedures performed	1400
Number of immature oocytes recovered (oocytes recovered from diestrus/subordinate follicles)	970
Number of in vivo-matured oocytes recovered (recovered from the stimulated dominant follicle)	16
If separation by oocyte type is not possible) Number of mixed oocytes	7453
Embryo production via ICSI at your facility	
Number of cases (mare aspiration sessions) on which ICSI was performed	2277
Number of oocytes on which ICSI was performed	13869
Number of transferrable IVP blastocysts produced via ICSI	2955
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)	422
Number of CRYOPRESERVED /warmed IVP blastocysts transferred to the uteri of recipient mares at your facility (including shipped cryopreserved IVP blastocysts)	629
Total Transfers	1051

A separate survey is conducted for Equine to allow collection of detailed equine embryo transfer data from practitioners that are not associated to the AETA. We express our gratitude to Dr Katrin Hinrichs (University of Pennsylvania) and Dr Robert Foss (Equine Medical Services, Colombia, MO) who created the survey form and contributed to its distribution among equine practitioners around the country.

2023 USA OTHER SPECIES EMBRYO ACTIVITY

- Reporting EBTs remain relatively stable for *in vivo* embryo production - Very low number of ETBs reporting other species *in vitro* work
- Ovine *in vivo* embryo production continues to grow (~30%)
- Caprine *in vivo* embryo production and total transfers down by 13% and 14%, respectively, even though collections were up 12%
- Cervid work continues to have very low reporting

2023 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	10	2,573	22,667	14,893	8.8	5.8	65.7%	2,150	12,743	1,876	14619
Caprine	11	2,131	22,918	12,569	10.8	5.9	54.8%	2,142	10,427	1,751	12178
Cervids	2	23	147	105	6.4	4.6	71.4%	87	18	0	18

2023 USA OTHER SPECIES IN VITRO EMBRYO PRODUCTION

Species	ETBs	OPUs	Total Oocytes	Oocytes per OPU	Viable Embryos	Embryos per OPU	% Viable	Frozen	Fresh ET
Ovine	2	122	1,391	11.4	147	1.2	10.6%	37	105
Caprine	2	579	10,791	18.6	3,083	5.3	28.6%	558	2478
Cervine	NR	NR	NR	NR	NR	NR	NR	NR	NR
Water buffalo	NR	NR	NR	NR	NR	NR	NR	NR	NR

For questions or comments about this report, please contact:

Charles Looney, PhD, Statistics Committee Chair

PHONE: (870) 777-9702

EMAIL: clooney@uada.edu