

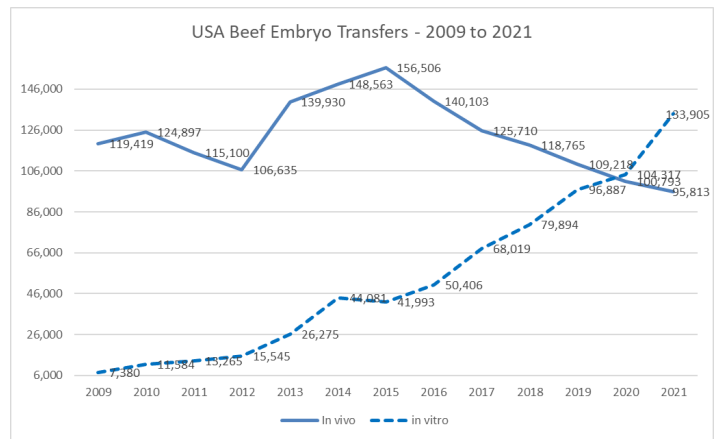
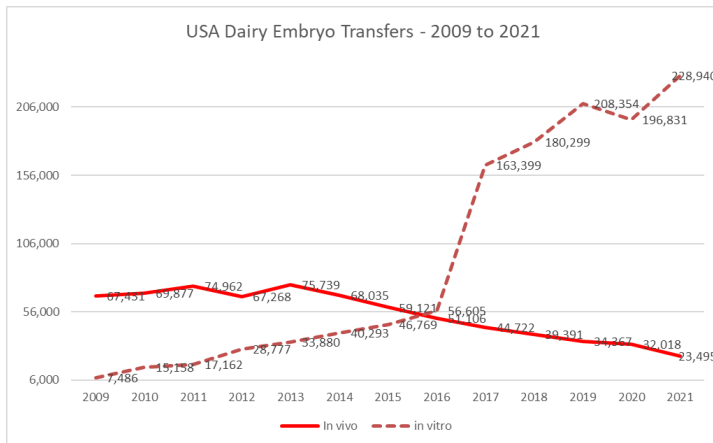
## **2022 STATISTICAL INFORMATION COMMITTEE REPORT (2021 DATA)**

Daniela Demetrio (chair), Charles Looney, Alvaro Garcia-Guerra, Scott Larsen

Data from 129 surveys including 213 embryo practitioners, 155 AETA certified Embryo Transfer Businesses (ETBs) are summarized below.

- 122 ETBs transferred bovine embryos.
- 33 ETBs reported beef on dairy embryo transfers.
- 109 ETBs flushed cows.
- 47 ETBs performed OPU.
- 17 ETBs reported embryo work with different species other than bovine.
- 52 ETBs exported 23,500 bovine embryos to 41 countries (similar to 2019, a decrease of -19% from 2020).
- 10 ETBs transferred 150 bovine embryos imported from 5 different countries.
- 15 IVP labs (fertilized oocytes and cultured embryos *in vitro*) reported data (some ETBs 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 from 2009 to 2021.



### **2021 USA BOVINE EMBRYO TRANSFERS**

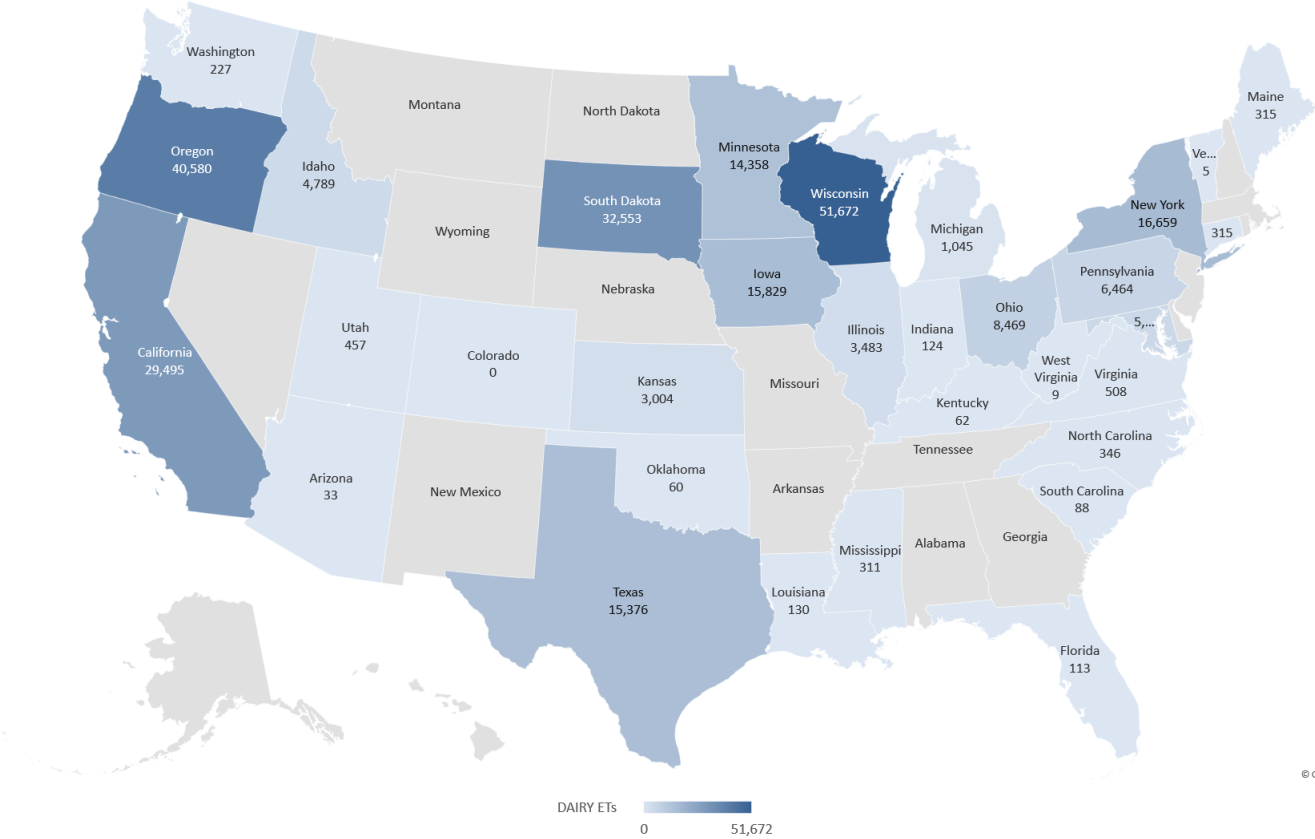
		<b>IN VIVO</b>			<b>IN VITRO</b>			<b>TOTAL</b>		
		<b>FRESH</b>	<b>FROZEN</b>	<b>TOTAL</b>	<b>FRESH</b>	<b>FROZEN</b>	<b>TOTAL</b>	<b>FRESH</b>	<b>FROZEN</b>	<b>TOTAL</b>
<b>DAIRY</b>	<b>TOTAL</b>	12,722	10,773	23,495	155,043	73,897	228,940	167,765	84,670	<b>252,435</b>
	<b>%</b>	54%	46%	9%	68%	32%	91%	66%	34%	<b>52%</b>
<b>BEEF</b>	<b>TOTAL</b>	30,866	64,947	95,813	51,541	82,364	133,905	82,407	147,311	<b>229,718</b>
	<b>%</b>	32%	68%	42%	38%	62%	58%	36%	64%	<b>48%</b>
<b>TOTAL</b>	<b>TOTAL</b>	<b>43,588</b>	<b>75,720</b>	<b>119,308</b>	<b>206,584</b>	<b>156,261</b>	<b>362,845</b>	<b>250,172</b>	<b>231,981</b>	<b>482,153</b>
	<b>%</b>	<b>37%</b>	<b>63%</b>	<b>25%</b>	<b>57%</b>	<b>43%</b>	<b>75%</b>	<b>52%</b>	<b>48%</b>	

**2021 USA BOVINE EMBRYO TRANSFERS BY STATE AND NUMBER OF ETBS**

STATE	ETBs	DAIRY ETs		BEEF ETs		TOTAL ETs	
		TOTAL	%	TOTAL	%	TOTAL	%
Alabama	7		0.00%	2,254	0.98%	2,254	0.47%
Arizona	5	33	0.01%	1,165	0.51%	1,198	0.25%
Arkansas	1		0.00%	134	0.06%	134	0.03%
California	17	29,495	11.68%	12,215	5.32%	41,710	8.65%
Colorado	5	0	0.00%	3,644	1.59%	3,644	0.76%
Connecticut	1	315	0.12%		0.00%	315	0.07%
Florida	6	113	0.04%	2,971	1.29%	3,084	0.64%
Georgia	9		0.00%	7,792	3.39%	7,792	1.62%
Idaho	10	4,789	1.90%	2,931	1.28%	7,720	1.60%
Illinois	9	3,483	1.38%	2,288	1.00%	5,771	1.20%
Indiana	10	124	0.05%	6,051	2.63%	6,175	1.28%
Iowa	15	15,829	6.27%	20,030	8.72%	35,859	7.44%
Kansas	9	3,004	1.19%	16,900	7.36%	19,904	4.13%
Kentucky	11	62	0.02%	6,397	2.78%	6,459	1.34%
Louisiana	3	130	0.05%	2,344	1.02%	2,474	0.51%
Maine	1	315	0.12%		0.00%	315	0.07%
Maryland	9	5,556	2.20%	2,725	1.19%	8,281	1.72%
Michigan	6	1,045	0.41%	1,722	0.75%	2,767	0.57%
Minnesota	10	14,358	5.69%	2,404	1.05%	16,762	3.48%
Mississippi	2	311	0.12%	1,025	0.45%	1,336	0.28%
Missouri	3		0.00%	5,721	2.49%	5,721	1.19%
Montana	7		0.00%	5,742	2.50%	5,742	1.19%
Nebraska	9		0.00%	18,541	8.07%	18,541	3.85%
New Mexico	3		0.00%	497	0.22%	497	0.10%
New York	12	16,659	6.60%	668	0.29%	17,327	3.59%
North Carolina	9	346	0.14%	1,459	0.64%	1,805	0.37%
North Dakota	5		0.00%	2,294	1.00%	2,294	0.48%
Ohio	18	8,469	3.35%	5,188	2.26%	13,657	2.83%
Oklahoma	12	60	0.02%	12,126	5.28%	12,186	2.53%
Oregon	11	40,580	16.08%	2,324	1.01%	42,904	8.90%
Pennsylvania	22	6,464	2.56%	1,698	0.74%	8,162	1.69%
South Carolina	6	88	0.03%	324	0.14%	412	0.09%
South Dakota	7	32,553	12.90%	20,799	9.05%	53,352	11.07%
Tennessee	9		0.00%	6,788	2.95%	6,788	1.41%
Texas	12	15,376	6.09%	37,306	16.24%	52,682	10.93%
United States	1		0.00%	347	0.15%	347	0.07%
Utah	5	457	0.18%	800	0.35%	1,257	0.26%
Vermont	1	5	0.00%		0.00%	5	0.00%
Virginia	11	508	0.20%	3,124	1.36%	3,632	0.75%
Washington	6	227	0.09%	1,332	0.58%	1,559	0.32%
West Virginia	5	9	0.00%	800	0.35%	809	0.17%
Wisconsin	38	51,672	20.47%	5,052	2.20%	56,724	11.76%
Wyoming	4		0.00%	1,796	0.78%	1,796	0.37%
<b>TOTAL</b>		<b>252,435</b>		<b>229,718</b>		<b>482,153</b>	

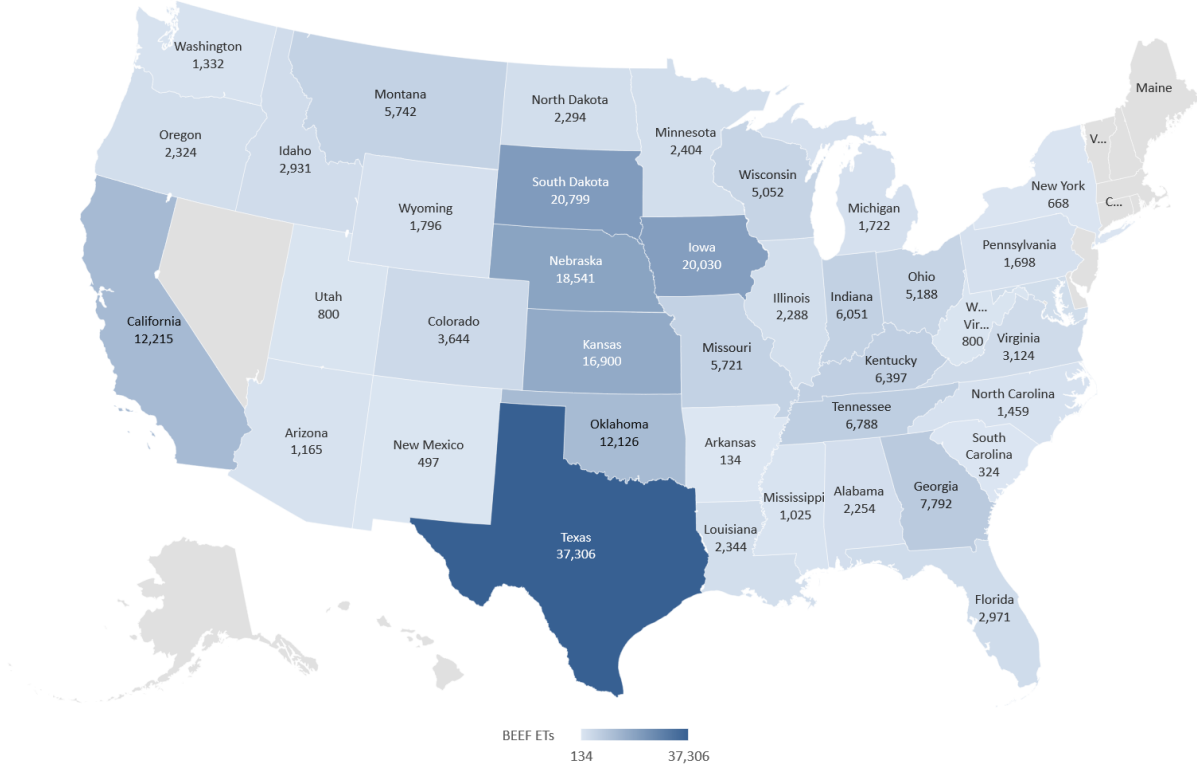
Embryo transfer numbers per State were calculated based on the % of work provided by members on the survey. The 3 highest numbers per State in each category are highlighted (ETBs, Dairy or Beef).

2021 USA Number of **DAIRY** Embryo Transfers by State



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2021 USA Number of **BEEF** Embryo Transfers by State



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**2021 USA BOVINE IN VIVO EMBRYO PRODUCTION (SUPERVOVULATION/FLUSH)**

	ETBs	COLLECTIONS		TOTAL OVA		VIABLE EMBRYOS			FRESH ETs		FROZEN	
		#	% using Sexed Semen	#	Average	#	Average	%	#	%	#	%
<b>DAIRY</b>	75	9,609	43%	74,809	7.7	47,339	4.9	63%	13,048	28%	34,291	72%
<b>BEEF</b>	97	18,559	7%	200,197	10.8	112,149	6.0	56%	29,712	26%	82,437	74%
<b>TOTAL</b>	<b>172</b>	<b>28,168</b>	<b>25%</b>	<b>275,006</b>	<b>9.8</b>	<b>159,488</b>	<b>5.7</b>	<b>58%</b>	<b>42,760</b>	<b>27%</b>	<b>116,728</b>	<b>73%</b>

**2021 USA BOVINE IN VITRO EMBRYO PRODUCTION**

<b>ALL ETBs that performed OPU</b>	<b>DAIRY</b>	<b>BEEF</b>	<b>TOTAL</b>
Number of ETBs	32	39	47
Total OPUs	96,052	50,317	146,369
Total oocytes recovered	1,771,281	1,169,618	2,940,899
Recovered oocytes per OPU	18.4	23.2	20.1
% of OPUs stimulated with FSH	42%	54%	46%
% of OPUs fertilized with sexed semen	70%	36%	59%
<b>ONLY ETBs with IVF labs</b>	<b>DAIRY</b>	<b>BEEF</b>	<b>TOTAL</b>
Number of ETBs	13	13	15
Total OPUs	86,517	46,141	132,658
Total oocytes recovered	1,619,442	1,098,441	2,717,883
Oocytes per OPU	18.7	23.8	20.5
Fertilized oocytes	1,364,753	948,028	2,312,781
Fertilized oocytes per OPU	15.8	20.5	17.4
Total viable embryos	327,103	315,108	642,211
Viable embryos per OPU	3.8	6.8	4.8
% Viable embryos (viable/recovered)	20%	29%	24%
% Viable embryos (viable/fertilized)	24%	33%	28%
Total frozen (in the production lab)	100,958	204,800	305,758
% Frozen	31%	65%	48%
Total transferred fresh or discarded	226,145	110,308	336,453
% Transferred fresh or discarded	69%	35%	52%

## Definitions:

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.

Unfortunately we were not able to separate the data by FSH usage this year since there were several practitioners that were using for 40-50% of the donors.

**2021 USA BOVINE EMBRYOS EXPORTED BY COUNTRY**

Country	IN VIVO		IN VITRO		TOTAL
	Dairy	Beef	Dairy	Beef	
Argentina	31	0	119	156	306
Australia	1,255	232	113	656	2,256
Austria	2	0	0	0	2
Belgium	0	0	0	9	9
Brazil	686	115	0	100	901
Canada	72	280	349	1,278	1,979
Chile	0	0	0	31	31
China	8,710	632	0	0	9,342
Costa Rica	0	0	4	0	4
Cuba	0	100	0	0	100
Cyprus	0	13	0	0	13
Denmark	0	0	46	0	46
Ecuador	0	0	0	409	409
EU (country not specified)	64	15	0	12	91
France	106	32	102	6	246
Germany	524	255	472	42	1,293
Guatemala	0	0	0	40	40
Honduras	0	0	0	44	44
Hungary	18	0	187	0	205
Ireland	0	18	79	0	97
Israel	0	30	0	0	30
Italy	90	0	0	30	120
Japan	1,828	9	0	0	1,837
Jordan	5	0	5	0	10
Mexico	0	0	96	40	136
New Zealand	29	8	0	0	37
Nicaragua	0	0	0	21	21
Norway	0	2	0	101	103
Poland	0	32	0	0	32
Portugal	0	8	0	0	8
Russia	23	0	50	0	73
South Africa	0	35	0	0	35
South Korea	144	0	0	0	144
Spain	52	88	17	0	157
Sweden	0	16	0	14	30
Switzerland	23	0	91	26	140
Thailand	0	100	0	99	199
The Netherlands	807	21	858	20	1,706
Turkey	0	67	0	0	67
United Kingdom	392	225	105	412	1,134
Uruguay	0	0	0	67	67
<b>TOTAL</b>	<b>14,861</b>	<b>2,333</b>	<b>2,693</b>	<b>3,613</b>	<b>23,500</b>

**2021 EMBRYOS IMPORTED INTO THE USA**

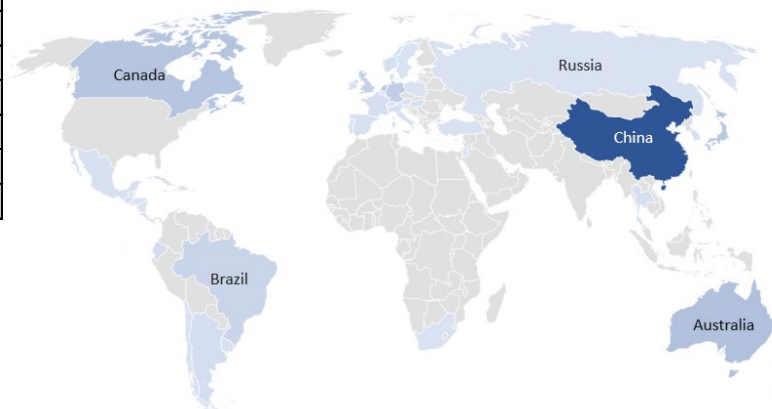
COUNTRY	BOVINE DAIRY	BOVINE BEEF
Australia	8	35
Belgium		45
Canada	29	12
UK		21
<b>TOTAL</b>	<b>37</b>	<b>113</b>

**2021 USA BOVINE EMBRYOS EXPORTED BY BREED**

DAIRY BREEDS	IN VIVO	IN VITRO	TOTAL
Ayrshire	0	15	15
Brown Swiss	43	74	117
Guernsey	2	61	63
Holstein	14,675	2,229	16,904
Jersey	129	314	443
Procross	12	0	12
<b>TOTAL DAIRY</b>	<b>14,861</b>	<b>2,693</b>	<b>17,554</b>

BEEF BREEDS	IN VIVO	IN VITRO	TOTAL
Akaushi	14	0	14
American Bucking Stock	0	47	47
Angus	757	1,761	2,518
Beefmaster	67	80	147
Belted Galloway	0	35	35
Brahman	20	525	545
Brangus	18	21	39
Charolais	35	94	129
Crossbred	22	234	256
Gelbvieh	0	3	3
Hereford	70	227	297
Maine-Anjou	0	5	5
Mini Hereford	0	9	9
Montbeliarde	148	0	148
Red Angus	49	68	117
Santa Gertrudis	0	44	44
Senepol	175	0	175
Shorthorn	11	11	22
Simmental	450	185	635
Speckled Park	6	36	42
Texas Longhorn	15	0	15
Wagyu	476	228	704
<b>TOTAL BEEF</b>	<b>2,333</b>	<b>3,613</b>	<b>5,946</b>

2021 USA Bovine Embryo Exports



**2021 USA Equine Embryo Transfer / In-Vitro Embryo Production****Number of Submissions: 9 (5 AETA Members)**

<b>Embryo recovery from mares via uterine flush (in vivo recovery)</b>	
Number of recovery procedures performed	852
Number of recovered embryos	542
Average	0.6
<b>Transfer of IN-VIVO RECOVERED embryos to recipient mares</b>	
Number of <b>FRESH</b> embryos (recovered at your facility or shipped to you by others) transferred to recipient mares at your facility	1268
Number of <b>CRYOPRESERVED</b> / warmed embryos (recovered at your facility or shipped to you by others) transferred to recipient mares at your facility	22
Total Transfers	1290
<b>Oocyte recovery procedures (TVA, OPU, flank) for in vitro embryo production</b>	
Number of oocyte recovery procedures performed	815
Number of immature oocytes recovered (oocytes recovered from diestrus/subordinate follicles)	6997
Number of in vivo-matured oocytes recovered (recovered from the stimulated dominant follicle)	508
If separation by oocyte type is not possible) Number of mixed oocytes	0
<b>Embryo production via ICSI at your facility</b>	
Number of cases (mare aspiration sessions) on which ICSI was performed	1203
Number of oocytes on which ICSI was performed	7486
Number of transferrable IVP blastocysts produced via ICSI	1347
<b>Transfer of IVP embryos at your facility</b>	
Number of <b>FRESH</b> IVP blastocysts transferred to the uteri of recipient mares at your facility (including fresh shipped IVP blastocysts)	450
Number of <b>CRYOPRESERVED</b> /warmed IVP blastocysts transferred to the uteri of recipient mares at your facility (including shipped cryopreserved IVP blastocysts)	278

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.

**2021 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	1,623	13,635	9,619	8.4	5.9	70.5%	432	9,187	417	9604
Caprine	13	1,199	16,442	8,646	13.7	7.2	52.6%	795	7,851	768	8619
Cervids	2	60	160	86	2.7	1.4	53.8%	54	32	0	32

**2021 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	156	1,620	10.4	446	2.9	27.5%	93	353
Caprine	3	942	22,175	23.5	6,000	6.4	27.1%	1489	4026
Cervine	1	190	1,515	8.0	178	0.9	11.7%	160	18
Water buffalo	1	6	94	15.7	11	1.8	11.7%	11	0

One ETB reported to have manipulated 118 embryos (37 biopsied for sexing and 81 bisected).

A total of 348 (64 dairy and 284 beef) embryos produced from slaughterhouse ovaries were recorded from 4 ETBs. There is a large amount of IVF abattoir embryos being commercialized but we were not able to collect the data from the main companies.

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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September 26<sup>th</sup>, 2022