

Annual Report of the AETA Statistics Committee for the Calendar Year 2007

Dairy ET up by 3200 stimulated collections, while beef numbers dropped slightly compared to 2006. Also, embryo exports are very healthy. That's a quick two sentence summary of this year's report, but read on because there is some interesting information regarding individual ETB stats near the end. IVF is also on the rise due to one ETB that is producing a noticeable number of frozen IVP embryos from abattoir derived oocytes.

Regional Map



NE = MD, ME, NY, OH, PA, VT, CT

SE = GA, KY, MS, NC, TN, VA

NC = IL, IA, IN, MI, MN, NE, WI

SC = CO, KS, LA, MO, OK, TX

NW = ID, UT, MT, OR, WA, WY

SW = CA

White states (16 total) have no ETBs reporting data: Alaska, Alabama, Arizona, Arkansas, Delaware, Florida, Hawaii, North Dakota, South Dakota, New Jersey, New Hampshire, Nevada, New Mexico, Rhode Island, South Carolina, and West Virginia. This does not infer that embryo transfer is not performed in those states. It simply means that ETBs reporting data to the committee are not headquartered in those states.

ETBs Reporting

The number of ETBs reporting for 2007 was up (8) for certified companies (113 in 2006 to 121 in 2007). Non-certified companies (13) remained constant compared to the year before. The North Central region was responsible for most of the increase (8 ETBs).

Region	# ETBs 2004	# ETBs 2005	# ETBs 2006	# ETBs 2007
Northeast	21	28	29	27
Southeast	15	18	18	17
North Central	28	39	37	45
South Central	19	30	24	26
Northwest	13	15	14	14
Southwest	5	4	4	5
Totals	101	134	126	134

Dairy Collection Data

Dairy single egg collections increased slightly in 2007. Viable embryos per collection remained constant at about half an embryo.

2006 Dairy Single Ova Collection Data by Region

Region	Non Stim Dairy Donors Collected	EMB Collected From Non Stimulated Dairy Donors	Embryos Per Collection Dairy
Northeast	123	51	0.41
Southeast	16	12	0.75
NorthCentral	122	76	0.62
Southcentral	4	4	1.00
NorthWest	2	2	1.00
Southwest	2	2	1.00
Totals	269	147	0.55

2007 Dairy Single Ova Collection Data by Region

Region	Non Stim Dairy Donors Collected	EMB Collected From Non Stimulated Dairy Donors	Embryos Per Collection Dairy
Northeast	122	54	0.44
Southeast	6	2	0.33
NorthCentral	139	77	0.55
Southcentral	9	4	0.44
NorthWest	9	6	0.67
Southwest	8	1	0.13
Totals	293	144	0.49

Dairy stimulated collections were up substantially (3200) in 2007. Viable embryos were up by almost 18,000. An interesting fact is that the mean number of viable embryos per stimulated collection has remained consistent across the US over the last several years; 2005/5.50 embryos, 2006/5.45 embryos, and 2007/5.47 embryos. That is a testament to the accuracy and consistency of data reporting by the dairy ET practitioners.

2006 Stimulated Dairy Collection Data

Region	Dairy Donors Stimulated & Collected	Trans EMB Collected From Stim Dairy Donors	Mean # of Viable Emb Recovered from Stim Dairy Donors	Total Transferrable EMB Collected From Dairy Donors
Northeast	5473	28683	5.24	28734
Southeast	1149	6464	5.63	6476
Northcentral	7777	43937	5.65	44013
Southcentral	437	2202	5.04	2206
NorthWest	724	4593	6.34	4595
Southwest	1010	4508	4.46	4510
Totals	16570	90387	5.45	90534

2007 Stimulated Dairy Collection Data

Region	Dairy Donors Stimulated & Collected	Trans EMB Collected From Stim Dairy Donors	Mean # of Viable Embs Recovered from Stim Dairy Donors	Total Transferrable EMB Collected From Dairy Donors
Northeast	6144	30824	5.02	30878
Southeast	1703	10462	6.14	10464
NorthCentral	9509	54625	5.74	54702
Southcentral	483	2773	5.74	2777
NorthWest	746	4264	5.72	4270
Southwest	1196	5300	4.43	5301
Totals	19781	108248	5.47	108392

Beef Collection Data

Single egg beef collections were negligible. Only 39 were performed in 2007. 26 viable embryos were recovered. Stimulated collections were down by about 1000 with 5000 fewer embryos collected in 2007. As with dairy collections the one constant stat is viable embryos per collection – 2006/6.50 and 2007/6.54. These numbers are very important when new breeders are entering the industry. Practitioners have a good source of information from which to present hard data so that expectations are realistic.

2006 Stimulated Beef Collection Data

Region	Beef Donors Stimulated & Collected	Total # of viable embryos collected from stim beef donors	Mean # of viable embryos recovered from stimulated beef donors
Northeast	1840	11064	6.01
Southeast	7605	53706	7.06
North Central	10818	68972	6.38
South Central	11969	73658	6.15
Northwest	2850	19840	6.96
Southwest	241	2189	9.08
Totals	35323	229429	6.50

2007 Stimulated Beef Collection Data

Region	Beef Donors Stimulated & Collected	Total # of viable embs collected from stim beef donors	Mean # of viable embryos collected from stimulated beef donors
Northeast	1746	10147	5.81
Southeast	6429	42801	6.65
North Central	9852	63009	6.40
South Central	12501	80469	6.44
Northwest	3674	26029	7.08
Southwest	241	1973	8.19
Totals	34299	224428	6.52

Total Viable Embryos Collected Beef & Dairy Combined

2006	2007
319,984	332,846

Fresh Transfers

Dairy fresh transfers were up by 6500. Fresh beef transfers were down by 1500. The overall gain was about 5000 transfers as compared to the year before. The total fresh transfers columns include manipulated (demi/biopsied embryos) data that is not included in the fresh transfers columns.

2006 Fresh Transfers Dairy & Beef

Region	Fresh Transfers Dairy	Fresh Transfers Beef	Total Fresh Transfers Beef & Dairy
Northeast	13009	3418	16463
Southeast	2775	20098	23049
North central	16158	11843	28273
South central	1142	27318	28753
Northwest	1971	4608	6599
Southwest	2382	0	2382
Totals	37437	67285	105519

2007 Fresh Transfers Dairy & Beef

Region	Fresh Transfers Dairy	Fresh Transfers Beef	Total Fresh Transfers Beef & Dairy
Northeast	13840	3103	16955
Southeast	4707	14742	19571
North central	19390	10948	30523
South central	1373	30184	31844
Northwest	2244	6373	8623
Southwest	2390	317	2707
Totals	43944	65667	110223

Embryos Frozen

The interesting note about frozen embryos is that none were reported vitrified in 2007. The 2006 data included over 500 vitrified embryos, mostly by one ET practitioner from the north central region.

Embryos frozen using glycerol as the cryoprotectant are dwindling each year with a slight resurgence in beef cattle in 2007. Most of the gain in glycerol data came from beef cattle in the south central region by a single ETB (>2500 embryos in glycerol). This could possibly be explained by a heavy influence of Bos Indicus cattle in that region.

Glycerol Data

Dairy Embryos Frozen in Glycerol

2005	2006	2007
8540 (16.7% of total frozen)	7258 (13.79% of total frozen)	5682 (8.96% of total frozen)

Beef Embryos Frozen in Glycerol

2005	2006	2007
3577 (2.49% of total frozen)	988 (0.63% of total frozen)	3806 (2.48% of total frozen)

Dairy DT Data

There was a substantial increase in the total number of dairy DT embryos frozen in 2007. Most of the activity came from the north east and north central regions.

Dairy Embryos Frozen DT

Region	2006 Data	2007 Data
Northeast	13888	16266
Southeast	3406	5546
North central	22765	29957
South central	1035	987
Northwest	2501	1992
Southwest	1286	2995
Totals	44881	57743

Beef DT Data

2007 saw a marked decline of 5000 in the number of beef embryos frozen by DT.

Beef Embryos Frozen DT

Region	2006 Data	2007 Data
Northeast	7395	6932
Southeast	33110	24018
North central	57139	52263
South central	41877	45889
Northwest	15223	18823
Southwest	0	0
Totals	154744	149507

Total Embryos Frozen – Beef and Dairy Combined

2006	2007
208,380 (65% of total embs collected)	216,697(65% of total embs collected)

Frozen Embryos Transferred

In previous years this report combined beef and dairy thawed glycerol embryos as well as beef and dairy DT embryos. From this point forward the report will separate dairy from beef to more closely follow trends in the two bovine segments of the industry.

More frozen embryos are transferred annually (55%) than fresh (45%) as seen in the far right column of the chart below.

Glycerol and DT Embryos Thawed 2007

	Glycerol Transfers	DT Transfers	Combined Gly & DT	Total frozen transfers dairy + beef	Fresh transfers dairy + beef
Dairy	4045 (11.46% of total)	31,265 (88.54% of total)	35,310	137,772	110,223
Beef	2584 (2.52% of total)	99,878 (97.5% of total)	102,462	(55.55% of total transfers)	(44.45% of total transfers)

Manipulated Embryos

Biopsied Embryos: It appears that very few embryos are being biopsied for sex. No beef embryos were reported for 2007, and slightly over 100 dairy embryos were biopsied.

Biopsied Embryos 2007

Region	Fresh biopsied transferred dairy	EMB biopsied & frozen dairy	Fresh biopsied transferred beef	EMB biopsied & frozen beef
Northeast	12	0	0	0
Southeast	0	0	0	0
North Central	58	21	0	0
South Central	1	23	0	0
Northwest	0	0	0	0
Southwest	0	0	0	0
Totals	71	44	0	0

Demi Embryos: The numbers for 2007 are nearly identical to the 2006 data.

Demi Embryos 2007

Region	Fresh demis transferred dairy	DEMI emb frozen dairy	Fresh demis transferred beef	DEMI emb frozen beef	DEMI emb thawed
Northeast	0	0	0	0	0
Southeast	22	0	100	0	0
North Central	102	22	25	0	0
South Central	30	0	256	0	0
Northwest	0	0	6	0	0
Southwest	0	0	0	0	0
Totals	154	22	387	0	0

Embryos in Storage

There is debate as to the value of this information. Several ET practitioners have stated that most of the embryos they freeze are stored in owners Dewars, which makes the numbers reported here look dismal compared to what is actually being stored. It would be impossible to track the disposition of embryos stored in our client's vessels, so we don't attempt to do so. Also, the number of embryos stored at ETBs changes daily, which makes this data somewhat precarious. What date each ETB chooses to take inventory is up to them. The IETS Statistics and Data Retrieval committee requests this data as part of its annual report, which is why the AETA asks for it. The stats committee best guesstimate is that ETBs store about one fourth of total embryos stored, and breeders maintain the rest in their own Dewars. That would give industry inquirers some relative number from which to extrapolate totals.

The number of stored embryos has remained relatively constant the last two years with dairy showing a modest increase in 2007.

Dairy and Beef Embryos Stored in 2006

Region	Frozen Embryos in Storage - Dairy	Frozen Embryos in Storage - Beef	Total Embryos in Storage
Northeast	6939	2157	9096
Southeast	615	8430	9045
North Central	8884	22915	31799

South Central	333	45314	45647
Northwest	398	17710	18108
Southwest	4886	3000	7886
Totals	22055	99526	121581

Dairy and Beef Embryos Stored in 2007

Region	Frozen emb in storage dairy	Frozen emb in storage beef	Total embs in storage
Northeast	6705	1944	8649
Southeast	1280	6735	8015
North Central	12477	14815	27292
South Central	1350	45961	47311
Northwest	754	21314	22068
Southwest	7065	0	7065
Totals	29631	90769	120400

Embryos Exported

Dairy Exports in 2007 were up significantly.

Dairy Exports 2005 = 5859 Dairy Exports 2006 = 6834 Dairy Exports 2007 = 8559

Dairy Exports by Country 2007

Argentina	Australia	Bolivia	Canada	China	Columb	Czech	Denmark
526	38	96	389	861	61	10	15
D. Rep	England	Finland	France	Germany	Holland	Iran	Ireland
11	191	74	305	939	718	152	369
Italy	Japan	Kazakstn	Mexico	Netherlds	Panama	Poland	Portugal
342	1291	100	347	852	29	87	15
S Africa	Spain	Sweden	Switz	Turkey	Wales	UK	
19	37	64	89	202	26	304	

Countries not listed had no reported exports for both dairy and beef charts.

Beef Exports in 2007 were up by a modest 500 count from 2006.

Beef Exports by Country 2007

Argentina	Belize	Australia	Brazil	Canada	Columb	C Rica
-----------	--------	-----------	--------	--------	--------	--------

208	30	1762	1848	402	89	89
Czech	DenMk	Eng	EU	Finland	Germany	Mex
34	46	25	11	10	8	202
Panama	Paraguay	Uruguay	Sweden	Thailand	Turkey	UK
117	22	48	100	433	4	18

Beef Exports 2005 = 3572 Beef Exports 2006 = 4936 Beef Exports 2007 = 5506

IVF

IVF was up by a factor of 2x in 2007 compared to 2006. Five ETBs reported IVF activity in 07. One company reported 300,000 slaughterhouse oocytes recovered with 25,000 embryos produced and frozen. Excluding the 25,000 slaughterhouse embryos there were 13,000 embryos produced from the live donor OPU collections. About 9000 of those were transferred fresh. The other 4000 were frozen. Most of the donor collections were beef (3500) as compared to dairy (1000).

2006 IVF Data

Dairy Collections	Beef Collections	Total Collections
460	1868	2328

2007 IVF Data

Dairy Collections	Beef Collections	Total Collections
985	3504	4489

Clones

Only one company reported any cloning activity for 2007. Five cell lines produced 120 embryos of which all were vitrified and thawed. Thirty pregnancies (25%) were reported, but not the number of live offspring.

ETBs performing cloning services requested that their data remain confidential.

Other Species

The data provided is barely worth mentioning. Very few equine practices participate in the AETA, which makes gathering data difficult at best. There does not seem to be an association that caters to the equine ET industry.

Equine Collections: 124 donors collected. 86 embryos were recovered and transferred fresh.

Caprine Collections: One ETB reported 76 stimulated goat collections with 707 embryos recovered and transferred fresh.

Ovine Collections: One ETB reported 3 stimulated ewe collections with 16 embryos recovered and transferred fresh.

ETB Information

The general theme of the 2007 data was that the north central region, which is primarily dairy influenced, had a significant increase in donor collections and embryo numbers. This was also reflected in an increased number of professional staff. Otherwise ETB data has remained constant from 2006 to 2007.

2006 ETB Data

Region	Cert YES	Cert NO	Totl ETBs	Full Time	Part Time	Prof Staff	PRO Staff / ETB	Support Staff	Support Staff per ETB	House Donors	Provide Recips
Northeast	26	3	29	10	19	23.01	0.8	14.0	0.5	4	4
Southeast	16	1	17	10	8	19.1	1.1	25.6	1.5	12	6
North Central	33	4	37	20	16	46.9	1.3	144.9	3.9	15	9
South Central	21	3	24	15	9	24.7	1.0	59.2	2.5	18	15
Northwest	12	1	13	6	8	11.0	0.8	16.6	1.3	18	5
Southwest	3	1	4	2	1	2.1	0.5	4.0	1.0	2	2
Totals	113	13	126	63	61	126.8	1.0	264.2	2.1	69	41

2007 ETB Data

Region	Cert Yes	Cert No	Tot ETBs	Full time ETBs	Part time ETBs	Pro staff	Pro staff / etb	Support staff	Support staff per ETB	House donors	Provi de recips
Northeast	26	3	29	10	19	23.01	0.8	14.0	0.5	4	4
Southeast	16	1	17	10	8	19.1	1.1	25.6	1.5	12	6
North Central	33	4	37	20	16	46.9	1.3	144.9	3.9	15	9
South Central	21	3	24	15	9	24.7	1.0	59.2	2.5	18	15
Northwest	12	1	13	6	8	11.0	0.8	16.6	1.3	18	5
Southwest	3	1	4	2	1	2.1	0.5	4.0	1.0	2	2
Totals	113	13	126	63	61	126.8	1.0	264.2	2.1	69	41

Northeast	24	3	27	12	15	25.40	0.94	20.00	0.74	5	3
Southeast	17	0	17	9	16.25	16.25	0.96	20.30	1.19	12	8
North Central	40	5	45	16	25	50.88	1.13	148.06	3.29	18	9
South Central	23	3	26	19	7	30.50	1.17	53.60	2.06	17	14
Northwest	13	1	14	5	9	9.45	0.68	16.95	1.21	16	6
Southwest	4	1	5	3	2	4.00	0.80	4.40	0.88	4	3
Totals	121	13	134	64	74.25	136.48	1.02	263.31	1.97	72	43

Last year's report compared the number of collections, fresh transfers, frozen transfers, and embryos frozen per professional by region. This year's numbers are not much different, so the committee will compare embryo collection data by region and by ETB.

Donor Collection Data by ETB

Dairy Collection: categorized by # of collections/ETB						
Region	Total # ETBs in region	# of ETBs Collecting 0 Dairy Donors	# of ETBs Collecting 1-50 Dairy Donors	# of ETBs Collecting 51-100 Dairy Donors	# of ETBs Collecting 101-200 Dairy Donors	# of ETBs Collecting > 200 Dairy Donors
Northeast	27	4	4	4	2	13
Southeast	17	4	4	3	1	4
North Central	45	6	12	6	2	19
South Central	26	16	7	1	1	1
Northwest	14	2	7	3	1	1
Southwest	5	1	1	0	1	2
Totals	134	33	35	17	8	40

Nationwide 33 ETBs didn't collect a single dairy female as compared to only 12 that did not collect at least one beef donor. Sixty-three percent of ETBs nationwide performed fewer than 100 stimulated dairy collections. For beef collections the numbers were comparable with 58% ETBs collecting fewer than 100 donors. This isn't surprising since 74 (55%) of ETBs reporting were part time ETers in 2007.

Beef Collections: categorized by # of collections/ETB

Region	Total # ETBs in region	# of ETBs Collecting 0 Beef Donors	# of ETBs Collecting 1-50 Beef Donors	# of ETBs Collecting 51-100 Beef Donors	# of ETBs Collecting 101-200 Beef Donors	# of ETBs Collecting > 200 Beef Donors
Northeast	27	5	15	3	2	2
Southeast	17	0	4	1	4	8
North Central	45	5	17	10	6	7
South Central	26	0	3	5	5	13
Northwest	14	0	5	1	2	6
Southwest	5	2	2	0	1	0
Totals	134	12	46	20	20	36

Nationwide 28 ETBs did the majority of beef donor collections in 2007. Geographically, the high volume beef ETBs are located in the central US (north and south), and the southeast. Not surprisingly, high volume dairy ETBs reign from the north central and northeast.

Embryos per Stimulated Collection – comparing high and low ETBs

Dairy Viable Embs per Collection 2007			
Region	Mean # of viable embs per collection by region	Lowest reported mean by ETB (minimum 200 collections)	Highest reported mean by ETB (minimum 200 collections)
Northeast	5.02	4.0	6.1
Southeast	6.14	5.0	10.8
North Central	5.74	4.3	10.9
South Central	5.74	6*	6*
Northwest	5.72	6.6*	6.6*
Southwest	4.43	4.2	5.1
Totals	5.47	* Only 1 ETB qualified	* Only 1 ETB qualified

The 2006 and 2007 embryos per collection data were relatively indifferent. However, there were noticeable differences in viable embryos per collection per ETB within regions with both dairy and beef cattle. Reasons are unclear, but in some cases the differences are double. It could be stimulation protocols, collection technique, or management considerations.

Beef Collection Data by Region/ETB

Region	Mean # of viable embs per collection by region	Lowest reported mean by ETB (minimum 200 collections)	Highest reported mean by ETB (minimum 200 collections)
Northeast	5.81	5.00	7.70
Southeast	6.66	5.21	8.50
North Central	6.40	5.84	7.70
South Central	6.44	5.43	8.91
Northwest	7.08	4.86	8.65
Southwest	8.19	0 qualifiers	0 qualifiers
Totals	6.52		

Total Ova, Unfertilized and Degenerates

The relative percentages of unfertilized ova, degenerates, and viable embryos for both dairy and beef cattle have remained stable since the committee began requesting data in 2005. It's interesting to note that although beef cattle produce more viable embryos per stimulated collection than dairy donors (6.52 vs. 5.47), the percentage of viable embryos per collection is not different. Dairy donors are not less fertile than beef, they just don't stimulate as heavily.

This information is very important for a number of reasons. Firstly, it gives AETA members an objective reference from which to compare their own data be it from a given stimulated collection or an entire year's worth of collections. Secondly, new stimulation protocols are constantly being developed, and practitioners need a reference to compare the results. Thirdly, new FSH products could enter the marketplace in the near future, and existing recovery data must be established in order to make valid clinical comparisons. A few ETBs are not reporting anything but viable embryos per collection, and the stats committee encourages them to document UFOs and degenerate ova.

There seems to be some confusion about the differences between unfertilized ova with fragmented cytoplasm and two to four cell degenerates (fertilized and dead). Without DNA staining it is sometimes impossible to tell the difference. Staining is out of the question, so the practitioner should make a judgment on such ova.

Percentages of UFOs, Degenerates, and Viable Embryos 2005

Cattle	UFOs	Degenerates	Viable
Dairy	31.3%	14.0%	52.0%
Beef	30.2%	15.8%	56.0%

Percentages of UFOs, Degenerates, and Viable Embryos 2006

Cattle	UFOs	Degenerates	Viable
--------	------	-------------	--------

Dairy	32.7%	12.9%	54.4%
Beef	29.7%	17.7%	52.6%

Percentages of UFOs, Degenerates, and Viable Embryos 2007

Cattle	UFOs	Degenerates	Viable
Dairy	33.1%	14.0	52.6
Beef	30.6	17.6	51.7

ET Conception Rates

Less than 25 ETBs reported actual pregnancy rates on transferred embryos, both fresh and frozen. Of the 15 that reported only 4 (at least 400 transfers) reported actual pregnancy rates for all of their transfers for the calendar year. The other 11 reported actual rates for some of their transfers and estimated the remainder. This makes reporting extremely difficult, and rather unscientific. Generally, when pregnancy rates were reported as actual, the percentage bred was lower than when rates were estimated. Also, more practitioners are reporting higher pregnancy rates than in past years. More dairy and beef ETBs reported estimated fresh transfers above 70% for 2007 than in previous years.

Comments & Suggestions

Several ETBs requested that embryo collection data using sex sorted sperm be included in the report. The stats committee dislikes making changes to the data forms, but will seriously consider this request since sorted sperm will likely be part of our future.

A few practitioners complained about having to collect data during the busy spring breeding season. Since the committee is requesting pregnancy rate data we can't ask for data for 60 to 90 days after year's end. The first request goes out at the end of March. Also, the IETS submits its report to the OIE in September, which includes the US data (the largest contributor in the world). Perhaps the main reason is that it takes this committee about 200 man hours to input, sort, analyze, and write its final report. This committee would like to delete pregnancy data in the future, with the possible exception of manipulated embryos. Data requests could go out by the first of January if preg rate was eliminated.

Conclusion

Embryo transfer is alive and well in the US. The stats committee would again like to thank the members for their prompt attention to the committee's request for stats. We encourage all ETBs to make a conscious effort to report accurate and complete data so that we can monitor trends in business volume, and address research efforts to improve fertilization, embryo recovery rates and new super ovulation protocols.

Committee Chairman: Brad Stroud, DVM

Committee Members: Matt Iager, Todd Stroud