

# Program Book



IETS 46th Annual Conference  
New York, New York  
January 16–19, 2020





# Program Book

**46th Annual Conference of the  
International Embryo Technology Society**

**From Stem Cells to Neonates—  
The Embryo at the Center of All**



**New York Hilton Midtown  
New York, New York  
January 16–19, 2020**

**Scientific Program Co-Chairs:  
Anna C. Denicol and Peter J. Hansen**

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## 2019 IETS Board of Governors

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## Reproduction, Fertility and Development

Proceedings of the Annual Conference of the  
International Embryo Technology Society,  
New York, New York, 16–19 January 2020

Volume 32(1–2) 2020



New York, New York



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## Preface

The choice of midtown Manhattan as the site of the 46th annual conference of the International Embryo Technology Society was a bold one. Few scientific societies of the size and scope of IETS would have the audacity to meet in the heart of the USA's most emblematic and important city—to locate ourselves within walking distance of such iconic locations as Times Square, Radio City Music Hall, the Museum of Modern Art, and Central Park. And, we are gathering there together in the height of winter!

The theme of this year's meeting was chosen to be equally bold. The phrase “From stem cells to neonates—The embryo at the center of all” reflects, of course, the research goals and clinical activities of many of us in IETS. It also highlights the fundamental importance of the embryo for formation of eukaryotic organisms by sexual reproduction. Harvey famously wrote *ex ovo omnia* but he could also have written *omnia ex embryone* (assuming Google Translator is faithful to Harvey's Latin). Furthermore, the theme focuses our attention on the increasing importance of the embryo as a research model for deciphering fundamental mechanisms of developmental biology and reproduction and acknowledges that the embryo is now at the center of many emerging and mature biotechnologies.

The choice of speakers is designed to illustrate important aspects of the centrality of the embryo for biology and biotechnology. Session I is focused on one of the building blocks of the embryo—the oocyte. Session II features presentations regarding how the embryo can be used to generate pluripotent stem cells *in vitro* and be used as a tool for gene editing. Sessions III, IV, and V are focused on embryo transfer including new concepts related to embryo production (session III), possible alterations in developmental programming associated with embryo transfer (session IV), and presentation of research focused on enhancing success of embryo transfer programs (session V).

The keynote presentation, by Theresa Woodruff of Northwestern University, is being saved for the last day to entice you all to stay. Her presentation, titled “Engineering reproduction: Creating physical environments for oocyte success” is sure to provoke excitement and contemplation about new possibilities for assisted reproduction.

The CANDES–Morulas Preconference Symposium, DABE Forum, and Practitioners Forum are important aspects of the meeting. As seen from the title of the CANDES–Morulas symposium, the embryo is also at the center of all for companion animals and non-domestic species. The DABE Forum is focused on the ethics of gene editing of embryos. The Practitioners Forum promises to be a lively and interesting session focused on the nuts and bolts of embryo transfer.

Finally, we have tried to maximize the number of oral presentations selected from the submitted abstracts. Some represent abstracts for award competitions, and some were selected from a larger group of abstracts that we felt merited special attention. The short oral presentations, as well as the posters, are often where the cutting edge of science and clinical practice resides.

Peter J. Hansen and Anna C. Denicol, Co-chairs

## Acknowledgments

The program co-chairs are grateful for all the support and hard work from our colleagues and friends. We thank all the speakers for getting their manuscripts in on time (mostly) and all those who submitted abstracts of work to be presented in poster and oral sessions. We are very grateful to the reviewers of the invited papers and abstracts for their timely reviews and for the section chairs who handled the review process for abstracts; the names are listed elsewhere in the program. The January issue of *Reproduction, Fertility and Development* provides an excellent medium for communication of the science presented at the annual conference—thanks are extended to Graeme Martin (editor), Jenny Foster (publisher), and Ellen Dutton (our point person for interactions with the journal). The program booklet was put together by the FASS editorial staff, and they deserve a big thanks for getting everything done well and on time.

The CANDES–Morulas Preconference Symposium was organized by Dragos Scarlet and Gabriela Mastromonaco, the DABE Forum by Marcia A. M. M. Ferraz, and the Practitioners Forum by Larry F. Lanzon and Anna C. Denicol. Thanks very much for organizing these very important components of the annual conference.

Fun parts of every IETS meeting are the student competitions. We thank Dr. Bianca Gasparini for organizing the IETS Foundation Student Competition (Bianca—we still need a soccer tournament, maybe in Monfalcone!) and Nisar Ahmad Wani for taking responsibility for the Farin Trainee Awards. The IETS Foundation has made the promotion of graduate education a key priority, and we thank Jennifer Barfield, chair of the Foundation, and Foundation members Hilde Aardema, Lucky Nedambale, Joao Viana, Satoko Matoba, and F. X. Grand for their continued support of student activities at the annual conference. The Morulas enrich the society in so many ways—we thank them for, among other things, co-organization of the preconference symposium, selection of co-chairs of sessions, and planning the Morulas and Mentors Luncheon. This year, the president of the Morulas was Pouya Dini and the governors were Beatriz Rodriguez Alonso and Rolando Pasquariello. We thank session chairs and co-chairs for their efforts to make for stimulating scientific sessions.

We sincerely thank IETS President Pascale Chavatte-Palmer and the Board of Governors for giving us the opportunity to develop the program, supporting us during the process, providing useful input, and organizing all the other aspects of the meeting in such a wonderful way.

We appreciate the leadership and the volunteer spirit of all those working to make the meeting a success. On a personal note, Debi Seymour of FASS has made what was always going to be a worthwhile endeavor (organizing the program) into a very enjoyable experience. Debi always knew the answer when we were unsure how to proceed, kept us to task gently but insistently, and made the process fun. Thanks Debi!!



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# 2020 Recipient of the IETS Pioneer Award

## Eric Palmer



The Pioneer Award is bestowed by the International Embryo Technology Society (IETS) to recognize individuals who have made seminal contributions to the development of embryo-based technologies.

**Award Presentation: Sunday, January 19, at 14:15**

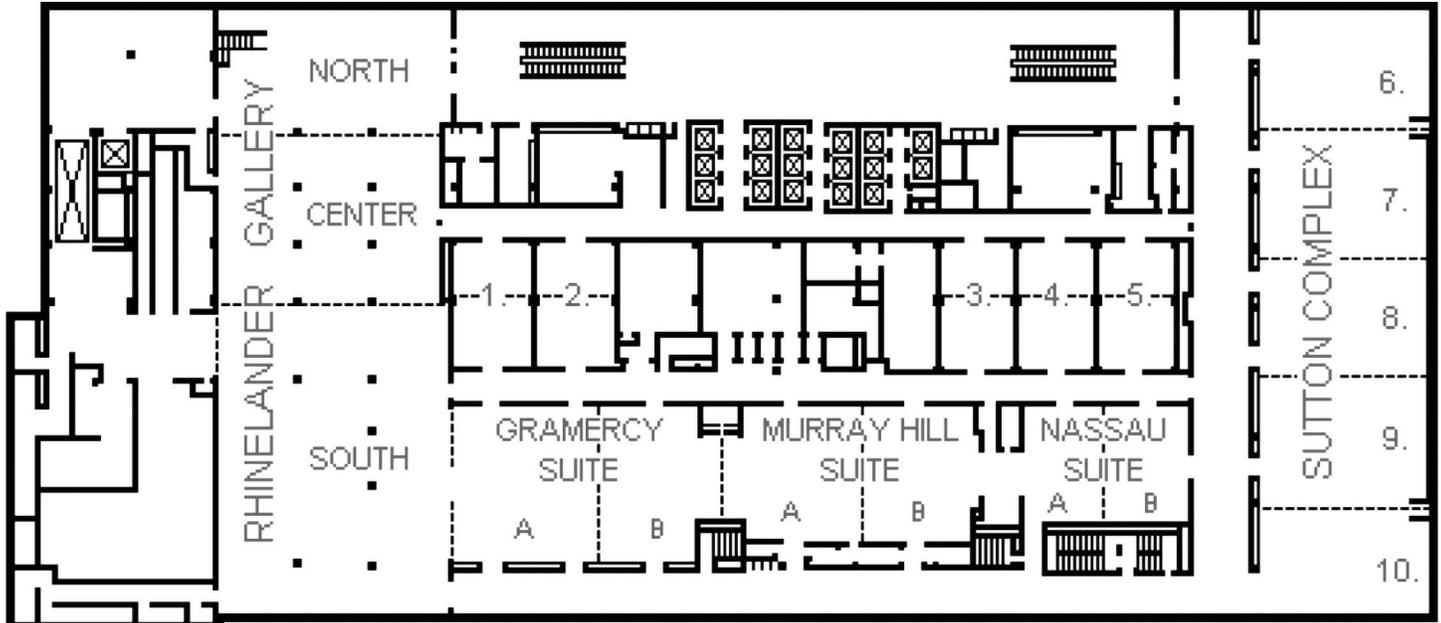
## Previous Recipients

- |                          |                               |                                    |
|--------------------------|-------------------------------|------------------------------------|
| B. Bavister (2019)       | A. Iritani (2007)             | R. G. Edwards (1993)               |
| M.-A. Sirard (2018)      | D. Kraemer (2006)             | R. L. Brinster (1992)              |
| D. T. Armstrong (2018)   | S. Willadsen (2005)           | A. K. Tarkowski (1991)             |
| H. Niemann (2017)        | B. Brackett (2004)            | J. D. Biggers (1990)               |
| C. E. Pope (2016)        | K. Betteridge (2003)          | C. Thibault (1989)                 |
| K. H. S. Campbell (2015) | R. H. Foote (2002)            | A. L. McLaren and D. Michie (1988) |
| J.-P. Renard (2015)      | P. J. Dziuk (2001)            | E. J. C. Polge (1987)              |
| W. W. Thatcher (2014)    | R. Yanagimachi (2000)         | T. M. Sugie (1986)                 |
| J. Hahn (2013)           | R. M. Moor (1999)             | L. E. A. Rowson (1985)             |
| O. J. Ginther (2012)     | I. Gordon (1998)              | L. E. Casida (1984)                |
| I. Wilmut (2011)         | S. Wintenberger-Torres (1997) | M. C. Chang (1983)                 |
| R. J. Mapletoft (2010)   | W. K. Whitten (1996)          | R. O. Berry (1982)                 |
| S. P. Leibo (2009)       | C. R. Austin (1995)           |                                    |
| G. Seidel Jr. (2008)     | N. W. Moore (1994)            |                                    |

# Map of the Venue

New York Hilton Midtown  
1335 6th Ave., New York, New York 10019

## Meeting Space (Second Floor)



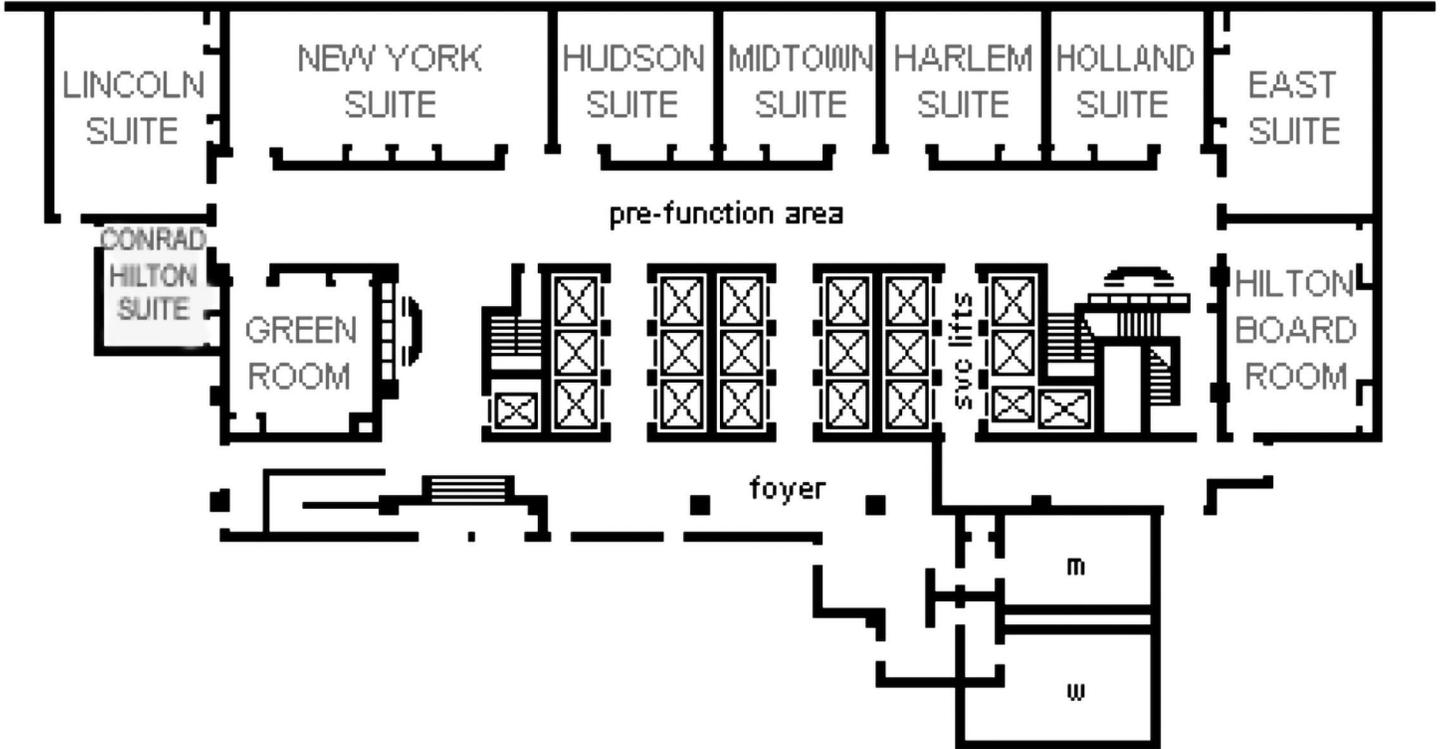
1. BRYANT SUITE
2. MORGAN SUITE
3. MADISON SUITE
4. CLINTON SUITE
5. GIBSON SUITE

6. BEEKMAN PARLOR
7. SUTTON NORTH
8. SUTTON CENTER
9. SUTTON SOUTH
10. REGENT PARLOR

# Map of the Venue

New York Hilton Midtown  
1335 6th Ave., New York, New York 10019

## Meeting Space (Fourth Floor)



# General Information

## Meeting Room Directory

Main conference sessions	Sutton North, Center, and South; DABE Forum, Beekman
Exhibits	Rhineland Gallery
Poster displays	Rhineland Gallery

Please see the Scientific Program for additional room assignments.

## Registration Desk Hours

The registration desk is located on the second floor, East Promenade.

### Pick-up of preregistration packets

Wednesday, January 15 16:00–19:00

### On-site registration hours

Thursday, January 16 07:00–18:00

Friday, January 17 07:00–18:00

Saturday, January 18 07:30–16:00

Sunday, January 19 08:00–15:00

## Exhibit Information

Rhineland Gallery

### Setup

Thursday, January 16 13:00–18:00

### Exhibits open

Friday, January 17 09:00–19:00  
18:00–19:00 (Reception)

Saturday, January 18 08:00–17:00

Sunday, January 19 08:30–13:00

### Teardown

Sunday, January 19 13:00–15:00

This year, all registrants of the 46th IETS Annual Conference will find a game board in their registration bags. Take time to meet the exhibitors and get your game boards filled. All completed game boards will be eligible for a drawing of four prizes to be drawn on Sunday, January 19, right before the Keynote Lecture.

Details on the exhibitors can be found in the Exhibit Directory on page 52.

## Badges

As a security requirement, we request that all participants wear their conference name badges to all sessions and social functions.

## Certificates of Attendance and Presentation

A Certificate of Attendance will be included in your badge packet.

## Currency

The dollar is the legal tender in the United States. Should you need to exchange your local currency, you will be able to make exchanges at the larger airports: New York, Miami, Los Angeles, Atlanta, Dallas, or Houston.

## Passport and Visa Information

As with all IETS meetings, we expect attendees from all over the world. **Please contact your embassy for visa/passport requirements for entering into the United States to attend conferences.**

## Climate

In January, daytime high temperatures tend to be mostly in the lower 40s °F (4–6°C), and overnight lows tend to average in the mid to upper 20s °F (2–3°C). A few of the warmer afternoons will see temperatures reaching or exceeding the lower 50s °F (11–12°C).

Winter in New York City requires at least one warm winter jacket or coat, as well as a warm hat and gloves. If sightseeing, a waterproof jacket will keep you warm in case of rain, sleet, or snow. New York tends to be windy in January. Layering your clothing will leave you feeling warm outdoors, with the option to remove layers when indoors. Wear comfortable, warm shoes or boots when sightseeing. Manhattan is a walking city, and you want to keep your feet warm and dry.

## Registration Fees

All registration fees will be paid in US dollars or credit card purchases.

## Messages

Any messages received for conference delegates will be posted on the message board located near the registration desk.

## Fun Run

The Fun Run is still in effect; we have just had a run, pardon the pun, of bad luck. There was not any close space for the run this year. We would also been required to have a number of permits and security and safety officers for this year's run at a very steep cost. Next year we will look at space for a run in Peru, and definitely in 2022 in Savannah, Georgia, we will most definitely have the run. It will be next to the river, right behind our hotel!

## Refreshments

Morning and afternoon refreshments are included in your registration fee and are provided during the scheduled break times in the exhibit area located in Rhineland Gallery.

## Dining and Entertainment

With hundreds of restaurants in midtown, there is something for everyone and everyone's pocketbook.

Located in the heart of Midtown, the Hilton Midtown puts you in the forefront of a dining experience that only NYC can offer. Start your day with a breakfast buffet and specialty coffees at Herb N' Kitchen. Unwind with a few friends and a few drinks at the sophisticated Bridges Bar. Enjoy light fare or a late night snack at the Lobby Lounge.

## Services and Amenities

Guests can take advantage of the modern fitness center, complimentary internet in guest rooms, gift shop, tour desk, theater, and transportation desk.

# Program

## Tuesday, January 14

09:00–17:00 IETS Board of Governors meeting (Hilton Board Room)

## Wednesday, January 15

09:00–17:00 IETS Board of Governors meeting (Hilton Board Room)

09:00–13:00 HASAC Research Subcommittee meeting (Morgan)

14:00–18:00 HASAC Regulatory Subcommittee meeting (Morgan)

16:00–19:00 Registration (Rhineland Gallery)

## Thursday, January 16

07:00–18:00 Registration (Rhineland Gallery)

08:00–15:00 W4171 Committee meeting (Harlem)

08:30–17:30 **CANDES–Morulas Preconference Symposium (Sutton North, Center, South)**

Companion Animals and Non-Domestic Species: The Embryo at the Center of All

13:00–18:00 Poster setup (Rhineland Gallery)

13:00–18:00 Exhibitor setup (Rhineland Gallery)

14:00–18:00 IETS Foundation Board of Trustees meeting (Hilton Board Room)

## Friday, January 17

07:00–18:00 Registration (Rhineland Gallery)

07:00–08:00 Poster setup (Rhineland Gallery)

07:00–08:00 Past Presidents Breakfast (Morgan)

07:00–08:00 Graduate and Undergraduate Student Competition Presenters Breakfast with IETS Foundation Education Chair (Madison)

08:00–08:30 Opening and welcome (Sutton North, Center, South)

09:00–19:00 Exhibits (Rhineland Gallery)

### Session I: *In Vitro* Oogenesis and Folliculogenesis (Sutton North, Center, South)

*Session co-chairs: Luiz F. Shutz, University of Nevada, Reno, and Miranda Zwiefelhofer, University of Saskatchewan*

08:30–09:15 In vitro growth (IVG) of immature bovine follicles and oocytes

*Evelyn Telfer, University of Edinburgh, Scotland*

09:15–10:00 Prospects for new oocyte-based assisted reproduction in animals and humans

*David Albertini, Center for Human Reproduction, USA*

10:00–10:30 Refreshment break, poster viewing, and exhibits (Rhineland Gallery)

### IETS Foundation Student Competition Presentations (Sutton North, Center, South)

*Session chair: Bianca Gasparrini, Università degli Studi di Napoli Federico II*

10:30–10:45 Assessing the energy status of porcine embryos by means of Biodynamic Imaging

*I. Lorenzo\*, Z. Li, M. Torres, Z. Machaty, and D. Nolte (Abstract 1)*

10:45–11:00 The landscape of accessible chromatin in bovine oocytes and early embryos

*H. Ming\*, J. Sun, R. Pasquariello, J. R. Herrick, Y. Yuan, E. Gutierrez, L. Gatenby, K. R. Bondioli, R. L. Krisher, and Z. Jiang (Abstract 2)*

- 11:00–11:15 Dietary caloric normalization or restriction as preconception care strategies: Impact on metabolic health and fertility in high fat-induced obese outbred mice  
*A. Smits\*, W. Marei, M. De Ketelaere, B. Meulders, P. Bols, and J. Leroy (Abstract 3)*
- 11:15–11:30 Sperm, but not seminal plasma, elicit changes in the bovine endometrial transcriptome after natural mating  
*S. Recuero\*, J. M. Sánchez, Y. Mateo-Otero, S. Bagés-Arnal, M. McDonald, S. K. Behura, T. E. Spencer, M. Yeste, P. Lonergan, and B. Fernandez-Fuertes (Abstract 4)*
- 11:30–11:45 Transport and cholinergic innervation in the bovine oviduct are dysregulated in cystic ovary disease  
*D. Scully\*, D. Champion, F. McCartney, S. Reese, and S. Kölle (Abstract 5)*
- 11:45–12:00 In vitro validation of gene edited phenotypes using CRISPR-dCas9 transcriptional activators  
*K. M. Polkoff\*, N. K. Gupta, and J. A. Piedrahita (Abstract 6)*
- 12:00–13:30 Lunch break
- 12:00–13:30 IETS Board luncheon with Partner Societies (Morgan)
- 12:00–13:30 HASAC Manual and Certificates Subcommittee meeting (Madison)
- 12:00–13:30 Morulas and Mentors Luncheon (Clinton)

## **Session II: Embryonic Stem Cells and Gene Editing (Sutton North, Center, South)**

*Session co-chairs: Martha Sofia Ortega, University of Missouri, and Kathryn Polkoff, North Carolina State University*

- 13:30–14:15 Livestock pluripotency is finally captured in vitro  
*Pablo Ross, University of California–Davis, USA*
- 14:15–15:00 Application of genome editing systems to enhance available pig resources for agriculture and biomedicine  
*Kiho Lee, Virginia Tech, USA*
- 15:00–15:30 Refreshment break, poster viewing, and exhibits (Rhineland Gallery)
- 15:30–16:45 **Selected short presentations (Sutton North, Center, South)**
- Edition of prostaglandin E2 gene receptors EP2 and EP4 by CRISPR/Cas9 technology in equine adipose mesenchymal stem cells  
*A. C. Furlanetto Mançanares\*, J. Cabezas, D. Rojas, J. Manriquez, L. Rodriguez, and F. Ovideo Castro (Abstract 207)*
- CRISPR Cas9 gene editing of in vivo fertilized bovine embryos via endoscopic oviductal flushing and electroporation of zygotes  
*D. Miskel\*, L. Beunink, M. Poirier, V. Havlicek, F. Rings, K. Schellander, U. Besenfelder, and M. Hölker (Abstract 133)*
- YAP/TAZ increased expression encourages outgrowth establishment, 3D colony formation and boosts plasticity of Parthenogenetic stem cells  
*S. Arcuri\*, G. Pennarossa, F. Gandolfi, and T. Brevini (Abstract 212)*
- Urine samples as a non-invasive source for induced pluripotent cells (iPSCs) generation in the swine model  
*K. Recchia, L. Machado, R. Botigelli, N. Pieri, P. Neto, F. Meirelles, A. Souza, S. Martins, and F. Bressan\* (Abstract 218)*
- CRISPR-on, a new tool for activation of endogenous gene expression in bovine embryos  
*V. Savy\*, V. Alberio, N. Canel, L. Ratner, M. Gismondi, O. Taboga, S. Ferraris, S. Rulli, R. Fernandez-Martin, R. Bevacqua, and D. Salamone (Abstract 60)*

## **16:45–17:15 Distinguished Service Award (Sutton North, Center, South)**

- 18:00–19:00 Welcome Reception (Rhineland Gallery)  
19:00–21:00 Student Mixer (Beekman)

## Saturday, January 18

- 07:00–08:00 Organizational breakfast meeting of the IETS Foundation (Hilton Board Room)  
07:30–16:00 Registration (Rhineland Gallery)  
08:00–17:00 Exhibits (Rhineland Gallery)

### Session III: New Developments in Embryo Transfer Technologies (Sutton North, Center, South)

*Session co-chairs: Veronica Negron, University of Puerto Rico, and Paula Chen, University of Missouri*

- 08:00–08:45 Genetics of embryo production in cattle  
*Filippo Miglior, Ontario Genomics, Canada*
- 08:45–09:30 The role of extracellular vesicles from follicular fluid during oocyte maturation and early embryo development  
*Juliano da Silveira, University of São Paulo, Brazil*
- 09:30–10:00 **Selected short presentations (Sutton North, Center, South)**  
microRNAs of extracellular vesicles secreted by embryos as early biomarker of competence  
*B. Melo-Baez, Y. S. Wong, J. Cabezas, C. J. Aguilera, F. O. Castro, and L. Rodriguez-Alvarez\**  
(Abstract 79)
- Embryonic metabolism orchestrates epigenetic mechanisms: What can we anticipate from the first cleavages?  
*J. Ispada\*, A. M. Fonseca Junior, E. C. dos Santos, K. Annes, O. L. R. Santos, C. B. de Lima, J. L. Chitwood, P. J. Ross, and M. P. Milazzotto (Abstract 89)*
- 10:00–12:00 **Poster session I** (Rhineland Gallery)  
10:00–12:00 **Exhibits** (Rhineland Gallery)  
12:00–13:30 Lunch break  
12:00–13:30 IETS Data Retrieval Committee meeting (Madison)  
12:00–13:30 IETS Exhibitors Luncheon with IETS Board of Governors (Morgan)  
12:00–13:30 Morulas Career Luncheon (Clinton)

### Session IV: Developmental Programming Associated with Assisted Reproduction (Sutton North, Center, South)

*Session co-chairs: Maria Belen Rabaglino, Denmark Technical University, and Emilie Derisoud, INRA*

- 13:30–14:15 Consequences of assisted reproductive techniques on the embryonic epigenome in cattle  
*Rocio Rivera, University of Missouri, USA*
- 14:15–15:00 Consequences of assisted reproductive technologies for function of the offspring in cattle  
*Luis Siqueira, Embrapa, Brazil*
- 15:00–15:30 **Peter Farin Trainee Award Winners Presentations (Sutton North, Center, South)**  
15:30–16:00 Refreshment break, poster viewing, and exhibits (Rhineland Gallery)

### Concurrent Session

- 16:00–18:00 Practitioners' Forum (Grand Ballroom AB)  
*Co-Chairs: Larry F. Lanzon and Anna C. Denicol*

*In vivo or in vitro embryo production: when to choose each technology, and why?*

1. Introduction and overview of the latest data on the status of MOET and IVP in the US and worldwide

## 2. Selected abstract presentations from Case Reports and Field Data

Relationship between estrus manifestation and pregnancy rates on recipients used in an IVP embryo transfer program

*B. M. Pasqual, E. E. Correa, E. P. da Silva, M. K. Sermersheim, L. M. Naves, S. G. Sell, B. R. Lindsey, M. Rubessa, and M. B. Wheeler\* (Abstract 8)*

Pregnancy loss in Holstein lactating recipient cows diagnosed pregnant by PAG test in blood

*R. Santos\*, M. Oliveira, N. Melgar, R. Chebel, and D. Demtrio (Abstract 9)*

3. Panel discussion and Q&A: Critical factors for success of both practices including IVM, IVF and embryo culture, embryo manipulation and cryopreservation, and recipient management.

*Panel members: Alvaro Guerra (Ohio State University), Daniela Demtrio (Maddox Dairy, California), William Croushore (White Oak Veterinary Clinic, Pennsylvania), Larry Lanzon (Embryo Inc, California), Teresa Mogas (Universidad Autonoma de Barcelona).*

## Concurrent Session

16:00–18:00 DABE—Narrowing the gaps between embryo gene editing and ethics (Beekman)

*Chair: Marcia A. M. M. Ferraz*

Introduction

Embryo gene editing: Techniques, uses and future perspectives

*Alison L. Van Eenennaam, University of California, USA*

Ethical aspects of embryo gene editing for animal production and the development of biomedical models

*Jason Scott Roberts, Arizona State University, USA*

Panel discussion

18:00–18:30 **IETS Business Meeting (Sutton North, Center, South)**

18:30–19:30 HASAC open meeting (Sutton North, Center, South)

18:30–19:30 Morulas Forum (Beekman)

## Sunday, January 19

07:30–08:30 Organizational Meeting of the IETS Board of Governors (Hilton Board Room)

08:00–15:00 Registration (Rhineland Gallery)

08:30–13:00 Commercial exhibits (Rhineland Gallery)

## Session V: Enhancing Success of Embryo Transfer Programs (Sutton North, Center, South)

*Session co-chairs: Vitor Mercadante, Virginia Tech, and Jacqueline Ervin, New Mexico State University*

08:00–08:45 Bovine oocyte maturation: Acquisition of developmental competence

*Bernard Roelen, Utrecht University, the Netherlands*

08:45–09:30 Factors affecting embryo production in superovulated Bos taurus cattle

*Marja Mikkola, Geno SA, Norway*

09:30–10:00 **Selected short presentations (Sutton North, Center, South)**

Pregnancy from a vitrified-warmed alpaca preimplantation embryo

*J. Lutz, S. Johnson, K. Duprey, P. Taylor, H. Vivanco, M. Ponce-Salazar, M. Miguel, and C. Youngs\* (Abstract 7)*

Comparison of slow and rapid freezing in freeze-dry ram spermatozoa

*L. Palazzese\*, D. A. Anzalone, P. Toschi, and P. Loi (Abstract 40)*

- 10:00–10:30 **Richard Fayrer-Hosken, Lifetime Career Award Recipient (Sutton North, Center, South)**
- 10:30–12:30 **Poster session II** (Rhineland Gallery)
- 12:30–14:00 Lunch break
- 12:30–14:00 2019, 2020, 2021 IETS Program Committee lunch (Morgan)
- 13:00–16:00 Commercial exhibit and poster takedown (Rhineland Gallery)  
All posters must be removed by 13:30.
- 14:15–14:45 **Pioneer Award (Sutton North, Center, South)**
- 14:45–14:45 Exhibitor drawing (Sutton North, Center, South)

### **Session VI: Keynote Lecture (Sutton North, Center, South)**

*Session chair: Pascale Chavatte-Palmer, INRA*

- 14:45–15:30 Engineering reproduction: Creating physical environments for oocyte success  
*Teresa Woodruff, Northwestern University, USA*

### **Awards Presentation and Updates (Sutton North, Center, South)**

- 15:30–16:00 IETS Foundation Early Career Achievement Award Winner
- 16:00–16:30 IETS Foundation Student Competition Awards; CANDES, DABE, and HASAC updates
- 16:30–17:00 Closing ceremony (Sutton North, Center, South)
- 19:00–23:00 Closing party, New York Hilton Midtown (Rhineland Gallery)



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# The Program Co-Chairs Acknowledge and Thank the Following People

## Section Editors

Bianca Gasparrini, *Graduate Student Competition*  
William Holt, *Bioethics, Welfare, and Sustainability*  
Roberto Sartori, *Case Reports and Field Data*  
Paula Rodriguez, *Cloning/Nuclear Transfer*  
Marcia A. M. M. Ferraz, *Companion CANDES*  
Jean-Magloire Feugang, *Cryopreservation/Cryobiology*  
Kun Zhang, *Developmental Biology*  
Alan Ealy, *Early Pregnancy*  
Dawit Tesfaye, *Embryo Culture*  
Irina Polejaeva, *Embryo Manipulation*  
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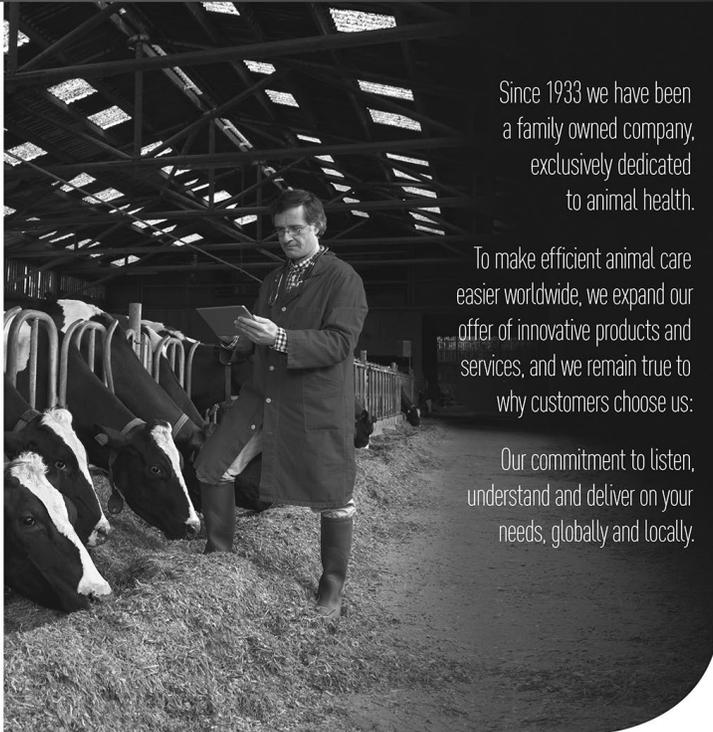
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# Poster Session Information

## Location

Posters are located in the Rhinelander Gallery of the New York Hilton Midtown on the second floor (see map on page 4).

## Poster Numbers

Posters are identified by the number corresponding to the abstract number in *Reproduction, Fertility and Development* 2020, 32(1). Numbering of the posters begins at 1 and ends at 231.

## Setup

Posters can be put up from 13:00 to 18:00 on Thursday, January 16, and from 07:00 to 08:00 on Friday, January 17. **They will remain up until 12:30, Sunday, January 19.**

## Poster Session I

**Presentations by authors of odd-numbered abstracts** (e.g., 7, 9, 11) in *Reproduction, Fertility and Development* 2020; 32(1) as well as the student competition finalist and undergraduate finalist poster presentations will take place Saturday, January 18, from 10:00 to 12:00. Odd-numbered posters for the poster competition will also be judged on Saturday, January 18, from 10:00 to 12:00.

## Poster Session II

**Presentations by authors of even-numbered abstracts** (e.g., 8, 10, 12) in *Reproduction, Fertility and Development* 2020; 32(1) will take place Sunday, January 19, from 10:30 to 12:30. Even-numbered posters for the poster competition will be judged on Sunday, January 19, from 10:30 to 12:30.

## Teardown

Poster teardown will take place from 12:30 to 13:00 on Sunday, January 19. **Posters that are not taken down by 13:30 on Sunday will be discarded.**

## Poster Session Order by Topic

Poster number = abstract number in *Reproduction, Fertility and Development* 2020; 32(1)

### Graduate Student Competition Finalists

- 1 Assessing the energy status of porcine embryos by means of biodynamic imaging  
*I. Lorenzo, Z. Li, M. Torres, Z. Machaty, and D. Nolte*
- 2 The landscape of accessible chromatin in bovine oocytes and early embryos  
*H. Ming, J. Sun, R. Pasquariello, J. R. Herrick, Y. Yuan, E. Gutierrez, L. Gatenby, K. R. Bondioli, R. L. Krisher, and Z. Jiang*
- 3 Dietary caloric normalization or restriction as preconception care strategies: Impact on metabolic health and fertility in high fat-induced obese outbred mice  
*A. Smits, W. Marei, M. De Ketelaere, B. Meulders, P. Bols, and J. Leroy*
- 4 Sperm, but not seminal plasma, elicit changes in the bovine endometrial transcriptome after natural mating  
*S. Recuero, J. M. Sánchez, Y. Mateo-Otero, S. Bagés-Arnal, M. McDonald, S. K. Behura, T. E. Spencer, M. Yeste, P. Lonergan, and B. Fernandez-Fuertes*
- 5 Transport and cholinergic innervation in the bovine oviduct are dysregulated in cystic ovary disease  
*D. Scully, D. Champion, F. McCartney, S. Reese, and S. Kölle*
- 6 *In vitro* validation of gene edited phenotypes using CRISPR-dCas9 transcriptional activators  
*K. M. Polkoff, N. K. Gupta, and J. A. Piedrahita*

### Case Reports and Field Data

- 7 Pregnancy from a vitrified-warmed alpaca pre-implantation embryo  
*J. Lutz, S. Johnson, K. Duprey, P. Taylor, H. Vivanco, M. Ponce-Salazar, M. Miguel, and C. Youngs*
- 8 Relationship between oestrus manifestation and pregnancy rates on recipients used in an *in vitro*-produced embryo transfer program  
*B. M. Pasqual, E. E. Correa, E. P. da Silva, M. K. Sermersheim, L. M. Naves, S. G. Sell, B. R. Lindsey, M. Rubessa, and M. B. Wheeler*
- 9 Pregnancy loss in Holstein lactating recipient cows diagnosed pregnant by pregnancy-associated glycoprotein test in blood  
*R. Santos, M. Oliveira, N. Melgar, R. Chebel, and D. Demetrio*
- 10 Pregnancy rates following artificial insemination or embryo transfer in lactating Holstein cows  
*M. Oliveira, R. Santos, R. Chebel, and D. Demetrio*
- 11 *In vivo*-derived embryo pregnancy rates at Maddox Dairy from 2008 to 2018  
*D. Demetrio, A. Magalhaes, M. Oliveira, R. Santos, and R. Chebel*
- 12 Assessment of oocyte and embryo production in senescent beef cows  
*R. H. Alvarez, B. M. Bayeux, Y. F. Watanabe, D. A. Joaquim, K. M. R. Duarte, and G. Pugliesi*
- 13 *In vitro* and *in vivo* embryo production during foal heat in a mare: A case report  
*L. F. Campos-Chillon and J. L. Altermatt*

## Cloning/Nuclear Transfer

- 14 Effects of long cooling periods of the ear skin on the isolation and cultivation of bovine fibroblasts for posterior use in cloning via nuclear transfer  
*J. M. Araujo, R. A. Oliveira, H. C. B. Cumpa, A. T. M. Cunha, M. A. N. Dode, and C. F. Martins*
- 15 Combination of RepSox with histone deacetylation inhibitors on *in vitro* development competence of porcine somatic cell nuclear transfer embryos  
*Z.-B. Luo, M.-F. Xuan, Z.-Y. Li, X.-J. Yin, and J.-D. Kang*
- 16 Improvement of porcine cloned embryo developmental competence via *KDM4A* overexpression and H3K9me3 methyltransferase inhibitor treatment  
*Y.-T. Zhang, Y. Liu, and Z. Liu*
- 17 Generation of myostatin gene knockout boars by somatic cell nuclear transfer  
*J.-D. Kang, M.-F. Xuan, Z.-B. Luo, S.-Z. Han, and X.-J. Yin*
- 18 Withdrawn
- 19 Improvement of the developmental competence of bovine somatic cell nuclear transfer embryos using latrunculin A during activation  
*G. Vans Landschoot, V. Savy, L. D. Ratner, V. Alberio, and D. F. Salamone*
- 20 Aggregation of yak heterospecific somatic cell nuclear transfer embryos improves cloning efficiency  
*M. Yauri Felipe, M. Duque Rodríguez, A. De Stéfano, and D. Salamone*
- 21 The contrasting role of histone methyltransferases during nuclear reprogramming: *SUV39H* knockdown improves bovine somatic cell nuclear transfer, while the absence of *EHMT2* hampers it  
*R. Sampaio, D. Ambrizi, R. Nociti, J. Pinzon, J. Sangalli, T. De Bem, K. Takahashi, J. Cruz, L. Smith, P. Ross, and F. Meirelles*

## Companion CANDES

- 22 The zona pellucida is required for normal development of *in vitro*-produced cat embryos  
*D. Veraguas, S. Saez, M. Cordero, C. Aguilera, D. Saez-Ruiz, F. O. Castro, and L. Rodriguez-Alvarez*
- 23 Sperm quality of Pure Spanish stallions is affected by inbreeding coefficient and age  
*Y. Pirosanto, M. Valera, A. Molina, J. Dorado, and S. Demyda-Peyrás*
- 24 Asynchronic tetraploid complementation and embryo quality in domestic cat and *Leopardus geoffroyi* hybrid embryos  
*M. Duque Rodriguez, A. Gambini, C. Gutnisky, L. Ratner, S. Rulli, A. Sestelo, O. Briski, R. Fernandez Martin, P. D. Cetica, and D. Salamone*

## Cryopreservation/Cryobiology

- 25 A preliminary study of the effects of breed and nanowater as extender diluent on ram semen characteristics post-thawing  
*M. Murawski, J. Szymanowicz, T. Schwarz, and P. Bartlewski*
- 26 Baobab oil supplemented extender preserves post-thaw bull sperm quality parameters  
*Z. Raphaelalani, F. Ramukhithi, R. Ndhala, K. Nephawe, and T. Nedambale*
- 27 Vitrification at the germinal vesicle stage does not trigger apoptosis in porcine oocytes and early embryos  
*T. Somfai, H. T. Nguyen, M. T. Nguyen, T. Q. Dang-Nguyen, H. Kaneko, J. Noguchi, and K. Kikuchi*

- 28 Short equilibration improves vitrification of *in vitro*-produced bovine embryos using VitTrans device  
*I. Martínez-Rodero, T. García-Martínez, M. López-Béjar, and T. Mogas*
- 29 Time-lapse analysis of bovine embryos derived after *in vitro* fertilization from vitrified and fresh oocytes  
*D. Angel Velez, H. Atashi, J. Dewulf, K. Smits, and A. Van Soom*
- 30 Supplementation of *in vitro* culture medium with linoleic acid albumin improves bovine embryo survivability in low-temperature storage at 4°C  
*S. K. Jung, T. Nishisouzu, O. Dochi, and K. Imai*
- 31 Effect of vitrification on global gene expression dynamics of bovine elongating embryos  
*Z. Jiang, E. Gutierrez, H. Ming, B. Foster, L. Gatenby, C. Mak, C. Pinto, and K. Bondioli*
- 32 Bovine embryo cryopreservation in a chemically defined medium  
*A. Østergaard, L. Gavin-Plagne, M. Guedes Teixeira, S. Buff, and T. Joly*
- 33 Assessment of spindle morphology and reactive oxygen species production after vitrification of bovine oocytes following *in vitro* maturation in the presence of glutathione ethyl ester  
*T. García-Martínez, M. Vendrell-Flotats, I. Martínez-Rodero, M. Álvarez-Rodríguez, M. López-Béjar, and T. Mogas*
- 34 Effect of polysaccharide from *Flammulina velutipes* on the vitrification of bovine oocytes  
*Y. Ihara, K. Tatakura, Y. Wada, H. Kawahara, and K. Yamanaka*
- 35 Ethanol extracts of Cerrado plants in cryotolerance of *in vitro*-produced bovine embryos  
*A. A. G. Fidelis, G. O. Fernandes, T. S. Kawamoto, F. R. Melo, and M. A. N. Dode*
- 36 Extended culture after vitrification-warming helps in spindle recovery of bovine oocytes  
*E. Gutierrez, Z. Jiang, and K. Bondioli*
- 37 *In vitro* maturation and fertilization in white-tailed deer (*Odocoileus virginianus*) oocytes vitrified with trehalose or sucrose  
*V. A. Rubio-Santillanes, J. Antillón-Ruiz, F. A. Rodríguez-Almeida, S. Romo, H. Álvarez-Gallardo, J. L. Rodríguez-Suástegui, E. Hernández-Pichardo, and M. E. Kjelland*
- 38 Ram sperm longevity after cryopreservation in extender containing l-carnitine  
*C. Souza, F. Brandão, J. Santos, V. Alfradique, V. Brair, L. Prellwitz, P. S. Rangel, A. Silva, and J. M. Souza-Fabjan*
- 39 Nanowater enhances cryoprotective effects of glycerol during ram semen freezing  
*J. Szymanowicz, M. Murawski, T. Schwarz, and P. Bartlewski*
- 40 Comparison of slow and rapid freezing in freeze-dry ram spermatozoa  
*L. Palazzese, D. A. Anzalone, P. Toschi, and P. Loi*
- 41 Effect of vitrification on DNA integrity of human spermatozoa  
*Y. Toishibekov, B. Shalekenov, Y. Assanova, S. Shalekenov, Y. Kuandykov, D. Toishybek, and V. Isachenko*
- 42 Vitrification of *in vitro*-produced feline embryos  
*D. Fuller, J. Herrick, J. Graham, and J. Barfield*

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- 43 Actions of colony-stimulating factor 3 on the maturing oocyte and developing embryo in cattle  
*E. Jannaman, Y. Xiao, and P. Hansen*

- 44 Analysis of abnormal chromatin configuration induced by inhibiting MEK at the 1-cell stage  
*K. Magara, S. Naruto, R. Watanabe, T. Wakayama, and S. Kishigami*
- 45 Expression patterns of *PRDM* family genes in porcine pre-implantation embryos  
*K. Farrell, K. Uh, and K. Lee*
- 46 Presence of porcine *TET3L* isoform in oocytes: Potential involvement in the DNA demethylation process  
*K. Uh, N. Wax, K. Farrell, and K. Lee*
- 47 Inhibition of endoplasmic reticulum stress during *in vitro* maturation improves the developmental competence of bovine cumulus–oocyte complexes  
*H. Khatun, Y. Ihara, K. Takakura, Y. Wada, and K.-I. Yamanaka*
- 48 Transrectal color Doppler evaluation of umbilicus, placentomes, and uterine vascularity changes throughout pregnancy in Surti buffalo  
*M. Gaur and G. N. Purohit*
- 49 Expression and actions of the dickkopf-1 receptors KREMEN1 and KREMEN2 in the bovine pre-implantation embryo  
*T. Fernandes Amaral, Y. Xiao, E. Estrada-Cortes, and P. Hansen*
- 50 Effect of colony-stimulating factor 2 on competence of bovine blastocysts to survive vitrification  
*F. Sosa and P. J. Hansen*
- 51 Bovine embryos with distinct early morphokinetic pathways present different post-embryonic genome activation transcriptomic patterns and different cryotolerance  
*A. P. Reis, A. Jampy, A. Teste, B. M. Le Guienne, L. Laffont, S. Ruffini, E. Canon, C. Archilla, L. Jouneau, A. Trubuil, and V. Duranthon*
- 52 Blocking of embryonic development by nanoparticles derived from endometrial and oviductal cells isolated with an Amicon filter system  
*J. Cabezas, D. Rojas, B. Melo-Baez, M. Gutierrez, F. Castro, and L. Rodriguez-Alvarez*
- 53 Transcriptomic profiles of uniform populations of *in vivo*-produced spherical, ovoid, or tubular porcine embryos during the initiation of elongation  
*S. Walsh, J. R. Miles, E. C. Wright-Johnson, B. Keel, L. A. Rempel, and A. K. Pannier*
- 54 Choline alters the pattern of DNA methylation and lipid content of pre-implantation bovine embryos  
*E. Estrada-Cortés and P. J. Hansen*
- 55 Identification of microRNAs associated with sex determination in bovine amniotic fluid and maternal blood plasma  
*J. M. Sánchez, I. Gómez-Redondo, J. A. Browne, B. Planells, A. Gutiérrez-Adán, and P. Lonergan*
- 56 Mammalian pre-implantation embryos at the single cell level: The bovine as a model for early human embryonic development  
*N. Ortega, V. Ahola, A. Plaza-Reyes, J. Schell, P. Kumar, A. Jouneau, V. Duranthon, and F. Lanner*
- 57 Primordial germ cell distribution in the horse fetal gonad  
*D. Scarlet, U. Reichart, G. Podico, R. Ellerbrock, I. Canisso, I. Walter, and C. Aurich*
- 58 Effect of different light sources on the developmental capacity of bovine embryos produced *in vitro*  
*A. Gonzalez, F. Dobener, S. Chatterjee, and C. Wrenzycki*
- 59 Genome activation in intracytoplasmic sperm injection-derived horse embryos  
*D. E. Goszczynski, P. Tinetti, Y. H. Choi, K. Hinrichs, and P. J. Ross*

- 60 CRISPR-on, a new tool for activation of endogenous gene expression in bovine embryos  
*V. Savy, V. Alberio, N. Canel, L. Ratner, M. Gismondi, O. Taboga, S. Ferraris, S. Rulli, R. Fernandez-Martin, R. Bevacqua, and D. Salamone*

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- 61 Low plasma progesterin concentration during the early luteal phase impairs equine conceptus development until placentation  
*C. Okada, M. Kaps, S. Handschuh, D. Scarlet, and C. Aurich*
- 62 Peripheral transcriptome response to embryo mortality in Holstein cows  
*C. L. Gonzalez-Berrios, H. M. Georges, J. V. Bishop, H. Van Campen, M. G. Thomas, and T. R. Hansen*
- 63 Inhibition of CXCR4 at the fetal–maternal interface during placentation results in altered production of vascular endothelial growth factor receptors in the placenta on Day 90 of pregnancy  
*J. M. Ervin, S. Z. McIntosh, C. L. Runyan, and R. L. Ashley*
- 64 Prediction of pregnancy and early embryo loss through *OAS-1* expression, concentrations of pregnancy-associated glycoproteins, and Doppler ultrasonography in beef cattle  
*G. D. Melo, B. P. Mello, L. M. F. Pinto, A. Guimarães, C. C. Rocha, I. G. Motta, E. H. Madureira, J. C. Silveira, K. G. Pohler, and G. Pugliesi*

## Embryo Culture

- 65 Effect of oviductal fluid extracellular vesicle supplementation during *in vitro* culture on development and quality of bovine embryos  
*D. Le Bourhis, S. Janati Idrissi, P. Mermillod, A. Carmen, P. Salvetti, and M. Saint Dizier*
- 66 Lipid profiling of bovine blastocysts produced *in vitro* with and without a stimulator of cyclic guanosine monophosphate synthesis by multiple reaction monitoring profiling  
*L. Schefer, L. M. Naves, C. Ramires Ferreira, E. Pradebon da Silva, T. J. Sobreira, P. Vieiro Marchioretto, C. Lima Verde Leal, M. Rubessa, and M. B. Wheeler*
- 67 Effects of phytohemagglutinin on the culture of isolated bovine blastomeres derived from the 8-cell stage *in vitro*-produced embryos  
*Y. Hashiyada, Y. Aikawa, H. Matsuda, and T. Yamanouchi*
- 68 Anti-Mullerian hormone levels in different bovine species and the relationship with *in vitro* embryo production  
*J. Berdugo, A. Tarazona-Morales, J. Echeverry-Zuluaga, W. Cardona Maya, A. López-Herrera, G. Crudeli, J. Konrad, and G. Espasandin*
- 69 Phosphorylation of mechanistic target of rapamycin in porcine blastocyst-stage embryos is dependent on the concentration of glutamine in the medium  
*P. Chen, L. Spate, and R. Prather*
- 70 Trolox during *in vitro* maturation of bovine oocytes protects developing embryos from palmitic acid-induced lipotoxicity  
*J. De Bie, W. Marei, P. Bols, and J. Leroy*
- 71 Comparison of sexed semen ULTRA-4M with conventional semen for the *in vitro* production of bovine embryos  
*H. Alvarez, M. Kjelland, F. Villaseñor, M. Pérez, and S. Romo*

- 72 *In vitro* embryo production using prepubertal calf oocytes with conventional semen and sexed semen  
ULTRA-4M  
*A. Velazquez, H. Alvarez, M. Kjelland, F. Villaseñor, G. Ariza, and S. Romo*
- 73 Cytokine addition does not increase developmental competence of *in vitro*-produced bovine embryos  
*C. M. Helland, M. Barcelo-Fimbres, and L. F. Campos-Chillon*
- 74 Analysis of chromosomal abnormality of bovine IVF embryos based on next-generation sequencing  
*M. Okada, Y. Nagai, S. Matoba, Y. Sakuraba, and S. Sugimura*
- 75 Expression of lipid metabolism-related genes in bovine embryos cultured *in vitro* with diacylglycerol  
acyltransferase-1 inhibitor  
*K. Cañón-Beltrán, J. Giraldo-Giraldo, Y. N. Cajas, N. Vásquez, C. L. V. Leal, A. Gutiérrez-Adán, M. E. González, and D. Rizos*
- 76 Extracellular vesicles from oviduct and uterus in sequential culture improve the quality of bovine  
embryos produced *in vitro*  
*C. Leal, K. Cañón-Beltrán, Y. Cajas, P. Gallego, P. Beltrán-Breña, M. Hamdi, M. González, and D. Rizos*
- 77 Nobiletin supplementation affects gene expression profiles of the Akt pathway in bovine embryos *in vitro*  
*Y. N. Cajas, K. Cañón-Beltrán, C. L. V. Leal, M. E. González, A. Gutierrez-Adán, and D. Rizos*
- 78 Radio electric asymmetric conveyer treatment during prolonged cold storage of ovaries enhances  
developmental competence of oocytes in the domestic cat model  
*F. Ariu, E. Sanna Passino, A. Piras, V. Melosu, M. Maioli, A. Castagna, V. Fontani, S. Rinaldi, and L. Bogliolo*
- 79 MicroRNAs of extracellular vesicles secreted by embryos as an early biomarker of competence  
*B. Melo-Baez, Y. S. Wong, J. Cabezas, C. J. Aguilera, F. O. Castro, and L. Rodriguez-Alvarez*
- 80 Evaluation of extracellular vesicles from culture medium of human embryos as a possible method of  
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*C. Aguilera, D. Veraguas, C. Henriquez, A. Velasquez, F. O. Castro, and L. Rodriguez-Alvarez*
- 81 Linoleic acid required for reduction of apoptosis through nuclear transcription factor-kappa B during  
pig embryo development  
*D. Lee, K. Choi, J. Oh, S. Kim, M. Lee, M. Cho, and C. Lee*
- 82 Stage-specific expression of lineage marker genes and pluripotency marker distribution in porcine  
pre-implantation embryos  
*J. Oh, M. Lee, D. Lee, K. Choi, S. Kim, M. Cho, and C. Lee*
- 83 Validation of propidium iodide dye for live-dead staining of bovine blastocysts: Preliminary results  
*H. Hellmold, D. Teuteberg, J. Tetens, and C. Blaschka*
- 84 Folate-methionine cycle and folate transport in developing buffalo embryos  
*S. Ansari, S. Jamwal, S. Saini, R. Singh, and D. Malakar*
- 85 Regulation of mammalian target of rapamycin signaling post-fertilisation is essential for efficient  
development of bovine pre-implantation embryos  
*M. El Sheikh, A. Mesalam, A. Mesalam, K. Lee, and I. Kong*
- 86 Effect of *in vitro* culture conditions on mitochondria functions in mouse embryos  
*M. Czernik, D. Winiarczyk, S. Sampino, P. Greda, J. A. Modlinski, and P. Loi*

- 87 Analyzing metabolomic profile of bovine IVF and somatic cell nuclear transfer embryos through Raman spectroscopy  
*J. Keim, W. Zhang, Y. Liu, H. Rutigliano, A. Zhou, and I. Polejaeva*
- 88 MicroRNA profile of *in vitro* bovine embryos cultured in the presence of amniotic extracellular vesicles shifts toward *in vivo*-collected blastocysts  
*A. Lange-Consiglio, B. Lazzari, F. Pizzi, A. Idda, F. Cremonesi, and E. Capra*
- 89 Embryonic metabolism orchestrates epigenetic mechanisms: What can we anticipate from the first cleavages?  
*J. Ispada, A. M. Fonseca Junior, E. C. dos Santos, K. Annes, O. L. R. Santos, C. B. de Lima, J. L. Chitwood, P. J. Ross, and M. P. Milazzotto*
- 90 Establishment and characterization of Day 30 equine chorionic girdle and allantochorion cell lines  
*S. Salman, A. Asghar, C. Magee, Q. Winger, G. Bouma, and J. Bruemmer*
- 91 *In vivo*- and *in vitro*-produced bovine embryos have different microRNA profiles after *in vitro* individual culture  
*A. Bridi, I. Motta, G. Andrade, M. Del Collado, A. Ávila, L. Silva, G. Pugliesi, F. Meirelles, J. Silveira, and F. Perecin*
- 92 Using physical parameters of bovine zygotes to predict *in vitro* development success  
*C. L. Timlin, A. Lynn, L. K. Wooldridge, K. Uh, A. D. Ealy, R. R. White, K. Lee, and V. R. G. Mercadante*

## Embryo Manipulation

- 93 Efficient introduction of green fluorescent protein-9R, a protein with cell-penetrating peptides, into oocytes using intracytoplasmic sperm injection  
*R. Watanabe, H. Okaji, K. Magara, K. Tetsuka, T. Kaitzuka, K. Tomizawa, and S. Kishigami*
- 94 Efficient generation of myostatin mutation in Korean beef cattle  
*G. Gim, Y. Jin, S. Yum, H. Park, J. Lee, S. Koo, W. Lee, and J. Goo*
- 95 Obtaining birds with chimeric gonads using *in vitro* lentiviral transduction of primordial germ cells  
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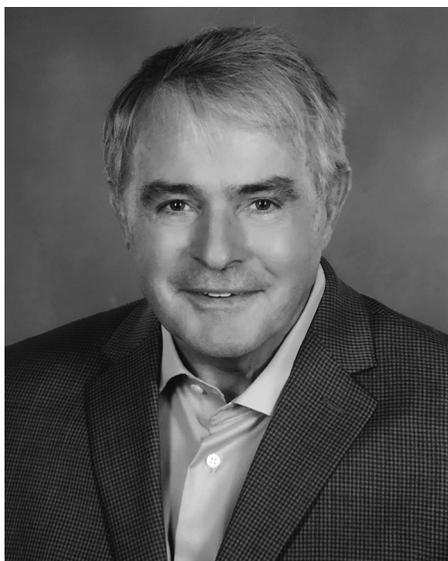
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## 2020 Recipient of the IETS Distinguished Service Award



### Dr. Brad Stroud

Dr. Brad Stroud was born and raised in Weatherford, Texas, and still resides there and operates his embryo transfer (ET) business, Stroud Veterinary Embryo Services Inc., in that town. Stroud was the starting quarterback on his high school football team and impressively set the school record, which still stands, in the 220-yard dash. After earning his undergraduate degree at Texas A&M University, he then earned his veterinary degree from the same institution in 1979. He went on to complete an internship in large animal ambulatory medicine at the Ohio State University in 1980, following which he returned to Weatherford, where he and his wife built and established his ET facility and business.

Stroud attended his first IETS conference in 1981, held in Denver for the seventh consecutive time in Colorado. Stroud recalls that there were approximately 150 participants at that conference and the main subject of conversation seemed to center around whether ova had been fertilized and the morphology of healthy embryos. Although many of the attendees were largely commercially active and competitive ET practitioners, many of them struck Stroud as being willing to openly share what they knew. Following this conference, Stroud vowed to help his colleagues in the industry and planned to one day stand at the podium and present new information.

Starting in 1981, Stroud's business grew steadily and peaked in size with approximately 20 employees, a large in-house donor and recipient facility, and a demand to provide ET services over a wide geographic area. Early on, Stroud started incorporating ART procedures that went well beyond the traditional procedures of classic ET. He successfully used gamete intrafollicular transfer and AI to produce embryos and pregnancies in clinically infertile cows. He was among the first nonacademic veterinarians to utilize ultrasound technology in his practice and, in fact, produced four very comprehensive cassette tapes (later changed to CDs) covering bovine reproductive ultrasonography, direct transfer of frozen embryos, bovine fetal sexing, and a guide to handling frozen embryos and semen. Several thousand of these tapes have been distributed on an international basis, and they continue to be relevant and very useful. In addition, Stroud has given many lectures, talks, and short courses on the use of ultrasound in bovine reproduction and ART.

Stroud was also among the first ART practitioners to incorporate IVF, embryo splitting, and user-friendly embryo recovery and transfer methods into his business. Furthermore, he has always welcomed visitors to his program and generously shared all that he had accomplished. Stroud was elected president of AETA in 1991 and then president of IETS in 1992. He remains the only individual to have served as the president of both organizations. In 1994 he was honored as the Schering Plough ET Person of the Year, and in October of 2019 he was presented with the AETA Edwin Robertson Lifetime Achievement Award. Perhaps most notably, Stroud has operated a large, busy ART facility for the past 40 years, while continuing to write and present papers and give workshops at both domestic and international conferences. In addition, he has openly and generously shared all of his mistakes, discoveries, and data with innumerable individuals and organizations in the ART industry.

Dr. Stroud is a most worthy recipient of the 2020 IETS Distinguished Service Award.

# Special Events

## CANDES–Morulas Preconference Symposium

Companion Animals and Non-Domestic Species: The Embryo at the Center of All

Thursday, January 16

08:30–17:30

Sutton North, Center, South

This year, CANDES and the Morulas are working together to bring you a preconference symposium that will explore embryo-based techniques in companion animals, non-traditional livestock, and non-domestic species. We will hear presentations from both main speakers and Morulas members in each of the sessions, including the CANDES Trainee Travel Award winners. The program will close with an “enlightening” presentation by Dr. David Gruber, who will share his experience exploring the bioluminescent diversity under the sea. **(Ticket required)**

## Morulas and Mentors Luncheon

Friday, January 17

12:00–13:30

Clinton

One of the main goals of the Morulas is to provide trainees the opportunity to interact with the general members of the IETS. The Morulas and Mentors Luncheon is designed to give trainees an opportunity to sit down with mentors in small groups, providing a chance to interact and develop a connection with leaders in our field. Trainees will have an opportunity to choose a mentor they would like to sit with prior to the conference.

The six amazing mentors will join the lunch and share their wisdom with Morulas: Drs. David Albertini, Pablo Ross, Filippo Miglior, Eduardo Gastal, Katarina Jewgenow, and Katrin Hinrichs. A complete description of mentor research activities will soon be available for trainees to choose from on a first-come, first-served basis. The Morulas Board is very grateful to the mentors for sharing their time with the trainee members. **(Ticket required)**

## Welcome Reception

Friday, January 17

18:00–19:00

Rhineland Gallery

*Sponsored by Professional Embryo Transfer Supply Inc. (PETS)*

A welcome reception will be held in the Rhineland Gallery of the New York Hilton Midtown Hotel, from 18:00 to 19:00. Meet the exhibitors and renew old friendships. Light hors d’oeuvres will be served with a cash bar. **(Do not forget to bring your drink ticket.)**

## Morulas Student Mixer

Friday, January 17

19:00–21:00

Beekman

After business comes fun! Everyone is invited to gather with friends and drinks for a social event. Hosted by IETS, this annual event is a fun time for all trainees to relax and enjoy the atmosphere. Take advantage of meeting new people and establish connections that last a lifetime. It is our pleasure to invite you all to the upcoming annual social event, the Morulas Mixer. We will all be gathering on Friday, January 17, at 19:00. We are excited to have an exclusive time set aside for trainee interaction along with general IETS members. All members are encouraged to join this fun event and relax in an enjoyable atmosphere. Some drinks will be provided. **(Registration and tickets are NOT required.)**

## Morulas Career Luncheon

Saturday, January 18

12:00–13:30

Clinton

*Sponsored by CSIRO Publishing*

Trainees will have the opportunity to meet and interact with two fantastic speakers who will talk about their experiences, their career paths, and the decisions they made that led to their current position, either within industry or academia. This year we will have two amazing scientists who kindly agreed to share their experience with us. One of the

astounding feathers of this year's Career Luncheon is that both of our mentors (Dr. Rebecca Krisher and Dr. Lotte Stroebech) have experiences in academia and industry. **(Ticket required)**

### **Practitioners Forum**

Saturday, January 18

16:00–18:00

Sutton North, Center, South

This year's Practitioners Forum will bring a panel of experts for an interactive Q&A session focused on opportunities, challenges, and the latest information related to these and other common questions that practitioners face in their daily work. For the first time this year, the forum will also feature oral presentations of two selected abstracts from Case Reports and Field Data. We truly hope that this program provides an enjoyable opportunity for learning, networking, and sharing knowledge.

### **DABE Forum**

Saturday, January 18

16:00–18:00

Beekman

Narrowing the Gaps Between Embryo Gene Editing and Ethics

### **Open Meeting of the Health and Safety Advisory Committee (HASAC)**

Saturday, January 18

18:30–19:30

Sutton North, Center, South

### **Morulas Trainee Forum**

Saturday, January 18

18:30–19:30

Beekman

All trainees are invited and encouraged to attend the Morulas Trainee Forum. The Board of Governors will be updating the membership on activities and attending to business matters. In addition, we will welcome the new president and discuss important events and opportunities for all trainees. This is a great time to get involved and boost your international relations. **(Everyone is welcome.)**

### **Closing Party**

Sunday, January 19

19:00–23:00

New York Hilton Midtown Hotel, Rhinelander Gallery

Put on your dancing shoes and join us for an evening filled with music, good food, and old and new friends. (Do not forget your drink tickets.)

**Come and join us for the closing event. (Tickets are required for this event.)**

## Recipient of the IETS Lifetime Career Achievement Award



### Dr. Richard Fayerer-Hosken, BVSc, PhD

Dr. Richard Fayerer-Hosken was born January 26, 1954, in Gwelo, Southern Rhodesia (now Zimbabwe), Africa.

Dr. Fayerer-Hosken received his BSc in zoology and entomology from Rhodes University in 1975 and his veterinary degree from University of Pretoria in 1981, both in South Africa. He worked in mixed veterinary practices in Zimbabwe and the United States before entering graduate school. His PhD from the University of Georgia (UGA) was granted in 1987 for research on the “Influence of cholesterol sulfate and carbohydrate moieties on rabbit sperm penetration of zonae pellucidae,” which led to 24 years as a professor, 18 of which were tenured, in the College of Veterinary Medicine at UGA. He was honored with a Lilly teaching fellowship and numerous faculty awards for teaching excellence in animal reproduction with special emphasis on horses. Fayerer-Hosken shared his technical and research expertise with scores of veterinary and graduate students in the United States and South Africa. Fayerer-Hosken was

best known professionally for the development of a contraceptive vaccine to control populations of dogs, cats, and elephants, winning creative research awards from UGA and a National Phi Zeta award for research excellence. In later years his research focus, as well as his passion, was the monitoring and protection of elephants in Kruger National Park in South Africa. Following his retirement from the university in 2012, Fayerer-Hosken owned and operated SoRhoVet LLC, a solo equine theriogenology practice, while continuing his elephant research.

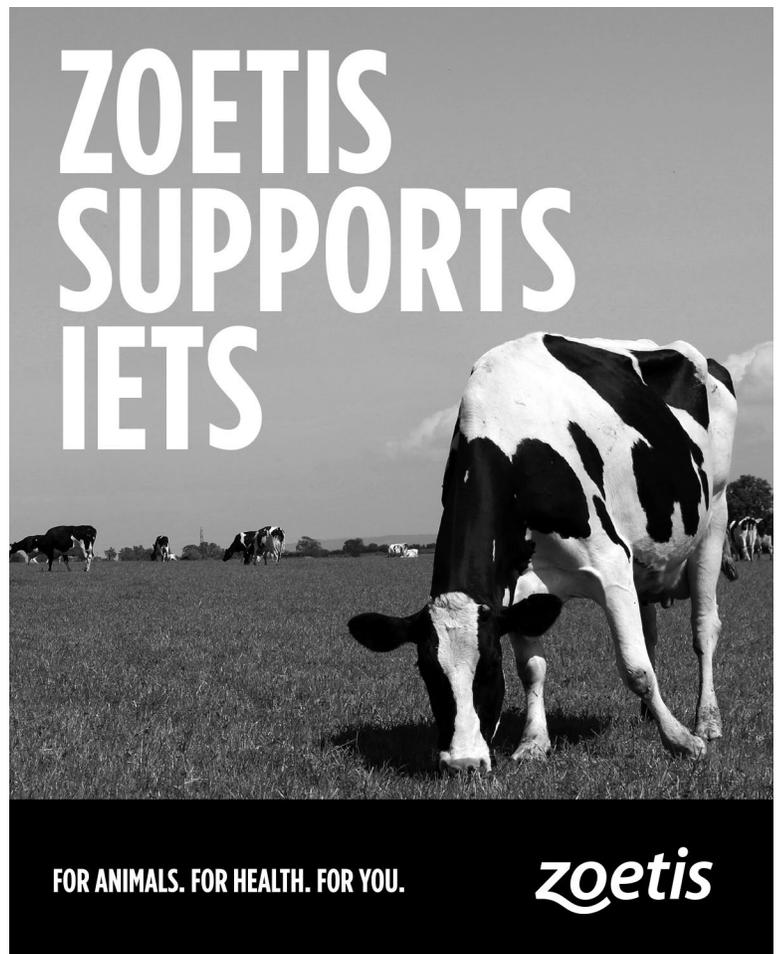
Dr. Fayerer-Hosken was a Diplomate of the American College of Theriogenologists, receiving the Theriogenologist of the Year award in 1999 for “Research in population control of the African elephant.” He was a Founding Diplomate of the European College of Animal Reproduction and was elected Research Fellow of the San Diego Zoo Institute for Conservation Research in 2009. Fayerer-Hosken was active in a number of professional organizations including the American Association of Equine Practitioners and the European College of Animal Reproduction, which certified him as a European Veterinary Specialist in Animal Reproduction. He rose to president of the American College of Theriogenologists and the International Embryo Technology Society.

Fayerer-Hosken joined IETS in 1985 as a student member, where he developed lifelong friendships and collaborations. He joined the IETS Foundation board in 1998 and presided as president from 2009 to 2011. He was a founding member of the Affiliate Society Committee, which he developed and led until his passing. Fayerer-Hosken was elected to the Board of Governors, serving as treasurer, vice president, and president in 2009. That year the annual IETS conference was scheduled for New Orleans, but Katrina struck, leaving Fayerer-Hosken to pilot the board in the Herculean task of changing the venue to San Diego just nine months before the meeting.

Dr. Fayerer-Hosken authored or co-authored over 250 scientific papers, articles, abstracts, and book chapters and spoke frequently at scientific and specialty group meetings around the world. He developed and taught dozens of continuing education courses covering a wide range of topics including infertility in dogs and cats, bovine physiology, integrated interactive learning systems for veterinary education, and equine oocyte maturation and sperm receptor mechanisms. Despite his rigorous teaching and clinical duties, Fayerer-Hosken volunteered his time with several animal rescue groups and was a tireless advocate for animal welfare. On one occasion he risked incarceration by rescuing a horse from a research facility that was planning to conduct a painful experiment. He was indeed arrested, but when the details of the animal treatment were revealed, he was released and subsequently championed for his act of compassion. Fayerer-Hosken’s love of animals was most evidenced by his devotion to his treasured Jack Russel terriers.

He left us too soon, but we are richer for having known him.

*The IETS Fayrer-Hosken Affiliate Scholarship Fund has been established in Richard's name. You can donate by clicking "Make an Online Foundation Donation" on the IETS home page, signing in, and clicking "Make a Donation."*



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IETS**

**FOR ANIMALS. FOR HEALTH. FOR YOU.**

**zoetis**

## 2020 IETS Foundation Early Career Achievement Award (Scientist)



### **Joanna Maria Gonçalves de Souza-Fabjan**

Joanna M. G. Souza-Fabjan studied veterinary medicine and is currently a professor and researcher in the Reproduction Sector, belonging to the Department of Veterinary Pathology and Clinics at the Veterinary School of the Universidade Federal Fluminense, Niterói, Rio de Janeiro, Brazil. Souza-Fabjan is a member of two graduate programs at the same university: Veterinary Medicine (Animal Clinics and Reproduction) and Sciences and Biotechnology. She is also a member of the graduate program in Veterinary Medicine at the Universidad de la Republica, Montevideo, Uruguay. She has been working on reproductive biotechnologies in farm animals, mainly in small ruminant models. Her research interests have been focused on improving the understanding of ovarian function by ultrasonography, tools for estrus synchronization, artificial insemination, in vitro and in vivo embryo production, and gamete/embryo cryopreservation. Recently, her team made important advances in enhancing feasibility of nonsurgical techniques for embryo recovery in sheep. She has organized several events in this field and worked on research projects with national and international collaborators.

### **Previous Recipients**

Alejo Menchaca (Scientist), 2019

Kiho Lee (Scientist), 2018

Pablo J. Ross (Scientist), 2017

Todd Stroud (Practitioner), 2017

## Session Speakers and Keynote Biographies

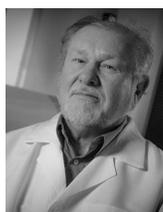
### Evelyn Telfer



Professor Evelyn Telfer holds a chair in Reproductive Biology at the University of Edinburgh and heads a research group in Ovarian Development within the Institute of Cell Biology and Genes and Development Group (CDBS). Her group has a particular interest in developing in vitro models to support oocyte development from immature stages in domestic species and human. Telfer's group has developed a culture system that supports in vitro growth of human and bovine primordial follicles to the metaphase II stage. They are now using these models to study the potential of female germ line stem cells isolated from adult ovaries in a range of species.

Telfer has published widely in this area, is a regular invited speaker at international meetings, and has several international collaborations. Her research is funded by the Medical Research Council U.K. and The Wellcome Trust. Her group has won several awards at international meetings, and in 2019 she received the distinguished scientist award from the Society of Reproduction and Fertility and delivered the Anne McLaren memorial lecture at the U.K. Joint Fertility Societies meeting. Telfer also has an interest in the public understanding of science, and she contributes to workshops and delivers lectures at science festivals and other public groupings.

### David Albertini



David Albertini received his PhD from Harvard University working on the cell biology of the mammalian ovary. After postdoctoral work at the University of Connecticut Health Center, he returned to Harvard Medical School as an assistant professor of anatomy and cell biology until 1984. He was an associate professor and professor at Tufts University School of Medicine up to 2004. At Tufts, he served as chair of the Department of Anatomy and Cell Biology (1996–2000), director of the Center for Reproduction (1999–2003), and director of the Confocal Microscopy core (1988–1999). From 2004 to 2016, he held the Hall Professor of Molecular Medicine Chair at the Kansas University

Medical Center, where he continued his career-long interests in biomedical imaging and oocyte and embryo development, as it pertains to the practice of human assisted reproduction technologies. He served as director of laboratories and senior scientist at The Center for Human Reproduction in New York City from 2016 to 2019 and is a visiting professor at The Rockefeller University. Since 2009 he has been the editor-in-chief of the *Journal of Assisted Reproduction and Genetics* (ASRM), and he has been the recipient of many awards including a Basil O'Connor fellowship from the March of Dimes, the Hammond Medal from the Society for Reproduction and Fertility (UK), and the Founder's Lecturer for the Australian Society of Reproductive Biology.

### Pablo Ross



Pablo Ross is an associate professor in reproductive biology in the Department of Animal Science at the University of California Davis. Dr. Ross was born and raised in Argentina, where he received a degree in veterinary medicine from La Plata National University and an MS in animal science from Mar del Plata National University/INTA Balcarce. He obtained a PhD in animal science from Michigan State University in 2007 and held a research assistant professor position at that institution, until he joined the faculty at Davis in 2010. Dr. Ross studies the mechanisms of epigenetic remodeling and transcriptional reprogramming that occur during preimplantation embryo development. Work

at the Ross laboratory also relates to developing gene editing approaches and embryo and pluripotent stem cell technologies for use in agriculture and biomedicine.

## Kiho Lee



Kiho Lee graduated from Seoul National University with a bachelor's degree in animal sciences. Then, he received his MS and PhD from Purdue University and postdoc training from the University of Missouri–Columbia. While at the University of Missouri, he generated the first immune-deficient pigs that could support growth and proliferation of human induced pluripotent stem cells. He joined Virginia Tech in 2013 and is currently an associate professor in the Department of Animal and Poultry Sciences. Dr. Lee's laboratory currently focuses on early embryonic development using the pig as a model. Understanding the mechanisms underlying the dynamic changes that occur during embryonic development can lead us to develop more efficient ways to generate and manipulate embryos in vitro. One of his main research interests is to identify the mechanism of epigenetic reprogramming by oocytes after fertilization. Specifically, he is interested in how oocytes can modulate the status of DNA methylation during early embryo development. His group also focuses on developing optimal use of gene-editing systems to introduce targeted modifications during embryogenesis in domestic animals. Using this approach, his group has generated various types of genetically engineered pigs for agriculture and medicine. His research program has been funded by the US Department of Agriculture and National Institute of Health. He was the recipient of the Early Career Achievement Award from the International Embryo Technology Technology in 2018.

## Filippo Miglior



Dr. Filippo Miglior is chief scientific officer and vice president, Sector Innovation and Programs, at Ontario Genomics in Toronto. Miglior is a world renowned researcher in animal breeding and genetics. Most recently, Miglior was chief of research and strategic development at the Canadian Dairy Network, a role he assumed in 2013. Miglior has been an adjunct professor at the University of Guelph since 2004, secretary of the Permanent International Committee of WCGALP (World Conference of Genetics Applied to Livestock Productions), past-president of Canadian Society of Animal Science, and editor-in-chief of Canadian Journal of Animal Science. Miglior is the recipient of several prestigious awards (2018 ASAS Rockefeller Prentice Award in Animal Breeding and Genetics, 2016 CSAS Technical Innovation in Enhancing Production of Safe Affordable Food, 2013 ADSA JL Lush Award in Animal Breeding). Miglior has authored 3 book chapters, 124 scientific journal articles, and over 600 articles and conference proceedings. Dr. Miglior has led several research projects with budgets exceeding \$14 million, advising a team of over 20 graduate students and researchers.

## Juliano da Silveira



Juliano da Silveira graduated in biological sciences from PUCRS (Brazil) and received his master's degree in genetics and applied toxicology from ULBRA (Brazil) and PhD in biomedical sciences from Colorado State University (USA). His research focuses on understanding intercellular communication within the ovarian follicle, oviduct, and uterus. His ultimate goals are to decode the roles of extracellular vesicles during folliculogenesis and early embryo development to understand female reproductive biology and develop new biomarkers and supplements to use in the in vitro production system. Additionally, da Silveira investigate the roles of miRNAs during folliculogenesis and early embryo development to find new biological pathways associated with oocyte quality and embryo viability.

## Rocío Rivera



Rocío Rivera completed her MS at Iowa State University in the laboratory of the late Dr. Steve Ford. She then pursued a doctoral degree in the laboratory of Dr. Peter J. Hansen at the University of Florida. For her postdoctoral training, Dr. Rivera worked in the laboratories of Dr. Richard Schultz and Dr. Marisa Bartolomei at the University of Pennsylvania. She is currently an associate professor in the Division of Animal Sciences at the University of Missouri. Her area of research is in reproduction and developmental epigenetics. The research conducted in Dr. Rivera's laboratory aims to identify mechanisms that lead to alterations of the epigenome in oocytes and embryos as a result of procedures commonly used during assisted reproduction in humans and animals. The main projects in her laboratory focus on the characterization of large offspring syndrome (an ART-associated loss-of-imprinting overgrowth syndrome in ruminants) and the study of the effects of superovulation and aging on the oocyte's epigenome in mice.

## Luis Siqueira



Dr. Luiz G. Siqueira is currently a research scientist at the Brazilian Agricultural Research Organization (EMBRAPA), where he conducts research in animal reproduction and physiology. Siqueira has studied ovarian physiology, Doppler ultrasonography, artificial insemination, different aspects of IVF procedures, developmental programming of the preimplantation embryo, and postnatal development of calves and heifers. He received his DVM from the Federal University of Viçosa, Brazil, in 2004 and a MSc degree in animal sciences from the same university in 2007. In 2009 Siqueira completed a master of veterinary sciences (MVetSc) program in theriogenology at the Department of Large Animal Clinical Sciences, University of Saskatchewan, Canada, conducting studies on in vitro fertilization and idiopathic infertility in cattle. In 2017 he finished his PhD in animal molecular and cellular biology at the University of Florida, USA. He studied developmental programming of the bovine embryo by maternal embryokines and postnatal consequences of ART in cattle. Siqueira is also involved in student training and short courses for veterinarians seeking to work with OPU, IVF, and cattle ultrasonography.

## Bernard Roelen



Bernard Roelen (1968) studied biology at Utrecht University (graduated 1992) and subsequently performed a PhD study at the Hubrecht Institute (Utrecht) under the supervision of Christine Mummery (graduated 1997). He worked for another three years as a junior researcher at the same institute. Afterward, he worked as a postdoctoral fellow at Massachusetts General Hospital/Harvard Medical School in Boston (USA). After returning to the Netherlands, he worked as a postdoctoral researcher at the Netherlands Cancer Institute in Amsterdam. In 2003 he became assistant professor and later associate professor at the Faculty of Veterinary Medicine, Utrecht University in Utrecht, the Netherlands. His research is focused on mammalian germ cells, stem cells, and pluripotency. His primary research interests are acquisition and maintenance of developmental potential. This includes oocyte development, oocyte maturation, preimplantation embryo development, and early differentiation. As a research model, his group mostly uses bovine and porcine oocytes and embryos but occasionally also human embryonic cells and human ES cells and iPS cells.

## Marja Mikkola



Marja Mikkola earned her DVM degree at Helsinki University, Finland, in 1997. She then began working primarily as an embryo transfer practitioner for cattle breeding companies and private farms. During her veterinary career, questions asked by her clients or raised by her daily work inspired her to earn a PhD degree while continuing in her veterinary practice. Her research covered topics including the use of sex-sorted semen on donor females, superovulation protocols, and nutritional management of donors. Since 2018 she has been working for Geno SA, Norway, establishing both MOET and OPU-IVP embryo production in the national breeding program for Norwegian Red cattle. She has served on the board of directors of the Association of Embryo Technology in Europe (AETE) since 2014 and has been responsible for collecting European statistics for commercial ET activity. She is currently the vice president of the AETE.

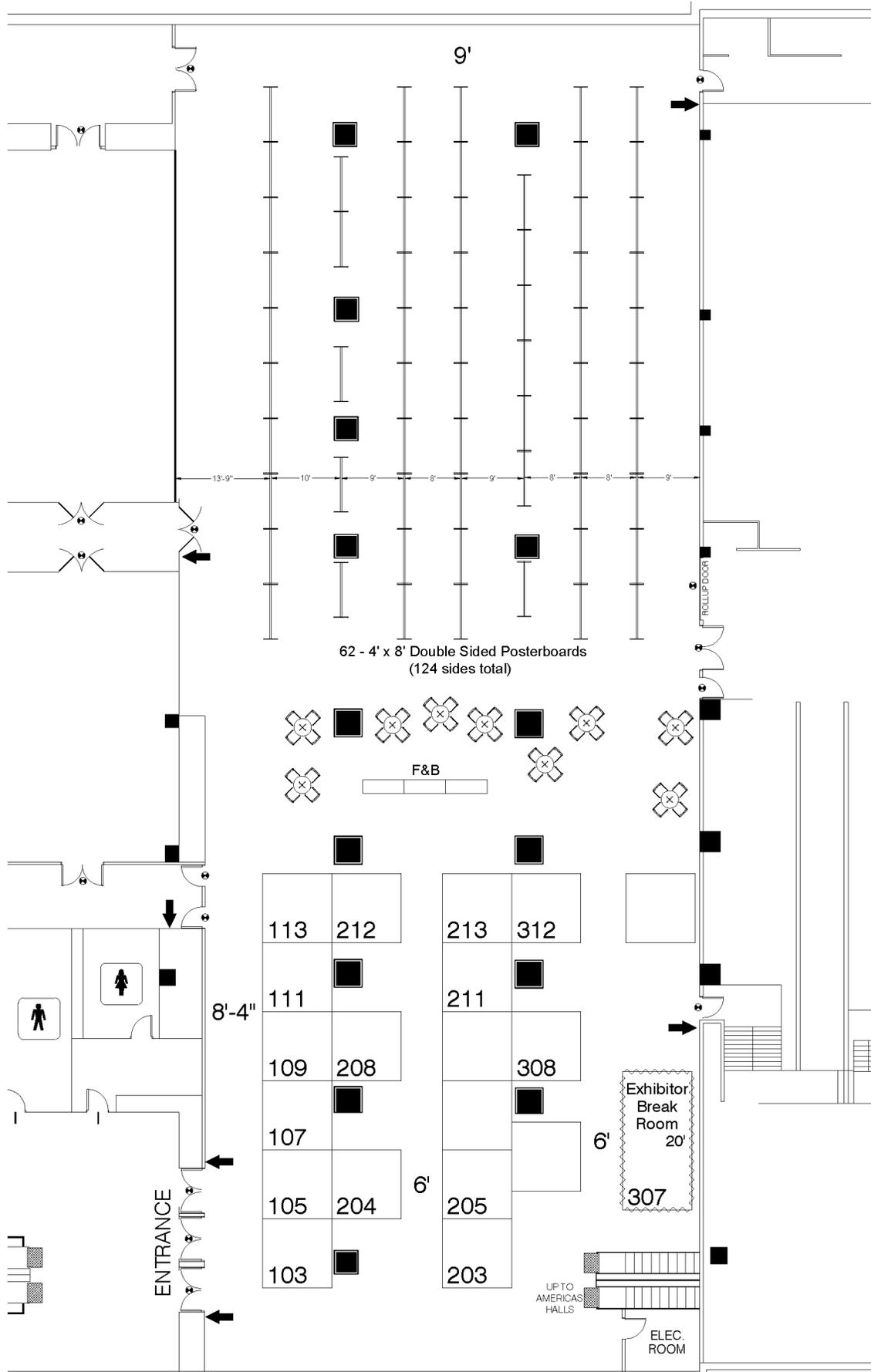
## Theresa Woodruff



Teresa K. Woodruff, PhD, is the dean and associate provost for graduate education in the graduate school at Northwestern University. She is also the Thomas J. Watkins Professor of Obstetrics and Gynecology, the vice chair for research and the chief of the Division of Reproductive Science in Medicine in the Department of Obstetrics and Gynecology, Feinberg School of Medicine. She is professor of molecular biosciences in the Weinberg College of Arts and Sciences and professor of biomedical engineering in the McCormick School of Engineering. She is the director of the Center for Reproductive Science (CRS), founder and director of the Women's Health Research Institute (WHRI), and director of the Oncofertility Consortium. She is an internationally recognized expert in ovarian biology and, in 2006, coined the term "oncofertility" to describe the merging of two fields: oncology and fertility. She now heads the Oncofertility Consortium, an interdisciplinary team of biomedical and social scientist experts from across the country. She has been active in education not only at the professional level but also with high school students. To

this end, she founded and directs the Oncofertility Saturday Academy (OSA), one of several high school outreach programs that engages girls in basic and medical sciences. She was awarded the Presidential Award for Excellence in Science Mentoring in an oval office ceremony by President Obama (2011). Woodruff holds more than 10 US patents and was elected to the National Academy of Inventors (2017). Her honors include a Guggenheim Fellowship (2017), the Society for Endocrinology Transatlantic Medal (2017), a Leadership Award from the Endocrine Society (2017), and the Mentor of the Year Award from the Society for the Study of Reproduction (2018). She has two honorary degrees: one from the University of Birmingham, College of Medical, UK (2016) and one from Bates College (2011). She is an elected member of the National Academy of Medicine (2018) and a fellow of the American Institute of Medical and Biological Engineering (2017) and the American Association for the Advancement of Science (AAAS; 2005). She is past-president of the Endocrine Society and championed the new NIH policy that mandates the use of females in fundamental research. She is civically active and is an elected member of The Economic Club of Chicago, member of the Adler Planetary of Chicago Board of Trustees, and served on the school board of the Chicago-based Young Women's Leadership Charter School.

# Exhibit Hall Layout



# Exhibit Directory

## Booth Listing by Number:

<b>Booth number</b>	<b>Company</b>
103 and 105.....	Vetoquinol
107.....	IMV Technologies/IMV Imaging
109.....	Esco Medical
111.....	Agtech Inc.
113 and 212.....	WTA Technologies LLC
203.....	Partnar Animal Health Inc.
204.....	Minitube USA Inc.
205.....	ART Lab Solutions
208.....	Ansh Labs
211.....	IVFtech ApS
213.....	IVF Bioscience
308.....	ICPbio Reproduction
311.....	Universal Imaging Inc.
312.....	Professional Embryo Transfer Supply Inc. (PETS)

# Alphabetical Listing of Exhibitors

## Agtech Inc.

Livestock Embryo Technology...since 1990, it's what we're about. From hands-on ET, OPU and AI training... to assisting with *your* specific product requirements. Now featuring OPU instruments from WTA company and media from IVF BIOSCIENCE.

Agtech's staff takes time to understand the breeding outcomes and associated costs that you are seeking for your beef or dairy operation, or for your veterinary IVF & MOET practice.

We appreciate the challenges you face with your reproduction programs and work to provide solutions that influence your success. Agtech designs its ET instruments, consumables and liquid medium to deliver efficacy and profitability to *your* business, and to your client's dairy or beef operation.

International customers should check out our NEW web store ([agtechinc.com](http://agtechinc.com)) which lets you select products, automatically determine fees for transportation and duty, and pay for *everything* online *at your convenience*. Your package moves seamlessly...from Agtech's office to your destination outside the United States.

Because *success transfers*, we take pride in customer relationships and in providing you with the products and attention to detail that you expect. We look forward to working with you!

8801 Anderson Avenue  
Manhattan, KS 66503 USA  
Phone: +1 (785) 776-3863  
Fax: +1 (785) 776-4295  
[www.agtechinc.com](http://www.agtechinc.com)  
Booth: 111

## Ansh Labs

Ansh Labs manufactures species-specific endocrine immunoassays, including Bovine AMH ELISA, the only AMH assay designed specifically for use in cattle. The assay has been tested in more than 15 breeds. Ansh Labs also has a CLIA certified Esoteric Laboratory (AEL) that processes samples for clients that prefer to send samples out.

445 Medical Center Blvd.  
Webster, TX 77598 USA  
Phone: 281-404-0260  
[www.anshlabs.com](http://www.anshlabs.com)  
Booth: 208

## ART Lab Solutions

ART Lab Solutions is proud to be one of the world's leaders in reproductive technologies that accelerate the

improvement of livestock quality. Our serum-free in vitro embryo production media suite is a result of over 25 years research by Professor Jeremy Thompson. These products enable rapid genetic gain and improve the efficiency of cattle breeding programs.

ThincLab, 10 Pulteney Street  
University of Adelaide  
South Australia 5005  
Australia  
[www.artlabsolutions.com](http://www.artlabsolutions.com)  
Booth: 205

## Esco Medical

Esco Medical is a leading manufacturer and innovator of high-quality equipment such as long-term embryo incubators, ART workstations, anti-vibration tables, and time-lapse incubators. We are continuously developing technologies to meet the increasing demand of the IVF industry. Esco Medical products are designed to assist embryo development based on the Silent Embryo Hypothesis as a guiding principle. The Silent Embryo Hypothesis states that the less disturbed an embryo can remain, the better its developmental potential will be. Most of our products are designed in Denmark and made in the EU. The primary focus of this division is to increase pregnancy success rates and patient satisfaction.

Esco Technologies Inc.  
903 Sheehy Dr., Ste. F  
Horsham, PA 19044 USA  
[www.escomedicalgroup.com](http://www.escomedicalgroup.com)  
Booth: 109

## ICPbio Reproduction

ICPbio Reproduction™ is a global supplier of embryo transfer and reproductive products including flushing and embryo handling media for equine, bovine and ovine used by veterinarians and reproductive specialists. ICPbio Reproduction™ also manufactures and distributes the Ovagen™ brand FSH for super ovulation of ovine and bovine for embryo transfer procedures.

PO Box 39  
303 South McKay Avenue  
Spring Valley, WI 54767 USA  
Phone: 877-978-5827  
[www.icpbio repro.com](http://www.icpbio repro.com)  
Booth 308

## IMV Technologies/IMV Imaging

IMV Technologies is a world leader in reproductive biotechnologies. We design and develop equipment, disposable items, and preservation media used in

animal reproduction. Our areas of expertise include the following:

- Embryo transfer
- Semen collection and analysis
- Sample preparation and dilution
- Packaging and cryopreservation
- Assisted insemination

IMV Technologies offers a wide range of ET products, including collection and freezing media, filtration devices, laboratory equipment, embryo packaging, and transfer tools. Our complete range can be found at [www.imv-technologies.com](http://www.imv-technologies.com).

IMV Imaging, pioneers in veterinary ultrasound for over 30 years, has joined forces with another successful animal reproduction and imaging company, ECM (Echo Control Medical), forming a new imaging division, IMV Imaging, under the IMV Technologies group.

IMV Technologies  
11725 95th Avenue North  
Maple Grove, MN 55369 USA  
[contact@imv-technologies.com](mailto:contact@imv-technologies.com)  
[www.imv-technologies.com](http://www.imv-technologies.com)  
Booth: 107

IMV Imaging  
2900 43rd Street NW, #600  
Rochester, MN 55901 USA  
[www.imv-imaging.com/](http://www.imv-imaging.com/)  
Booth: 107

### **IVF Bioscience**

IVF Bioscience manufactures high quality, species-specific media for in vitro fertilisation (IVF). Our innovative suite of ready-to-use media is helping many customers around the world to achieve higher blastocyst rates and superior results.

Our advanced, serum-free media system is provided in combination with an optimised IVF protocol and backed by continuous technical support, so you can be confident that you are in good hands. We work with you to ensure you get the best results possible.

With IVF Bioscience as your partner, establishing an IVF laboratory has never been easier.

Bickland Industrial Park  
Falmouth, Cornwall TR11 4TA  
United Kingdom  
Phone: +44 1326 370 642

[www.ivfbioscience.com](http://www.ivfbioscience.com)  
Booth: 213

### **IVFtech ApS**

IVFtech is a company producing high quality, customizable equipment for IVF laboratories. The art and science of assisted reproduction often demands personalized solutions where strict considerations must be given to the culture conditions and the growth environment of gametes and embryos. Key factors for success include providing a steady temperature close to 37°C and a secure atmosphere with the right humidity and CO<sub>2</sub> concentration. IVFtech knows that not all laboratories are the same; that's why IVFtech combines the bespoke nature of our products with a high quality and service level. Custom products and services are, by definition, unique.

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DK-3660 Stenløse  
Denmark  
Phone +45 3940 2565  
Fax +45 3940 2564  
IVFtech aps – CVR no: 20892307  
Contact: [info@ivftech.dk](mailto:info@ivftech.dk)  
[www.ivftech.dk](http://www.ivftech.dk)  
Booth: 211

### **Minitube USA Inc.**

Minitube USA, a subsidiary of Minitube International, offers a comprehensive, multispecies reproduction product line ranging from artificial insemination to embryo transfer to meet any theriogenologist's needs. Our continued collaboration with leading reproductive physiologists, universities, and institutes around the world enables us to be on the leading edge of industry development.

419 Venture Ct.  
Verona, WI 53593 USA  
[www.minitube.com](http://www.minitube.com)  
Booth 204

### **Partnar Animal Health Inc.**

Partnar Animal Health is pleased to present its range of embryo transfer and OPU products. We will present information eMP3, our own range of embryo flush, hold, and freeze media. For OPU, we have tube sets, vacuum lines, retrieval needles, and the MicroQ controlled temperature shipping device for oocyte, embryo, and fresh extended sexed semen transport.

2014 Holland Avenue, Unit 227  
Port Huron, MI 48060 USA  
Phone: 519-666-0033  
[www.partnaranimalhealth.com](http://www.partnaranimalhealth.com)  
Booth: 203

### **Professional Embryo Transfer Supply Inc. (PETS)**

PETS has been a world leading embryo transfer supply company in the bovine and equine industries for almost three decades. Our goal all this time has been your success, and we work every day to achieve this with quality service and E.T. supplies from ICPbio, Vetoquinol, MAI, ABT360, SPI, IMV, Wesco, and more. Come visit with us for more details.

285 FM 16  
Canton, TX 75103 USA  
Phone: 800-735-9215  
[www.pets-inc.com](http://www.pets-inc.com)  
Booth: 312

### **Universal Imaging Inc.**

Large Animals

#### **Ultrasound and Digital Radiology Equine Veterinary Solutions**

With 43+years of experience leading the industry, 18,000+ clients have trusted Universal Imaging to supply leading edge diagnostic imaging equipment and superior training. Whether your practice focuses on internal medicine, cardiac, MSK, reproduction, or sports medicine, we have mobile optimized systems that will deliver the clarity and detail you need for a faster, more accurate diagnosis. We partnered with the pioneers of the digital imaging field, including: Toshiba, ECM, Fujifilm, Canon, SonoScape, and IBM/Merge. Visit our booth or website to learn how we can help you expand your practice and provide the highest standard of veterinary care.

#### **Ultrasound and Digital Radiography Equine Veterinary Solutions**

Leading the diagnostic imaging industry for over 43 years, Universal Imaging offers cutting edge Ultrasound, Canon & FujiFilm Digital Radiography and IBM/Merge eFilm Cloud systems for today's equine practitioner. Offering superior technology, service and education, we're committed to meeting the needs of our customers, and their patients.

299 Adams Street  
Bedford Hills, NY 10507 USA  
[www.universalimaginginc.com](http://www.universalimaginginc.com)  
Booth: 311

### **Vetoquinol USA Inc.**

Vetoquinol, the manufacturer of Folltropin®, is a family-owned, independent company devoted exclusively to animal health. Our product portfolio is divided between livestock and companion animals and includes most therapeutic categories. Vetoquinol embraces the challenge of finding better ways to help animals and is committed to servicing the assisted reproduction industry with its long lasting tradition of excellence. The company boasts one of the largest research facilities in the world, where 100 world-class researchers passionately work to develop new products and protocols.

4250 N. Sylvania Avenue  
Fort Worth, TX 76137 USA  
[www.vetoquinolusa.com](http://www.vetoquinolusa.com)  
Booths: 103, 105

### **WTA Technologies LLC**

WTA Technologies LLC is a Brazilian technology company with additional offices in Texas. We specialize in producing tools for animal assisted reproduction, offering high-added-value solutions for ovum pick-up (OPU), *in vitro* fertilization (IVF), embryo transfer (ET), and artificial insemination (AI).

Our products are mainly for the reproduction of cattle, horses, and small ruminants, but we also meet different laboratory requirements.

WTA distributes throughout Brazil, USA, Canada, and Mexico, as well as in many countries across the five continents. WTA is recognized as one of the leading companies in the animal assisted reproduction market.

Each of our products is designed to provide the very best results and give a sense of security at an economical price, while always being mindful of animal welfare. Every piece incorporates precise design, quality materials, and excellent workmanship.

WTA Brazil: + 55 16 3951 8161  
Sales USA: + 979-324-6168  
[www.wtavet.com.br](http://www.wtavet.com.br)  
Booths: 113, 212

## Thank You to Our Exhibitors



Solutions for Cattle Breeding



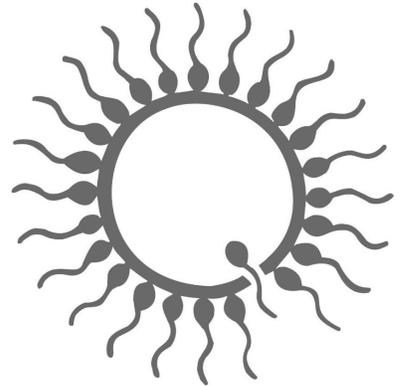
**ICP<sub>bio</sub>** <sup>TM</sup>  
REPRODUCTION

**imv**  
i m a g i n g

**imv**  
TECHNOLOGIES

**ivf**  
B I O S C I E N C E

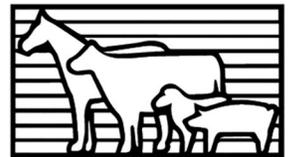
# IVFtech



minitube



# PETS



Professional Embryo Transfer Supply, Inc.



# CANDES Preconference Symposium

## Companion Animals and Non-Domestic Species: The Embryo at the Center of All

Program Co-Chairs: Dragos Scarlet and Gabriela Mastromonaco

08:00–08:30 Registration

08:30–08:40 Welcome, housekeeping, and introductory remarks

### Session I

08:40–09:20 Save the cat: Gamete biobanking for species conservation  
*Katarina Jewgenow, Germany*

09:20–09:30 Vitrification of *in vitro* produced feline embryos  
*Dana Wright Fuller (Abstract 42)*

09:30–10:10 Advancements in canine reproduction: IVF and ET  
*Alexander Travis, USA*

10:10–10:30 Strategies for the improvement of canine oocyte *in vitro* maturation  
*Matteo Duque (Abstract 199)*

Effect of TCM-199 and synthetic oviductal fluid medium supplemented with varying hormone concentrations on *in vitro* maturation of canine oocytes  
*Megan Tscharke (Abstract 190)*

10:30–11:00 Coffee break

### Session II

11:00–11:40 *In vitro* manipulation of equine preantral follicles: A review  
*Eduardo Gastal, USA*

11:40–12:10 Genome activation in ICSI-derived horse embryos  
*Daniel Estanislao Goszczynski (Abstract 59)*

Low plasma progesterin concentration during the early luteal phase impairs equine conceptus development until placentation  
*Carolina Okada (Abstract 61)*

Horse allogeneic mesenchymal stem cells perform homing and ameliorate endometrial inflammation after induced endometritis of mares  
*F. Navarrete (Abstract 210)*

12:10–13:30 Lunch break

### Session III

13:30–14:10 Embryo technologies in the donkey (*Equus asinus*)  
*Duccio Panzani, Italy*

14:10–14:30 Effect of seminal plasma on the interval to application of eCG for the recovery of COCs in Alpacas (*Vicugna pacos*)  
*Willian Fahrid Huanca (Abstract 228)*

Effect of different energy sources on motility and calcium ionophore-induced acrosome reaction in equine sperm  
*Luisa Ramírez-Agámez (Abstract 116)*

14:30–15:00 Coffee break

#### Session IV

15:00–15:40 Embryonic diapause in roe deer: Pluripotent stem cells placed on hold  
*Susanne Ulbrich, Switzerland*

15:40–16:00 *In vitro* maturation and fertilization in white-tailed deer (*Odocoileus virginianus*) oocytes vitrified with trehalose or sucrose  
*Veronica Alejandra Rubio-Santillanes (Abstract 37)*

Aggregation of yak heterospecific SCNT embryos improves cloning efficiency  
*Minera Yauri Felipe (Abstract 20)*

16:00–16:30 CANDES Trainee Travel Awards  
The zona pellucida is required for normal development of *in vitro* produced cat embryos  
*Daniel Veraguas (Abstract 22)*

Use of eCG in a minimum-handling protocol for oocyte collection in bison  
*Miranda Zwiefelhofer (Abstract 175)*

#### Keynote Lecture

16:30–17:15 Visual ecology in the ocean  
*David Gruber, USA*

17:15–17:30 Final discussion and remarks

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