Program Book

47th Annual Conference of the International Embryo Technology Society

Embryo Technologies in a Changing Climate

IETS Virtual Meeting
January 18–21, 2021

Scientific Program Co-Chairs:
Ann Van Soom and Patrick Blondin

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2020 IETS Board of Governors

Preface

Little did we know that when we were meeting in New York last year we would not be seeing each other in person in 2021. For the 47th Annual Conference of the International Embryo Technology Society, we had chosen an exciting venue: Lima, Peru, with the opportunity to visit the world-famous site of Machu Picchu (Unesco World Heritage) and the possibility to get submerged into Latin American culture. Unfortunately, a small virus has decided otherwise. The global pandemic of SARS-CoV-2, the corona virus that is causing COVID-19, has changed our way of living drastically over the last year. We have gotten used to digital meetings that are now part of our everyday lives, and we are all "working from home" (or do we "live at work?").

Because IETS members are innovative and passionate, we plan to have the first virtual IETS meeting online, and the topic of this conference will be "Embryo Technologies in a Changing Climate." The phrase "a changing climate" can be subject to a rather broad interpretation. Our first idea was to cover the effects that climate change has on the climate, food production, embryo technology, and breeding of animals. But, a "changing climate" can also refer to our changing way of life, which was responsible for the fact that this corona virus has been spreading so rapidly over the world. We used to jump on a plane to meet each other, shake hands, talk to each other in front of a poster, and sit close to each other in crowded conference rooms. This will not happen for the 47th annual IETS meeting, but we will find ways to encourage the great exchanges that we know occur at these annual meetings and nourish the friendships that have been built over the years.

Our speakers were chosen so we can focus on a world that has been changing rapidly. In spite of it all, embryo technology still continues to play an important role in animal breeding all over the world, food production, prevention of disease transmission, surviving global disasters, and preserving endangered animal species. Session I is on sustainable and safe food production, and session II is on local food production, with an emphasis on Latin America. We did not master the art of crystal gazing back in 2019, and yet, we decided that session III should be focusing on the threats of heat stress and tropical diseases in a changing climate. Session IV covers the fascinating theme of stopping time in reproduction, and session V permits us to look into the future, when we will be able to produce artificial gametes in different mammalian species.

The keynote speaker, Dr. Michael Skinner, will inform us all about the ever-interesting topic of epigenetics. "You are what you eat, but also what your mother and father ate" is an adage that has made us more aware of the effect that our environment can have on gametes and developing embryos, with transgenerational effects that can even be seen in resulting offspring. It is up to us to use this knowledge for either the best or the worst.

The DABE–Morulas Preconference Symposium, CANDES Forum, and Practitioners Forum are important aspects of the meeting. The DABE–Morulas symposium will cover the timely topic of "Extracellular Vesicles in Biomedical Embryology." The CANDES Forum is focused on new world camelids. The Practitioners Forum promises to be a lively and interesting session focused on 3 key questions: (1) Is use of FSH before stimulation in oocyte donors important for IVF embryo production? (2) Will AI be replaced by IVF-ET in commercial farms? (3) Can we recover oocytes from calves and prepubertal heifers successfully?

Finally, we have reduced the number of oral presentations to fit the conference into a 3.5-day meeting that would be acceptable for everyone. We had to juggle with time zones and time constraints. None of you will be suffering jet lag when attending the meeting from your home office, but you may have to get up a little early or stay up late to assist to live presentations from our speaker lineup. Most of the talks and short oral presentations will be available online after the meeting. Additionally, attendees will have direct access to digital poster sessions, can interact directly with our sponsors, and can attend digital meet-and-greet sessions. We understand this will not be our traditional coffee breaks and the real-life conversations that we have grown to love, but we believe we will have created a virtual opportunity for you that will be an opportunity you do not want to miss! We look forward in meeting you virtually in the coming new year. Until then, we wish you very happy, and safe, holidays!

Ann Van Soom and Patrick Blondin, 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 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 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—special thanks to Graeme Martin (editor), Jenny Foster (publisher), and Sussan Lau, 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 Preconference DABE–Morulas Symposium was organized by Dr. Marcia A. M. M. Ferraz, the CANDES Forum by Dr. Dragos Scarlet, and the Practitioners Forum by Dr. João H.M. Viana. 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 Gasparrini for organizing the IETS Foundation Student Competition and Dr. Nisar Ahmad Wani for taking responsibility for the Peter Farin Trainee Awards. Thank you to Dr. João H. M. Viana for his work on the Early Career Achievement Award. The IETS Foundation has made the promotion of graduate education a key priority, and we thank Dr. Jennifer Barfield, chair of the Foundation, and Foundation members Dr. Hilde Aardema, Dr. Bianca Gasparrini, Dr. Lucky Nedambale, Dr. João H. M. Viana, Dr. Satoko Matoba, and Dr. Paula Tribulo 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 Career Jam. This year, the president of the Morulas was Osvaldo Pascottini Bogado and 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 Dr. 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 enjoyable. Thanks Debi!!

Program

Monday, January 18

08:30–09:00 Opening ceremony and sponsor announcements

09:00 Posters open for viewing

09:00–15:00 **DABE–Morulas Preconference Workshop:** Extracellular Vesicles in Biomedical Embryology

09:00–09:05 Introduction to workshop
Marcia Ferraz, DABE chair, Ludwig-Maximilians University of Munich

09:05–10:30 **Extracellular vesicles isolation and characterization**
Dr. Kenneth W. Witwer, Johns Hopkins University School of Medicine
Part 1: Methods for isolation and quantification
Part 2: MISEV guidelines for EVs experiments

10:30–11:30 **Micro-engineering extracellular vesicles**
Dr. Ke Cheng, North Carolina State University, and University of North Carolina

11:30–12:00 DABE–Morulas Science SLAM

Validation of candidate mutation responsible for embryonic lethality in Holstein haplotype 2 carriers,
Kelsey Clark (Abstract 96)

High-resolution ribosome profiling reveals translational selectivity in the mammalian blastocyst,
Linkai Zhu (Abstract 47)

SIN3A regulates porcine early embryonic development by modulating CCNB1 expression,
Kun Zhang (Abstract 64)

Correction of CFTR/G542X mutation using CRISPR/Cas9 genome editing in ovine–bovine interspecies embryos,
Zhiqiang Fan (Abstract 92)

Analysis of miRNA content of oviduct and uterine extracellular vesicles across the bovine estrous cycle,
Meriem Hamdi (Abstract 36)

Embryo aggregation and adipose-derived mesenchymal donor cells in bovine SCNT,
Virgilia Alberio (Abstract 16)

12:00–13:30 Lunch break

13:30–14:30 **Gene editing using extracellular vesicles**
Dr. Randy Schekman, University of California, Berkeley

14:30–14:40 Science SLAM Awards
Rolando Pasquariello, Morulas Governor

14:40–15:00 Closing remarks

Tuesday, January 19

Session I: Sustainable and Safe Food Production

Session co-chairs: Peter J. Hansen, University of Florida, and Miranda L. Zwiefelhofer, University of Saskatchewan

08:00–08:45 Perspectives from a global platform of research farms
Michael Lee, Harper Adams University, United Kingdom

IETS Foundation Student Competition Presentations

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

08:45–09:00 Effect of cytokine supplemented maturation medium on bovine somatic cell nuclear transfer embryo development
J. Keim, Y. Liu, M. Regouski, R. Stott, G. N. Singina, and I. A. Polejaeva (Abstract 1)*

09:00–09:15 Intrafollicular injection of asprosin in water buffaloes and the potential role of FBN1 mRNA and asprosin in follicular function
Excel Rio Maylem[1], Leon Spicer, Eufrocina Atabay, Edwin Atabay, Isadora Batalha, and Luis Schutz (Abstract 2)*

09:15–09:30 Modulation of glycolysis alters histone acetylation and gene expression in bovine blastocysts produced in vitro
A. M. Fonseca Junior, E. E. Paulson, D. E. Goszczynski, J. Ispada, E. C. Santos, C. B. Lima, J. V. A. Silva, P. J. Ross, and M. P. Milazzotto (Abstract 3)*

09:30–09:45 Aryl hydrocarbon receptor targets are upregulated in porcine blastocyst-stage embryos that were cultured in vitro: a transcriptional analysis
P. R. Chen, L. D. Spate, W. G. Spollen, R. F. Cecil, M. S. Samuel, and R. S. Prather (Abstract 4)*

09:45–10:00 Heat stress during pregnancy compromises intrauterine development and reproductive parameters of female progeny in C57BL/6J mice
Tays F. M. Bento, José Ricardo N. da Silva, Joanna M. G. Souza-Fabjan, Robson C. Silva, Sâmara B. Silva, Isabella R. Dias, Cristiane R. F. Moura, Isaías O. Gino, and Ribrio Ivan T. P. Batista (Abstract 5)*

10:00–10:15 Immunological aspects of ovarian follicle ovulation and corpus luteum formation in cattle
N. A. Al Rabiah, A. C. O. Evans, J. McCormack, J. A. Browne, P. Lonergan1, and T. Fair (Abstract 6)*

Sponsors and Exhibitors Open House

10:15–11:15 Sponsors and exhibitors will be available to meet and discuss products and new technology.

Poster Session I

10:15–11:45 Odd-number posters as well as the student competition finalist and undergraduate poster finalist presentations will be available for viewing and author discussion. Odd-number posters for the poster competition will also be judged at this time. Authors should all be available during this time.

11:45–13:30 Lunch break

Session II: Local Food Production

Session co-chairs: Gregg P. Adams, University of Saskatchewan, and Sandra Soto Heras, University of Illinois

13:30–14:15 Approach to infertility diagnosis in alpacas and llamas
Ahmed Tibary, Washington State University, USA

14:15–15:30 In vitro production of small ruminant embryos: latest improvements and further research
Joanna Maria Gonçalves de Souza-Fabjan, Universidade Federal Fluminense, Brazil

Wednesday, January 20

Session III: Changing Climate: Heat Stress and Tropical Diseases

Session co-chairs: T. Lucky Nedambale, Tshwane University of Technology, and José Felipe Warmling Sprícigo, Universidade Federal de Goiás

08:00–08:45 Emerging diseases in international trade in embryos
Julie Gard Schnuelle, Auburn University, USA

08:45–09:15 Heat-stress reduces maturation and developmental capacity in bovine oocytes
Zvi S. Roth, The Hebrew University of Jerusalem, Israel

Session IV: Stopping Time in Reproduction

Session co-chairs: Katrin Hinrichs, University of Pennsylvania, and Daniel Angel Velez, Ghent University

09:15–10:30 Embryonic diapause in mammals and dormancy in embryonic stem cells with the European Roe deer as experimental model
Susanne Ulbrich, ETH Zurich, Switzerland

10:30–11:15 Dry storage of mammalian spermatozoa and cells: state of the art and possible future directions
Pasqualino Loi, University of Teramo, Italy

Poster Session II

11:15–12:45 Even-number poster presentations will be available for viewing and author discussion. Even-number posters for the poster competition will also be judged at this time. Authors should all be available during this time.

Sponsors and Exhibitors Open House

11:15–12:15 Sponsors and exhibitors will be available to meet and discuss products and new technology.

12:15–13:30 Lunch break

Peter Farin Trainee Award Winners Presentations

Session chair: Nisar Ahmad Wani, Reproductive Biotechnology Centre

13:30–14:00 **Peter Farin Award Winners**
Giovana Di Conato Catandi, Colorado State University (Abstract 141)
Jessica Cristina Lemos Motta, Ohio State University (Abstract 125)
Miranda Zwiefelhofer, University of Saskatchewan (Abstract 22)
Kohei Kawano, Hokkaido University (Abstract 85)
Camila Arroyo Salvo, Universidad de Buenos Aires (Abstract 103)

Concurrent Sessions

14:00–16:00 Practitioners' Forum
Chair: João H. M. Viana

Use of FSH pre-stimulation in oocyte donors
Daniela Demetrio, Ruann Genetics, USA

Challenges and opportunities for the commercial bovine IVF industry in the US
Bruno Sanches, Vytelle IVF, USA

Oocyte recovery from calves and prepubertal heifers
Hernan Baldassarre, McGill University, Canada

14:00–16:00 CANDES
Chair: Dragos Scarlet

14:00–14:45 The role of b-NGF in the luteotrophic effect in llamas
Marcelo Ratto, Universidad Austral De Chile

Selected oral presentations

14:45–15:00 Exploring the use of silver and diamond nanoparticles on sperm cell in vitro and chicken embryo in ovo
M. P. Thavhana, T. L. Nedambale, L. J. Shai, and M. L. Mphaphathi (Abstract 44)*

15:00–15:15 Effect of transvaginal oocyte aspiration on the equine blood and peritoneal fluid parameters
D. Orellana-Guerrero, E. Santos-Villanueva, S. Koshak, A. De La Fuente, and G. Dujovne (Abstract 124)*

15:15–15:30 Plasma anti-Müllerian hormone as a marker for ovarian follicular population and oocyte quality in alpacas
Nathalie Zirena Arana, Homero Céliz Ygnacio, Fritz Tello Zárate, Enrique Alvarado Malca, and Amalia Gallegos-Cárdenas (Abstract 88)*

15:30–15:45 Use of embryo transfer technology to salvage the germplasm of elite dromedary camels (Camelus dromedarius) infected with Brucellosis
Hosney Aly Abouhefnawy and Nisar Ahmad Wani (Abstract 73)*

16:00–16:45 Morulas Career Jam
Chair: Osvaldo Bogado Pascottini, Morulas President

How to choose a research path in academia and industry
Ann Van Soom, Ghent University, Belgium; Pierre Comizzoli, Smithsonian Institution, National Zoological Park, Washington, USA

16:45–17:30 Morulas Forum
Chair: Osvaldo Bogado Pascottini, Morulas President

Thursday, January 21

Session V: Future Biotechnologies

Session co-chairs: Jennifer P. Barfield, Colorado State University, and Tine De Coster, Ghent University

08:00–08:45 Artificially produced gametes in mice, humans and other species
Katsuhiko Hayashi, Kyushu University, Japan

Keynote Speaker

Session chair: Pascale Chavatte-Palmer, UMR BREED

08:45–09:30 Epigenetic inheritance and embryonic cell epigenetics change environmental impacts on sperm and oocyte
Michael Skinner, Washington State University, USA

Awards Presentation and Updates

09:30–10:00 IETS Foundation Early Career Achievement Award Winner
Chair: João H. M. Viana

CRISPR applications to understand reproductive failures in farm animals
Pablo Bermejo-Álvarez, INIA, Spain

10:00–10:30 IETS Foundation Student Competition Awards; CANDES, DABE, and HASAC updates

10:30–11:00 IETS Business Meeting
Pascale Chavatte-Palmer, IETS President

11:00–11:30 Closing ceremony

The Program Co-Chairs Acknowledge and Thank the Following People

Section Editors

William V. Holt, *Bioethics, Welfare, and Sustainability*
Patrick Blondin, *Case Reports and Field Data*
Paula Rodriguez Villamil, *Cloning/Nuclear Transfer*
Marcia A. M. M. Ferraz, *Companion CANDES*
Jean-Magloire Feugang, *Cryopreservation /Cryobiology*
Kun Zhang, *Developmental Biology*
Alan Ealy, *Early Pregnancy*
Patrick Blondin, *Embryo Culture*
Irina Polejaeva, *Embryo Manipulation*
Luciano Bonilla, *Embryo Transfer*
Miki Sakatani, *Epidemiology/Diseases*
Patrick Blondin, *Fertilization/ICSI/Activation*
Peter Hansen, *Folliculogenesis/Oogenesis*
Sofia Ortega Obando, *Genetic Engineering*
Bianca Gasparrini, *Graduate Student Competition*
Brett White, *Male Physiology*
Marcelo Marcondes Seneda, *Oestrus Synchronization/ Artificial Insemination*
Jeremy Block, *Oocyte Collection*
Marc-André Sirard, *Oocyte Maturation*
Paula Tribulo, *Periconceptional/Fetal Programming*
Pablo Ross, *Stem Cells*
João H. M. Viana, *Superovulation*
Paula Tribulo, *Undergraduate Poster Competition*

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João G. Viana de Grãizia
Patrick Vincent
Adam Watkins
Brian Whitaker
Brett White
Robin White
Christine Wrenzycki
Amanda Zangirolamo
Kun Zhang
Xue-Ming Zhao
Chuan Zhou

Poster Session Information

Poster Numbers

Posters are identified by the number corresponding to the abstract number in *Reproduction, Fertility and Development* 2021, 33(1-2). Numbering of the posters begins at 1 and ends at 151.

Setup

Posters must be posted on the website, along with the oral presentation recording, by Monday, January 11. All posters will be available for viewing on Monday, January 18.

Poster Session I

Presentations by authors of odd-numbered abstracts (e.g., 7, 9, 11) in *Reproduction, Fertility and Development* 2021; 33(1-2) as well as the student competition finalist and undergraduate poster finalists will take place on Tuesday, January 19, from 10:15 to 11:45. Odd-number posters for the poster competition will also be judged on Tuesday, January 19, from 10:15 to 11:45.

Poster Session II

Presentations by authors of even-numbered abstracts (e.g., 8, 10, 12) in *Reproduction, Fertility and Development* 2021; 33(1-2) will take place Wednesday, January 20, from 11:15 to 12:45. Even-number posters for the poster competition will be judged on Wednesday, January 20, from 11:15 to 12:45.

Poster Session Order by Topic

Poster number = abstract number in *Reproduction, Fertility and Development* 2021; 33(1-2)

Graduate Student Competition Finalists

1 Effect of cytokine-supplemented maturation medium on bovine somatic cell nuclear transfer embryo development
J. Keim, Y. Liu, M. Regouski, R. Stott, G. N. Singina, and I. A. Polejaeva

2 Intrafollicular injection of asprosin in water buffaloes and the potential role of *FBN1* mRNA and asprosin in follicular function
E. R. Maylem, L. Spicer, E. Atabay, E. Atabay, I. Batalha, and L. Schutz

3 Modulation of glycolysis alters histone acetylation and gene expression in bovine blastocysts produced *in vitro*
A. M. Fonseca Junior, E. E. Paulson, D. E. Goszczynski, J. Ispada, E. C. Santos, C. B. Lima, J. V. A. Silva, P. J. Ross, and M. P. Milazzotto

4 Aryl hydrocarbon receptor targets are upregulated in porcine blastocyst-stage embryos that were cultured *in vitro*: A transcriptional analysis
P. R. Chen, L. D. Spate, W. G. Spollen, R. F. Cecil, M. S. Samuel, and R. S. Prather

5 Heat stress during pregnancy compromises intrauterine development and reproductive parameters of female progeny in C57BL/6J mice
T. F. M. Bento, J. R. N. da Silva, J. M. G. Souza-Fabjan, R. C. Silva, S. B. Silva, I. R. Dias, C. R. F. Moura, I. O. Gino, and R. I. T. P. Batista

6 Immunological aspects of ovarian follicle ovulation and corpus luteum formation in cattle
N. A. Al Rabiah, A. C. O. Evans, J. McCormack, J. A. Browne, P. Lonergan, and T. Fair

Case Reports and Field Data

7 A record of 485 viable cumulus–oocyte complexes recovered and 165 viable embryos produced in a single ovum pickup session from a Senepol breed donor
A. O. Resende, R. C. Bohrer, and J. H. M. Viana

8 Effects of magnetic-activated cell sorting on human sperm motility and DNA fragmentation index
Y. M. Toishibekov, S. B. Baikoshkarova, Y. A. Assanova, M. K. Otarbayev, A. N. Komogortsev, V. A. Nekhorosheva, A. A. Tokubayeva, B. P. Battalov, and D. Y. Toishybek

9 Fixed timed artificial insemination during different seasons in Argentina (2016–2019)
A. S. Bandeo, J. A. Berdugo, G. A. Crudeli, P. Maldonado-Vargas, and J. L. Konrad

10 Segmental cervical aplasia in a mare with mosaic X-chromosome aneuploidy
C. A. Pinzón-Osorio, D. Cortes-Beltran, L. M. Jiménez-Robayo, H. Lozano-Márquez, J. Zambrano-Varón, and C. Jimenez-Escobar

11 Effect of breed type on production of bovine embryos: Experience in Paraguay
C. Arreseigor, F. Arza-Spinzi, P. Sanchez, J. A. Berdugo, J. L. Konrad, and P. Maldondo-Vargas

12 Artificial insemination and embryo transfer results in ewes during a long daylength period
T. Mittleider, S. Collins, P. Gibbons, and J. Gibbons

13 Generation of SLICK beef cattle by embryo microinjection: A case report
P. Rodriguez-Villamil, F. L. Ongaratto, J. R. Bostrom, S. Larson, and T. Sonstegard

Cloning/Nuclear Transfer

14 Telomere length in cloned camels produced by somatic cell nuclear transfer is not different from that in their naturally produced counterparts
N. A. Wani and K. P. Kumar

15 Blastocysts altered *CDX2* and *SOX2* gene expression and pregnancy failure after embryo transfer in yak heterospecific somatic cell nuclear transfer
M. Y. Felipe, M. D. Rodríguez, L. D. Ratner, A. De Stéfano, A. M. Valdez, and D. F. Salamone

16 Embryo aggregation and adipose-derived mesenchymal donor cells in bovine somatic cell nuclear transfer
V. Alberio, V. Savy, G. Vans Landschoot, L. N. Moro, F. D. Olea, L. Rodríguez-Álvarez, and D. F. Salamone

Companion CANDES

17 Increased inbreeding levels negatively affect sperm kinetics and motility in Purebred Spanish horses
Y. Pirosanto, A. Molina, M. Valera, J. Dorado, E. Terán, F. Azcona, and D. P. Sebastian

18 Histomorphometric comparison of right and left oviduct structure from alpaca (*Vicugna pacos*)
K. Sánchez, D. Dipaz, M. Rodriguez, and E. Mellisho

19 *In vitro* embryonic development from oocytes collected by ovum pickup of superstimulated females and nonstimulated slaughterhouse ovaries of alpaca (*Vicugna pacos*)
L. Landeo, M. Zuñiga, T. R. Gastelu, and J. A. Ruiz

20 Development and *Oct4*/*Cdx2* gene expression of *Puma concolor*, *Leopardus geoffroyi*, and *Panthera onca* hybrid embryos produced using domestic cat oocytes
M. D. Rodriguez, A. Sestelo, C. Buemo, L. D. Ratner, R. Fernandez-Martin, and D. F. Salamone

21 *In vitro* maturation of domestic cat oocytes: A comparison of different reproductive stages
J. E. Hernández Pichardo, M. R. Del Moral Reyes, M. E. Kjelland, and J. L. Rodríguez Suastegui

22 Strategies for oocyte collection procedures in free-roaming bison herds
M. L. Zwiefelhofer, T. Shury, E. M. Zwiefelhofer, and G. P. Adams

Cryopreservation/Cryobiology

23 Biopsied *in vitro*-produced bovine blastocysts survive vitrification better than slow freezing
V. Najafzadeh, J. Secher, A. Andersen, N. Jørgensen, K. K. Jensen, M. T. Jensen, L. Strøbech, and P. Hyttel

24 Lipid composition of fresh or frozen sexed bovine blastocysts produced *in vivo* or *in vitro*
S. J. Idrissi, D. Le Bourhis, A. Lefevre, P. Edmond, O. Desnoës, L. Le Berre, T. Joly, S. Buff, L. Schibler, and P. Salvetti

25 Effect of taxol and epothilone B on meiotic spindle stabilization in vitrified bovine oocytes
E. Girka and K. R. Bondioli

26 Effect of different cryoprotectant concentrations on vitrification of *in vitro*-matured bovine oocytes in paper containers
T. A. Oliveira, L. F. L. Correia, L. Schmaltz, Y. Locatelli, V. J. F. Freitas, J. M. G. Souza-Fabjan, and P. Mermillod

27 Cryopreservation of bovine semen using cell-permeating antioxidant and protein-free extender
S. X. Yang, G. P. Adams, E. M. Zwiefelhofer, K. Rajapaksha, and M. Anzar

28 Evaluation *in vitro* of two protocols of vitrification from alpaca (*Vicugna pacos*) embryos
W. Huanca, G. Marin, A. Cordero, M. Uchuari, and W. F. Huanca

29 The effect of vitrification at the immature stage on DNA methylation in porcine oocytes and its relevance to subsequent embryo development
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Special Events

DABE–Morulas Virtual Preconference Workshop

Extracellular Vesicles in Biomedical Embryology
Monday, January 18
09:00–15:00
This year, DABE and the Morulas are working together to organized the preconference workshop on Extracellular Vesicles in Biomedical Embryology. They will have three great speakers for a live and dynamic discussion on the isolation, characterization, engineering, and use of extracellular vesicles. One of the speakers is the 2013 Nobel Laureate in Physiology and Medicine, Dr. Randy Schekman, presenting his cutting-edge research on the use of EVs for gene editing. This year they will change their poster competition to the new Science SLAM competition. A science slam is a scientific communication talk where scientists present their own scientific research work in a short (5 min) time frame. They are excited to hold it for the first time at the IETS conference. A special thanks to our sponsor Acceligen for sponsoring the Science SLAM Award. Do not miss this great competition, in which six great trainees will present their amazing work! DABE is looking forward to seeing you in our online conference.

Practitioners Forum

Wednesday, January 20
14:00–16:00
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. We truly hope that this program provides an enjoyable opportunity for learning, networking, and sharing knowledge.

CANDES Forum

Wednesday, January 20
14:00–16:00
The role of b-NGF in the luteotrophic effect in llamas, Marcelo Ratto, Universidad Austral De Chile. CANDES will also have selected short oral presentations.

Morulas Career Jam

Wednesday, January 20
16:00–16:45
Join the Morulas and learn "How to choose a research path in academia and industry." Invited speakers are Ann Van Soom, Ghent University, Belgium, and Pierre Comizzoli, Smithsonian Institution, National Zoological Park, Washington, USA.

Morulas Trainee Forum

Wednesday, January 20
16:45–17:30
All trainees are invited and encouraged to attend the Morulas Trainee Forum. The Morulas governors will be updating the membership on activities and attending to business matters. In addition, we will welcome the new governors 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.)

IETS Awards Presentations and Updates

Thursday, January 21
09:30–10:30
Join us for the Early Career Achievement Award winner presentation and the IETS Foundation Student Competition and Poster Award winners.

IETS Business Meeting

Do not miss this opportunity to hear the updates and future programs of the IETS.

IETS Foundation 2021 Early Career Achievement Award

Pablo Bermejo-Álvarez

Pablo Bermejo-Álvarez obtained his DVM and PhD degrees from the University Complutense in Madrid, Spain. After his PhD, he worked as a postdoctoral researcher at the University of Missouri and University of Maryland. Currently, he is a tenured scientist at the Animal Reproduction Department of the Spanish National Institute for Agriculture Research (INIA), where he leads the Animal Genomics Engineering Group, funded by National and European (ERC) projects. His research interests are focused on understanding the developmental processes occurring during conceptus elongation in ungulates and the molecular roots of reproductive failures, using CRISPR technology and *in vitro* approaches. Recent advances of his group include (1) the development of a novel protocol to minimize mosaicism and boost KO generation rates following CRISPR-mediated genome edition in bovine embryos, (2) a post-hatching culture system achieving epiblast survival and complete hypoblast migration of bovine conceptuses, (3) the discovery of the role of the zona pellucida protein ZP4 by generating *ZP4* KO rabbits, and (4) uncovering the role of the third sperm protein known to be required for fertilization (TMEM95).

Previous Recipients

Joanna Maria Gonçalves de Souza-Fabjan (Scientist), 2020

Alejo Menchaca (Scientist), 2019

Kiho Lee (Scientist), 2018

Pablo J. Ross (Scientist), 2017

Todd Stroud (Practitioner), 2017

Session Speakers and Keynote Biographies

Michael Lee

Professor Michael Lee is an expert in sustainable livestock systems, defining their role in securing global food security while protecting environmental health (livestock's role in human and planetary health). He graduated with first class honors in animal science from the University of Wales, Aberystwyth, in 1997 and gained a PhD in ruminant nutrition (protein and energy metabolism) from the University of Aberdeen in 2001 followed by a postgraduate certificate for teaching in higher education from Aberystwyth University in 2012. He worked for the Institute of Grassland and Environmental Research from 2001 to 2008 (with his first postdoc on ruminal lipid metabolism), before the merger with Aberystwyth University, where he stayed as a principle scientist and senior lecturer in animal nutrition and rumen biochemistry until moving to the University of Bristol, School of Veterinary Science (Bristol Veterinary School) in 2013 as a reader in Sustainable Livestock Systems. In 2015 he took a joint appointment between Rothamsted Research and the University of Bristol as head of site at North Wyke and was promoted to chair in Sustainable Livestock Systems later that same year. In November 2020 Lee moved to his current position as deputy vice chancellor of Harper Adams University, England's premier specialist agriculture and land use university. He has published over 300 research articles and papers including recent articles in *Nature* and *Science*. He was awarded the Sir John Hammond Memorial Prize in 2015 for services to animal science. In August 2016 he was elected as vice president of the European Federation of Animal Science Livestock Farming Systems Commission and in August 2019 became president of the commission. In April 2018 he was elected as vice president of the British Society of Animal Science and will also take on the presidency in April 2021.

Ahmed Tibary

Dr. Ahmed Tibary graduated with a doctorate in veterinary medicine from the Institut Agronomique et Vétérinaire in Morocco. He earned his MS and PhD in reproductive medicine and surgery from the University of Minnesota and was certified as a Diplomate of the American College of Theriogenologists in 1991.

Dr. Tibary worked as a clinician in theriogenology in Morocco and the University of Minnesota before becoming the scientific director of the Veterinary Research Center in Abu Dhabi, UAE, where he helped develop a referral center for infertility and artificial breeding in Arabian horses and camels. He served as the resident veterinarian and veterinary consultant to the Royal stables and the National Stud Farms in Morocco and the Amiri stable in Abu Dhabi (UAE).

Dr. Tibary joined the College of Veterinary Medicine at Washington State University, where he is now a professor and head of the Comparative Theriogenology service, providing clinical service and conducting research in equine, ruminant, and camelid reproduction.

Dr. Tibary received several awards recognizing his excellence in teaching and clinical practice including the Norden Distinguished Teacher Award (2001 and 2005), the faculty member award by the Washington State Veterinary Medical Association (2003), the North African Veterinary Achievement Award for contributions to equine practice (2006), and the Veterinary Achievement Award by the Alpaca Research Foundation (2007). He was named 2011 Theriogenologist of the Year by the American College of Theriogenologists. He is the author of several scientific publications and books on large animal theriogenology. His focus on camelid theriogenology is on artificial breeding and diagnosis of reproductive disorders.

Joanna M. G. de Souza-Fabjan

Joanna M. G. de Souza-Fabjan has studied veterinary medicine and is currently a professor and researcher in the Reproduction Sector at the Veterinary School of Universidade Federal Fluminense, Niterói, Rio de Janeiro, Brazil. She is member of two graduate programs at the same university: Veterinary Medicine (Animal Clinics and Reproduction) and Sciences and Biotechnology. Dr. Souza-Fabjan's research interests have been revolving around reproductive biotechnologies in farm animals, mainly small ruminant species, and recently also the domestic cat as a model for endangered felids. Her primary research goals are to advance our understanding of ovarian function using ultrasonography as well as to develop and refine methods of estrus synchronization, artificial insemination, *in vitro* and *in vivo* embryo production, and gamete/embryo cryopreservation. Her studies have been supported by major Brazilian funding agencies, and she has published more than 100 original articles and invited reviews in top-ranked scientific journals. For her research achievements to date, she has been awarded a prestigious Young Scientist of Rio de Janeiro State prize (2018), a CNPq fellowship (2019), and the Early Career Achievement–Scientist award from IETS (2020).

Julie Gard Schnuelle

Dr. Julie Gard Schnuelle is a professor in the Department of Clinical Sciences in the Farm Animal Section, at the Auburn University College of Veterinary Medicine (AUCVM). She is a diplomate of the American College of Theriogenologists. Her PhD work was on bovine viral diarrhea virus (BVDV) as an embryonic pathogen. Her interests include embryo technologies, reproductive and respiratory pathogens, emergency preparedness, alternative therapies to reduce antibiotic use in food animals, and lameness. She is a member of a number of scientific societies such as the AVMA, ALVMA, AABP, IETS, AETA, USAHA, AAVLD, SFT, and ACT. She is the past chair of the Abstract Committee for the Society of Theriogenology. She is also an active member of IETS and is the past chair of the Health and Safety Advisory Committee. She is on the AABP Emergency Response, BVDV, and Reproductive Committees. She has served on a number of committees for the USAHA including the Animal Welfare, BVDV, and Import and Export Committee. She is the Theriogenology residency director at AUCVM. She is very involved with resident teaching and research. Additionally, she is very involved in student clubs and is an AABP faculty representative, SAVMA faculty representative, and coach of the SAVMA palpation team. She has a passion of teaching, specifically clinical teaching, and has received the dean's award for excellence in teaching at AUCVM. She has served on numerous committees while at the AUCVM, including the Research and Graduate Studies Committee, Antibiotic Use Committee, Pharmacy Committee, Annual Conference and Continuing Education Committee, Preceptorship Committee, and the AUCVM Hospital Board. She is the chair of the Affiliate and Adjunct Faculty Committee and is a member of the IACUC for Auburn University.

Zvi Roth

Prof. Zvi Roth is a recognized leader in the fields of reproductive physiology and embryology in dairy cows. He received his education in the Faculty of Agriculture, Hebrew University of Jerusalem, Israel. His postdoctoral research was performed at Pete J. Hansen Laboratory, University of Florida, USA. Prof. Roth has been an associate professor since 2016 in the Department Animal Science, Faculty of Agriculture, Rehovot, Israel. Prof. Roth has co-authored over 70 publications, with h-index = 25. For further information, please log in to Roth's home page. Prof. Roth is leading a Reproductive Physiology group that focuses on environmental stressors and their effects on female and male gametes. His research has global implications, taking into consideration global climate change and the increasing awareness of pollutants as biologically active molecules. The work in Prof. Roth's laboratory involves *in vivo* and *in vitro* experimental approaches to study the effect of environmental thermal stress on oocyte competence and embryonic development. These include physiological, morphokinetic, cellular, and molecular aspects. In the framework of the Hebrew University Center of Excellence in Agriculture and Environmental Health, Prof. Roth leads a Reproductive Toxicology Research Program that deals with the risks associated with exposure of oocytes and sperm to environmental toxins, using the bovine as a model.

Susanne Ulbrich

Susanne Ulbrich is an expert on livestock metabolism, focusing on relationships that affect fertility and reproduction. Her new, ultra-modern research methods have brought her an international reputation. Susanne Ulbrich's professorship is an important element in the World Food Strategy of the Department of Environmental Systems Science. She will also play a key role in the Agrovet-Strickhof project that ETH Zurich plans together with the University of Zurich and the Canton of Zurich.

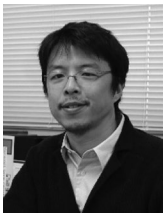
Susanne Ulbrich has been a full professor of animal physiology at the Institute of Agricultural Sciences since September 2013.

Susanne Ulbrich studied Agricultural Sciences with a focus on animal sciences at the Technical University Munich (TUM), followed by postgraduate studies in biotechnology. In 2005 she received her doctorate in physiology at the Science Center Weihenstephan of the TUM with the distinction summa cum laude. She then took over the management of a research group at the TUM. Research stays have taken her to the University of Adelaide in Australia and the Universidad de Concepcion in Chillán, Chile.

Pasqualino Loi

Pasqualino Loi's main scientific interest is developmental biology and particularly all aspects of biotechnologies applicable on embryos, with a focus on embryonic manipulation and nuclear transfer (cloning). His current area of research is nuclear reprogramming and the epigenetic modification of DNA induced on early embryos by cloning and other *in vitro* manipulations. He has 25 years of experience in reproductive control of male and female in domestic and wild ruminants, including *in vitro* generation of embryos and all associated technologies (embryo freezing, embryo transfer, cloning by somatic cell nuclear transfer). The laboratory crew (5 postdocs) is made up of experienced scientists, fully independent in planning laboratory activities, research grants, and scientific publications. His laboratory is endowed with state-of-the-art equipment hosted in new facilities (built in 2000). External facilities for animal farming and laboratories for embryo transfer, semen collection, and processing are available through a collaboration within the Istituto Zooprofilattico Sperimentale (located in the research station "Gattia").

Katsuhiko Hayashi



Katsuhiko Hayashi is a professor in the Department of Stem Cell Biology and Medicine, Graduate School of Medical Sciences, Kyushu University. He was born December 2, 1971, and received his master's degree from Meiji University. He was then an assistant professor from 1996 to 2002 at Tokyo University of Science, where he received his PhD 2004. He did research at Osaka Medical Center and was a postdoctoral fellow at the Gurdon Institute, University of Cambridge. Hayashi then moved to the Graduate School of Medical Sciences, Kyushu University, as an assistant professor. He became a full professor there in 2014. His work has recently been published in *Science Advances*, *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), and *Nature*.

Michael Skinner

Dr. Michael Skinner is a professor in the School of Biological Sciences at Washington State University. He did his BS in chemistry at Reed College in Portland, Oregon; his PhD in biochemistry/chemistry at Washington State University; and his Postdoctoral Fellowship at the C.H. Best Institute at the University of Toronto. He has been on the faculty of Vanderbilt University and the University of California at San Francisco. He is the founding director of the Center for Reproductive Biology at Washington State University and the University of Idaho. Dr. Skinner's current research has demonstrated the ability of environmental toxicants to promote the epigenetic transgenerational inheritance of disease phenotypes due to abnormal germ line epigenetic programming in gonadal development. Dr. Skinner has over 336 peer-reviewed publications and has given over 316 invited symposia, plenary lectures, and university seminars. He has done Ted talks and had documentaries done on his research with BBC Horizon, PBS Nova, Smithsonian, and France ARTE. He has founded several biotechnology companies.

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DABE

Domestic Animal Biomedical Embryology Committee

DABE-Morulas Virtual Preconference Workshop

Extracellular Vesicles in Biomedical Embryology

January 18, 2021, at 9:00 am (CST)

9:00 - 9:05 **Introduction to workshop**

Dr. Marcia Ferraz, *DABE chair*
Department of Veterinary Sciences
Ludwig-Maximilians University of Munich

9:05 - 10:30 **Extracellular vesicles isolation and characterization**

Part 1: Methods for isolation and quantification
Part 2: MISEV guidelines for EVs experiments

Dr. Kenneth W. Witwer, *Associate Professor*
Johns Hopkins University School of Medicine
Depts of Molecular and Comparative Pathobiology and Neurology
ISEV Executive Chair of Science and Meetings

10:30 - 11:30 **Micro-engineering extracellular vesicles**

Dr. Ke Cheng, *Randall B. Terry, Jr. Distinguished Professor in Regenerative Medicine*
Dept. of Molecular Biomedical Sciences, North Carolina State University
Dept. of Biomedical Engineering, University of North Carolina
Division of Molecular Pharmaceutics, University of North Carolina - Chapel Hill

11:30 - 12:00 **DABE-Morulas Science SLAM**

12:00 - 13:30 Lunch break

13:30 - 14:30 **Gene editing using extracellular vesicles**

Dr. Randy Schekman, *Howard Hughes Institute Investigator and Professor of Cell and Developmental Biology*
Department of Molecular and Cell Biology
University of California at Berkeley
Nobel Prize in Physiology or Medicine 2013 for his discoveries of machinery regulating vesicle traffic

14:30 - 14:40 **DABE-Morulas Science SLAM Awards sponsored by Acceligen**

Presented by **Dr. Rolando Pasquariello**, Morulas Governor

14:40 - 15:00 **Closing remarks**

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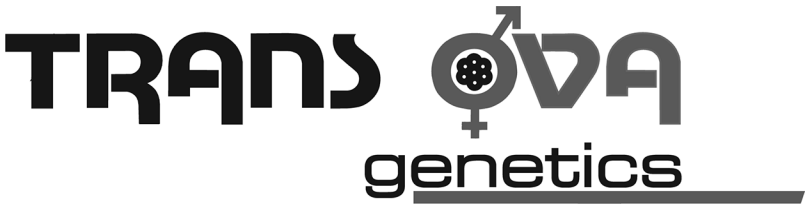
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