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# WORLD ASSOCIATION for ANIMAL PRODUCTION

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## *The World Animal Science News*

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## EDITORIAL

Welcome to my first editorial as president of WAAP. I would first like to thank my immediate predecessors, Philippe Chemineau and Jim Sartin, for their contributions to WAAP and the global animal science community. I would also to thank them for the support and mentoring they have provided me as I take on this important role in what I think are challenging times. In particular, I would like to congratulate Philippe and the WAAP and EAAP teams for the fantastic WAAP day and other sessions at the recent meeting in Lyon. The full-day meeting was attended by over 500 people and, I think, tackled some of the big issues facing the global livestock industries. The livestock industries are facing continuous pressure from many quarters, with much of this driven by misinformation delivered by individuals or groups, often with vested interests.

In a world of constant change and evolving trends, some things remain of critical importance, with the livestock industry being one such pillar. The value of livestock industries to society cannot be overstated, with this vibrant sector playing indispensable roles in providing food, livelihoods, and a sustainable future for our growing global population. There is no doubt that the need for animal products will increase as people in developing countries will need and desire an increased consumption of livestock products. We need to ensure that this continues to be possible.

The animal industries are an essential component of the global food supply chain. They provide a steady source of high-quality protein in the form of meat, milk, and eggs. Humans evolved as omnivores; animal products are the most reliable and critical sources of many micro and macro-nutrients. As the global population grows, ensuring access to consistent and nutritious food sources is paramount, and the livestock industries will play a central role in achieving this goal, contributing to world food security. The animal industries also generate billions of dollars in revenue and provide millions of jobs globally. From small-scale farmers to large agricultural enterprises, these industries are crucial for economic development, especially in rural areas and developing countries. They stimulate local economies, create jobs, and promote entrepreneurship. In many parts of the developing world, livestock ownership is a path to financial independence, particularly for women.

... **Continues**

## Editorial (continues)

It should also be borne in mind that livestock are an integral part of many cultures and traditions across the world. They provide not only sustenance but also a sense of identity and connection to the land. Livestock farming practices have been passed down through generations, preserving heritage and cultural diversity. Despite some populist tenets, the livestock industries have made substantial strides in adopting sustainable practices and combating environmental impacts. Responsible farming methods, such as rotational grazing, waste management systems, and sustainable intensification, contribute to minimizing environmental impacts. These industries are increasingly committed to reducing their carbon footprint, conserving natural resources, and promoting animal welfare. It is critical that any developments and intensification of the animal industries be conducted in a responsible and sustainable manner if we are to continue to have a social licence to operate.

Livestock animals are found in diverse climates and terrains around the world, including in environments where it is not feasible to grow crops. Their adaptability makes them an invaluable resource, as they can thrive in a variety of conditions, providing sustenance and economic stability in both developed and developing regions. For example, a major characteristic of ruminant animals is that they can convert low nutritional value plant materials into high nutritional value animal products.

The external threats to the animal industries provided the impetus for a coalition of concerned scientists in Dublin in October 2022, and the papers from this meeting have been captured in a recent issue of [Animal Frontiers](#) and I encourage all concerned animal scientists to peruse these papers in this Open Access journal. I am also encouraging you, as advocates of the animal industries, to consider reading and signing [the Dublin Declaration](#) that was developed at this meeting. In summary, the livestock industries capture multifaceted sectors that significantly contribute to our society's well-being. Its role in food security, economic prosperity, and cultural heritage should not be

underestimated. It is a sector that continuously evolves, embracing sustainable practices and technological innovations. The value of livestock industries to society is immeasurable, and as we move forward, it is essential that we advocate for the animal industries to ensure a prosperous and sustainable future for all.

Frank Dunshea  
President WAAP

## From WAAP Members

### Australian Association of Animal Sciences (AAAS)

#### [AAAS News](#)



### Joint Congress for the Australian Association of Animal Science (AAAS) and the Asian-Australasian Association of Animal Production (AAAP)

It is our great pleasure to invite you to the joint Congress for the Australian Association of Animal Science (AAAS) and the Asian-Australasian Association of Animal Production (AAAP). Focusing on recent and future developments in Animal Science, this congress combines the 35th biennial AAAS conference and the 20th AAAP Congress in one meeting. This 3-day event (plus day tours) will take place from July 8th to 12th, 2024 at the Melbourne Convention and Exhibition Centre. This congress aims to bring together the brightest minds in animal science from the Asia and Australasia regions to discuss recent developments and research findings in the field. The conference will include keynote speeches from prominent researchers, informative presentations, and interactive workshops. All of

which will provide a great platform for networking and collaboration among professionals in the animal science industry and academy.

### Short Paper Submissions Open

One-page papers are now being accepted for the 2024 Embracing disruption as an opportunity for animal science. A joint AAAP and AAAS congress will be published in the digital conference proceedings book. Papers will undergo a peer review process and the Editor's decision is final. Papers must not be previously published work. Authors must adhere to the strict style and formatting guidelines to ensure that their paper can be sent for peer review. Papers failing to meet these guidelines will be returned to the author. All papers must be submitted online using the online portal. Please follow the step-by-step instructions in the portal. Submissions close **11.59pm AEDST on Sunday 4th February 2024.**

### Expressions of Interest Co-chairing a session

The organising committee of the Joint AAAP & AAAS Animal Production Congress 2024 invite expressions of interest (EOI) from animal scientists to co-chair sessions at the Congress.

The expression of interest is open to everyone, and the organising committee especially encourage early career animal scientists to apply for this opportunity as there will be a dedicated early career co-chair for each session. Early career animal scientists are those who are:

- Current animal science students
- People who completed tertiary studies in the last 5 years and are working in animal science fields

### What's involved?

Every effort will be made to assign you to a session within your field of interest. As co-chair you will work with your session co-chair/s to:

- Promote abstract submissions to your session
- Review and/or arrange reviewers for abstracts submitted to your session
- Arrange the final program for your session including

assignment of orals and posters, in conjunction with scientific organising committee

- Co-chair your session in-person at the Joint AAAP/ AAAS Animal Production Congress in 2024

To facilitate a smooth experience co-chairs will be asked to attend an online information & training session. EOI are invited from all animal scientists, however priority will be given to current members of AAAS or AAAP.

**EOI close on Monday 30th October 2023.** [Click here](#) to access the form.

### American Dairy Science Association® (ADSA®)

#### ADSA News



Since 1906, ADSA has been the home for trustworthy dairy science and for a diverse community of educators, scientists, and industry representatives advancing the science behind the food we eat.

Want to stay up to date on the latest dairy science news? Sign up for our [free weekly newsletter](#) and tune into our [Dairy Digressions podcast](#).

### Read | Latest issues of the | *Journal of Dairy Science* and *JDS Communications*

Keep a finger on the pulse of global dairy research with the latest open-access issues of ADSA's Journal of Dairy Science and JDS Communications, which are now reaching [researchers and readers faster than ever](#). [Read more](#)



**Join and save** | [ADSA members enjoy meeting discounts](#)

ADSA publishes the top open-access dairy science journals in the profession: the *Journal of Dairy Science* and *JDS Communications*. Members can stay connected to the best in dairy science with electronic access to both journals; those in the [professional membership tier](#) enjoy significant discounts on article-publishing charges—more than \$1,900 for the *Journal of Dairy Science* and more than \$500 for *JDS Communications*. Explore the many benefits of membership and join or renew today! Not ready to become a member? We offer half-off [e-memberships](#) for individuals outside of the US and Canada. [Learn more](#).



**Join us** | [Discover Conference on value-driven dairy farming](#)

Register today to join ADSA in person **May 6–9, 2024**, in Itasca, Illinois, as we address the adoption of technology, data governance, and cybersecurity, as well as the value of data mining in dairy. Learn more and register now to receive the early bird rate. [Register](#)



**Save the date** | [2024 ADSA Annual Meeting in Florida](#)

ADSA's 2023 Annual Meeting, which gathered more than 1,700 dairy science experts from around the globe, wrapped in the summer. Be sure to mark your calendar for our next gathering on June 16–19, 2024, in West Palm Beach, Florida! Attending ADSA's conferences gives you face-to-face, personal access to the latest dairy science and the people behind the breakthroughs. [Learn more](#)



**Mark your calendar** | [International Symposium on Ruminant Physiology \(ISRP\)](#)

ISRP is the major international symposium on ruminant physiology, providing an overview of current, important scientific findings and areas of research in the physiology of ruminants of all kinds. ADSA is honoured to bring this prestigious event to Chicago, Illinois, this **August 26–29, 2024**. [Save the date](#)





## American Society of Animal Science (ASAS)

### ASAS News



AMERICAN SOCIETY OF ANIMAL SCIENCE

### 2024 ASAS Southern Section Meeting Information

The 2024 Southern Section Meeting will take place in Louisville, Kentucky, January 27-30, 2024, at the Omni Louisville Hotel. Make sure to visit the [meeting website](#) for more meeting details.

### 2024 ASAS Midwest Section Meeting Information

The 2024 Midwest Section Meeting will take place in Madison, Wisconsin, March 10-13, 2024, at the Monona Terrace. Meeting details can be found on the [meeting website](#).

### 2024 ASAS ASAS/CSAS/WSASAS Annual Meeting Information

The 2024 Annual Meeting will take place at the Calgary TELUS Convention Centre. Calgary is in Western Canada in the province of Alberta nestled in the foothills of the majestic Canadian Rocky Mountains. Make sure to check the [meeting website](#) for registration and housing information. ASAS is dedicated to promoting animal science research and supporting your career. We work with universities, research institutions, and

industry professionals to make sure you have access to the leading publications and networking opportunities. Membership is open to individuals, organizations, or firms interested in research and application, instruction, or extension in animal science or associated with the production, processing, marketing, or distribution of livestock and livestock products. Membership is based on the calendar year (January 1 through December 31).

More information on memberships can be found on the [Membership website](#).

## Canadian Society of Animal Science (CSAS)

### CSAS News



Greetings from the Canadian Society of Animal Science! We have just had our annual ASAS-CSAS symposium, and we are already planning the next one for 2024. It's a big one, as our 2024 conference will be hosted right in Calgary and feature a variety of speakers covering topics related to animal science. Please keep checking in to hear more about our theme and important upcoming dates.

We have also welcomed Younes Miar as our president following years of service to our society and the scientific community at large. We would also like to welcome James Sartin as the new president of the American Society of Animal Science (ASAS). For more information about the Canadian Society of Animal Science or our symposium, please contact Sarah Lindsay at [sarah.tfio@bellnet.ca](mailto:sarah.tfio@bellnet.ca).

## European Federation of Animal Science (EAAP)

### EAAP News



### Scientific presentations from Lyon finally available!

We are thrilled to announce that the eagerly awaited scientific presentations from our latest conference in Lyon are now available! At EAAP, we are committed to advancing knowledge and fostering collaboration in the field of animal science, and we are pleased to make these valuable resources accessible to you. Our conference brought together experts from around the world, delivering cutting-edge research and insights in animal science. All EAAP members can now access materials of almost all presentations from Lyon Annual Meeting. To access the scientific presentations, simply visit our Restricted Site. There, you'll find a user-friendly interface that allows you to search, view, and download the presentations of your choice. If you are not EAAP member yet, please apply at on the [dedicated webpage](#). The videos of the EAAP Plenary Sessions about *Primum non nocere: Can we feed the planet without depleting its resources?* providing a treasure trove of knowledge for professionals about animal science and livestock industry is also available on [the EAAP YouTube channel](#). Furthermore, the videos of the two very interesting WAAP Plenary Sessions about Climate change, biodiversity and global sustainability of animal production and Biodiversity as a lever for sustainable animal production are also available on the [EAAP YouTube channel](#). By making these presentations available, we aim to foster knowledge exchange and enhance your understanding of the latest developments, methodologies, and breakthroughs in animal science and to facilitate ongoing education and skill development. We hope

you find these scientific presentations valuable and insightful.

Stay Connected! Keep an eye on [our website](#) and follow us on social media for updates on upcoming events, webinars, and more.

### Preparing Next EAAP Annual Meeting in Florence

In a focused meeting held few days ago, our team came together with representatives of the Italian Animal Science Association (ASPA) and with local organizers to strategize for the upcoming annual scientific conference to be held in Florence in 2024. We discussed logistics and engagement initiatives. Excitement is building for another enriching event that promises to deliver cutting-edge insights and networking opportunities in one of the most iconic cities in the world: Florence! The 75th EAAP Annual Meeting will be held on 1st – 4th September 2024. Stay tuned for more updates. Have a look at [the website of the event](#).



EAAP Staff, ASPA representatives and local organizers

### Success at the 1st Ruminant Feed Efficiency Academy Workshop!

The recent workshop of the 1st Ruminant Feed Efficiency Academy held in Milan was very interesting with relevant invited speakers and with interesting and long discussions among participants and speakers. The workshop was a collaboration of EAAP with Selko Trouw Nutrition. We can say that the workshop in Milan exceeded all expectations.

Participants from around the globe came together to explore the latest insights, fostering innovation and collaboration in ruminant nutrition. Many thanks to all who contributed to this incredible success! The videos of the workshop will be soon available. Stay tuned for this and more exciting events.

## **Tanzania Society of Animal Production (TSAP)**

### TSAP news



**The 46th Annual Scientific Conference for the Tanzania Society of Animal Production (TSAP)**  
Olasit Garden, Arusha, Tanzania from 25th to 27th October, 2023

Excellent opportunity that brings together scientists, policy makers, professionals, and students from interdisciplinary fields of Animal Science, Range, Veterinary, Fisheries, Aquaculture, Economics, and other stakeholders with interest in the livestock and fisheries sectors to share latest reports in science and development. It is time for meeting, old and new friends to forge strong partnerships for R&D projects in Tanzania and worldwide. Come, share your experience during this era of industrialization in Africa amid the pressures of changing environment, culture, and technologies.

Conference Theme: “Merging Indigenous Knowledge and Modern Technologies to Transform

the Livestock and Fish Value Chains”

Sub-themes:

- Indigenous technologies and their role in Livestock and Fish value chains transformation;
- The need for modern technologies for livestock and fish values chains transformation;
- Cross-cutting issues in Livestock and Fish Production;
- Funding and Insurance avenues for transformation of the fish and livestock value chains.

Fees:

TSAP Members	<b>TZS 350,000</b>
Non-Members	<b>TZS 360,000</b>
Foreign Participants	<b>USD 200</b>

**PAY THROUGH BANK** Account: Tanzania Society of Animal Production (TSAP), CRDB Bank, SUA Branch, Account No. 01J2075479500, Swift code: CORUTZTZ and send your pay-in-slip.

Participants are also expected to meet their travel costs to and from Arusha as well as the living costs during the entire period. Education tour will be arranged and announced later.

## **News from Science**

### **Future-proofing extensive livestock production in subtropical grasslands and savannas**

Climate change is poised to have detrimental effects on extensive livestock production in subtropical grasslands and savannas. To counter these negative impacts, proactive measures are imperative. Livestock adaptation through selective breeding for future environmental conditions is vital to ensure the well-being and performance of animals in hot and unpredictable environments. Effective grazing management is central to providing high-quality wet season forage and ample dry season forage, essential for extensive livestock production under challenging circumstances. Two main strategies



for safeguarding livestock production in such conditions are breeding small, adapted animals and ensuring adequate wet season quality and dry season quantity of forage. These strategies resemble natural wildlife systems and can be applied in both commercial and communal grazing setups, with some adjustments. The primary approach is centred on effective grazing management and the use of adapted animals, followed by secondary strategies involving animal health and veterinary programs and targeted supplementary feeding. This multi-pronged approach aims to future-proof livestock production in the face of climate change. [Read the full article on Animal Frontiers.](#)



### **Cow detection and tracking system utilizing multi-feature tracking algorithm**

In modern cattle farm management, video-based monitoring has gained importance for analysing cattle behaviour, monitoring health, and predicting calving, reducing the need for stress-inducing sensors. This text proposes a novel method using video cameras to recognize and track individual cattle, especially challenging for visually similar black and brown varieties. Their approach combines deep learning and image processing, with stages like data pre-processing, cow detection, and tracking. Cow detection utilizes an instance segmentation network, while tracking employs cow location, appearance, and recent features. The system extracts colour and texture features from images and uses Convolutional Neural Network features for tracking. A Multiple Object

Tracking algorithm enhances robust cow tracking. Experimental results show the system's ability to handle tracking issues and reliably monitor cattle. The system aims to predict calving times for timely assistance. Future work will focus on addressing false detections and enhancing tracking tools while expanding experiments for broader applicability in multi-object detection and tracking in real-world scenarios. [Read the full article on Nature.](#)

### **Under the sea: How can we use heart rate and accelerometers to remotely assess fish welfare in salmon aquaculture?**



Recent advancements in bio-sensing technologies offer promising opportunities to monitor and enhance the welfare of fish in aquaculture. However, before implementing these novel biosensors, their suitability and potential applications must be thoroughly assessed. In this study, researchers explored how data from bio-loggers, including parameters derived from ECG and accelerometry, such as heart rate, acceleration, and variance of acceleration, relate to factors like oxygen consumption rate and indicators of stress and tissue damage in fish. To achieve this, 13 fish were fitted with biologgers and intravascular catheters, then subjected to swimming and stress protocols, during which physiological parameters were measured and analysed afterward. The results demonstrated that acceleration effectively reflects swimming activity, particularly tail beat



frequency. Additionally, heart rate, acceleration, and variance of acceleration can predict metabolic rate. Accelerometry data, especially variance of acceleration, significantly correlate with venous partial pressure of O<sub>2</sub>, blood lactate, plasma cortisol concentration, pH, and mean corpuscular haemoglobin concentration. These relationships stem from variance of acceleration indicating the onset of burst-swimming activity, often followed by acid-base imbalances and catecholamine release. These findings underscore the potential of biosensors in monitoring fish welfare, as they can extrapolate various stress-related physiological events when coupled with increased activity. [Read the full article on Aquaculture.](#)

### **Practical applications of genomic information in livestock**

The article discusses the accelerated access to high-dimensional genomic information in livestock species, facilitated by reduced genotyping costs and expanded services. Genomic data on individual animals serve various purposes, including parentage verification, traceability, karyotyping, sex determination, mutation monitoring, inbreeding estimation, mating advice, breed composition determination, precision management, and genomic evaluations for predicting genetic merit. Genomic data also support research efforts, which should eventually benefit one of the mentioned applications. The text outlines the process of generating genotypes, from sample procurement to identifying erroneous genotypes, and highlights the evolving landscape of genotyping technology over the past 15 years. While microarray-based genotyping has been prevalent, new technologies like genotype-by-sequencing may pose future challenges. Previously, genotyping was reserved for elite animals, but the focus has shifted towards genomic evaluations for most animals, aiming to inform breeding and management decisions based on genotype information from birth. This shift represents the future direction in livestock genomics. [Read the full article on Animal.](#)

### **News from International Organizations**

#### **Canada's feed and commodity sector**

It is estimated that there are approximately 600 feed and grain companies in Canada. The feed and commodity sector in Canada is very complex. There are a number of companies that only operate in the individual provinces, while a few cooperatives operate in all 10 provinces, including COOP Canada. Many of the farmers in the 3 large prairie provinces of Alberta, Saskatchewan and Manitoba are responsible for the mixture of feed for their own animals, just as the plant producers are largely responsible for the marketing and sale of their grain products. That is why many larger or smaller silos are seen everywhere at the farms for storing the harvest until the time when the prices are most favourable for the individual farmer. [Read the full article on AllAboutFeed.](#)

#### **Remarkable dynamics of the global poultry industry**



Poultry meat production has seen tremendous growth in the last 50 years. It's a wonder of agricultural development. Emeritus professor and statistical analyst Dr Hans-Wilhelm Windhorst witnessed it from the inside and reflects upon these remarkable dynamics. Between 1970 and 2020, global poultry meat production increased from 15.1 million tonnes to 137 million tonnes, or

by 807.8%. It was by far the fastest-growing animal product. Production volume grew much faster from 2000 than in the previous decades. Between 2000 and 2020 it increased by over 68 million tonnes. [Read the full article on PoultryWorld.](#)

## Job Offers

### International Fully Funded PhD Positions in the Life Sciences, Switzerland

Life Science Zurich Graduate School offers more than 100 funded PhD positions. With around 500 research groups and more than 1600 PhD students, the Life Science Zurich Graduate School is one of the largest graduate schools in Europe. It has 17 highly competitive PhD programs and is jointly run by the Swiss Federal Institute of Technology (ETH) and University of Zurich. Deadline: **1 November 2023**. For all the details and application read [the dedicated webpage](#).

### Assistant/Associate Professor at Huazhong University, China

The Meat Science group at [Huazhong Agricultural University](#) is seeking up to 8 tenure-track faculty positions at the level of Assistant/Associate Professor. Deadline: **21 November 2023**. Contact information [haizhou@mail.hzau.edu.cn](mailto:haizhou@mail.hzau.edu.cn) for more details regarding the positions and application process. For all the details read the [job vacancy webpage](#).

## Publications

### I. Elsevier

[Animal: Volume 17- Issue 10 – October 2023](#)

Article of the month: [“Egg production in nests and nesting behaviour: genetic correlations with egg quality and body weight for laying hens on the floor”](#).

### 2. New technical articles have been recently published on Engormix:

I. [“Choline: A required Nutrient for Transition Dairy Cows”](#)

II. [“Effects of Hydroxychloride Zinc and Elevated Levels of Hydroxychloride Copper in Broiler Chickens’ Diet on Productive Traits and Gut Health”](#)

III. [“Identifying key points of ASF risk in pig production”](#)

IV. [“Optimizing Post-Calving Care for Cattle: Ensuring Healthy Mothers and Calves”](#)

## Other news

**No IGCC workshop at PAG XXXI / January 12-17, 2024 - San Diego, CA, USA**

**Suggestions to submit your "goat" abstracts**

Since the International Goat Genome Consortium (IGGC) has agreed with International Plant & Animal Genome Conference (PAG) organizers to have a workshop every 2 years in San Diego, no workshop will be organized in 2024. Please submit your “goat abstracts” (your name, presentation title, and a short tentative abstract, which can be modified later on the conference site) either for a presentation:  
- in The International Sheep Genomics Consortium workshop, to Shannon Clarke ([shannon.clarke@agresearch.co.nz](mailto:shannon.clarke@agresearch.co.nz))

- or in the Cattle/Sheep/Goat workshop, to Andrew Hess ([ahess@unr.edu](mailto:ahess@unr.edu))

by Monday the **30th of October**

Please [check here](#) the dates for submission of your poster abstract to the PAG 31 portal

### 13th ATF Seminar

The 13th ATF seminar will be held on 15th November 2023, in Brussels at University Foundation. The ATF seminar would like to engage discussion with farmers, industries, scientists, policy makers and with the society. It is a follow up of the one-day Symposium of the ATF & Livestock Farming Systems Study Commission, EAAP Annual Meeting in Lyon, France on August 28th, 2023. For all the details and the programme [visit the webpage](#).

## Meetings and Conferences

WAAP invites you to check the validity of the dates for every single event published below and in the Calendar of the website, due to the state of sanitary emergency that World is currently dealing with.

Event	Date	Location	Information
12th Asia Pacific Poultry Conference (APPC 2023)	31 October – 4 November 2023	Nanjing, China	<a href="#">website</a>
SAADC2023	21 – 24 November 2023	Vientiane, Laos	<a href="#">website</a>
2024 ASAS Southern Section Meeting	27 – 30 January 2024	Louisville, Kentucky, USA	<a href="#">website</a>
2024 ASAS Midwest Section Meeting	10 – 13 March 2024	Madison, Wisconsin, USA	<a href="#">website</a>
2nd EAAP Regional Meeting	24 – 26 April 2024	Nicosia, Cyprus	<a href="#">website</a>
46th Discover Conference	4 – 6 May 2024	Itasca, Illinois, USA	<a href="#">website</a>
ADSA 2024 Annual Meeting	16 – 19 June 2024	Florida, USA	<a href="#">website</a>
Joint AAAP & AAAS Animal Production Congress	8 – 12 July 2024	Melbourne, Australia	<a href="#">website</a>
2024 ASAS ASAS/CSAS/WSASAS Annual Meeting	21 – 25 July 2024	Calgary, Canada	<a href="#">website</a>
International Symposium on Ruminant Physiology (ISRP)	26 – 29 August 2024	Chicago, Illinois, USA	<a href="#">website</a>
75th EAAP Annual Meeting	1 – 5 September 2024	Florence, Italy	<a href="#">website</a>

More conferences and workshops [are available on EAAP website](#).

The **World Animal Science News** is the Official WAAP Newsletter. This interesting update about activities of the global animal science community presents information on leading research institutions in the entire world and also informs on developments in the industry sector related to animal science and production. The Newsletter is sent to all WAAP member organizations and to their associates. You are all invited to submit information for the newsletter. Please send information, news, text, photos and logo to [waap@waap.it](mailto:waap@waap.it).

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