Book of Abstracts

of the 2nd Regional Meeting
of the European Federation of Animal Science

EUROPA · EAAP · FEZ · EVT · EAAB

Table of Contents

Summary

The European Federation of Animal Science (EAAP)

The main aims of the EAAP are to promote, by means of active co-operation between its members and other relevant international and national organisations, the advancement of scientific research, sustainable development and production systems; experimentation, application and extension; to improve the technical and economic conditions of the livestock sector; to promote the welfare of farm animals and the conservation of the rural environment; to control and optimise the use of natural resources in general and animal genetic resources in particular; to encourage the involvement of young scientists and technicians. More information on the organisation and its activities can be found at www.eaap.org.

Former Presidents

1949-1961	A.M. Leroy (France)
1961-1967	R. Trehane (United Kingdom)
1967-1972	J.M. Rijssenbeek (The Netherlands)
1972-1978	J.H. Weniger (Germany)
1978-1984	E.P. Cunningham (Ireland)
1984-1990	A. Roos (Sweden)
1990-1996	A. Nardone (Italy)
1996-2000	P. Solms-Lich (Germany)
2000-2004	A. Aumaitre (France)
2004-2008	J. Flanagan (Ireland)
2008-2012	K. Sejrsen (Denmark)
2012-2016	P. Chemineau (France)
2016-2020	M. Gauly (Germany)

Council members

President

- Isabel Casasús (Spain)

President - elect

Jöel Berard (Switzerland)

Vice-Presidents

- Peter Sanftleben (Germany)
- Hans Spoolder (the Netherlands)

Members

- Peer Berg (Norway)
- Sam de Campeneere (Belgium)
- Gunnfríður Elín Hreiðarsdóttir (Island)
- Nicolò Macciotta (Italy)
- Olga Moreira (Portugal)
- Klemen Potocnik (Slovenia)
- Diana Ruska (Latvia)

FAO Representative

- Badi Besbes

Auditors

- Zdravko Barac (Croatia)
- Georgia Hadjipavlou (Cyprus)

Alternate Auditor

- Jeanne Bormann (Luxembourg)

Secretary General

- Andrea Rosati

European Federation of Animal Science has close established links with the sister organizations American Dairy Science Association, American Society of Animal Science, Canadian Society of Animal Science and Asociación Latinoamericana de Producción Animal.

Welcome to the
EAAP Regional Meeting in Nicosia

On behalf of the Cyprus Organizing Committee, it is our honour and pleasure to welcome you to the 2nd Regional Meeting of the EAAP, which is taking place in Nicosia (Lefkosia), the capital of the Republic of Cyprus. This event is organised as a result of a joint initiative of the Mediterranean Working Group (Med WG) and represents the continuation of a new strategy in the development of EAAP activities.

In the past, the Med WG had mainly organized independent thematic symposiums, often in collaboration with other institutions such as CIHEAM and/or FAO, with the most recent one in Corte (2008). In recent years, the Med WG has continuously been organising successful scientific sessions or symposia within the EAAP annual meeting, always in collaboration with one or more EAAP Scientific Commissions. As all EAAP scientific entities, the Med WG has no formal institutional constitution and works on the basis of volunteer involvement of the participants. This regional EAAP meeting plans to focus on the Mediterranean region's specific attributes, gaps, needs and potential advantages in terms of research and development in animal production.

At a time of rapid development of computing and digital communication technologies, bringing people together is essential for building and developing scientific and personal relationships. The speed of scientific progress and the increase in scientific knowledge underline the need for active exchange and the formation of broader teams to address people's current needs. It is expected that by 2050 there will be 9.7 billion people on Earth, and more than 60% of them will live in urban agglomerations with no direct connection to the land and their own food production.

The science in animal production is currently facing many challenges, such as climate change, the use of marginal land unsuitable for other types of production, the use of raw materials unsuitable for human consumption, increasing production intensity, the need to ensure sustainability and animal health and welfare. Due to scientific advances in interdisciplinary research, agriculture, and in particular livestock production, continues to constitute one of the main pillars supporting food production, while also decisively contributing to rural development, agroecology and biodiversity protection, especially in harsh environments such as the Mediterranean area. The programme of the EAAP regional meeting in Nicosia will provide a much-needed platform for scientific exchange, in order to gain various insights into aspects of cutting-edge research in animal genetic resources, nutrition, genetics, technological advancements, livestock farming systems, animal health and welfare and climate and environmental changes affecting all dimensions of livestock production.

We believe that the meeting will be full of new and interesting information, will bring interaction and create a space for strengthening existing and establishing new relationships between scientists and teams in the Mediterranean region and beyond. In addition to the scientific programme, you can look forward to an enjoyable stay at the hospitable island of Cyprus and pleasing social events within the duration of the meeting. We hope the 2nd EAAP Regional Meeting for the Mediterranean region will be a unique opportunity to combine fruitful scientific interactions with the exploration of the cultural treasures of Cyprus. We wish you a pleasant stay in our beautiful city and country!

Organizers of the 2nd
Mediterranean EAAP Regional Meeting

President of the Meeting

Georgia Hadjipavlou
Animal Production Section,
Agricultural Research Institute, Cyprus

International Scientific Board

- Isabel Casasús - EAAP president
- Georgia Hadjipavlou - EAAP Sheep &Goat Commission
- Christos Dadousis - EAAP Sheep & Goat Commission, YoungEAAP
- Christina Ligda - EAAP Mediterranean Working Group
- Filippo Miglior - EAAP Genetics Commission
- Giuseppe Bee - EAAP Pig Commission
- Ioanna Poulopoulou - EAAP Livestock Farming Systems Commission
- Luciano Pinotti - EAAP Nutrition Commission
- Yuri Montanholi - EAAP Physiology Commission, Cattle network Working Group
- Keelin O'Driscoll - EAAP Health and Welfare Commission
- Peer Berg - EAAP FAnGR Working Group

National Organizing Committee

- Vassilis Vassiliou– Head of Animal Production Section, ARI, Cyprus
- George Adamides-Head of Rural Development Section, ARI, Cyprus
- Dionysis Sparaggis – Animal Production Section, ARI, Cyprus
- Michalis Omirou -Agrobiotechnology Section, ARI, Cyprus
- Dionysia Fasoula-Plant Improvement Section, ARI, Cyprus
- Andreas Stylianou-Rural Development Section, ARI, Cyprus

About the Agricultural Research Institute

The Agricultural Research Institute (ARI) is a Department of the Ministry of Agriculture, Rural Development and Environment. ARI was established in 1962 as the first Research Institute in Cyprus, after the independence of Cyprus, in cooperation with the Special Development Fund of the United Nations and the Food and Agriculture and became the property of the Government of Cyprus in 1967. The vision of the Agricultural Research Institute is to be a model centre of knowledge and innovation, and lead Cyprus to a better future by strengthening rural development, improving the quality of life, and ensuring the sustainable use of natural resources. ARI is the only institute in Cyprus that conducts innovative applied agricultural research aiming to create and transfer knowledge for the development of the primary sector and to solve problems at the farmer level. Research results are transferred to stakeholders through modern educational programs and dissemination tools. In 2000, ARI was designated as a new European Centre of Excellence in Agriculture and the Environment. It is a highly dynamic organization, maintaining fruitful collaborations with national, regional and international organizations and research networks, as well as >30 academic and/or research institutions in Cyprus and abroad, having successfully implemented several research and innovation projects funded on a competitive basis by the National, the European Framework, and other Regional and International Funding Programmes. ARI is composed of eight scientific sections, in which about 30 scientists, supported by technicians and field workers, conduct research in the following areas: Animal Production, Plant Improvement, Vegetable Crops, Fruit Trees, Natural Resources and Environment, Plant Protection, Rural Development and Biotechnology. ARI scientists have wide experience on agri-genomic studies of animal, crop and soil microbial genetic resources, on long-term collection of associated phenotypes in field conditions and on smart applications and technological advancements on farm. ARI, in addition to the central facilities and laboratories in Nicosia, where the meeting will be held, has also unique field and farm facilities and training Centres across Cyprus to conduct its diverse experiments. Finally, ARI scientists are also involved in the training and co-supervision of students from various universities in Cyprus and abroad.

Agriculture and EU Common Agricultural Policy (CAP) implementation

Cyprus' agricultural land covers approximately 135 560 hectares. There are about 34 940 farms, rather small in size, with an average of 3 hectares. In fact, more than 75% of the farms occupy less than 2 hectares. About 60% of Cypriot farms produce olives, citrus fruits or a combination of other permanent crops, such as grapevine. The Cypriot farm labour force employs around 72000 persons, the majority of which represents family holdings. Even if the unemployment rate between 2018 and 2020 has been reduced by 1% in rural areas, it remains the highest share in the country with 8.1%. Unemployment in rural areas remains an issue, especially for young people, in light of the aging population trend.

The approved 2023-2027 CAP Strategic Plan of Cyprus will provide an opportunity to renew the agricultural potential of Cyprus, creating a robust primary sector. It aims to respond to the concerns of producers and consumers, to attract younger generations, maintain social cohesion and promote a sustainable rural development. In parallel, it intends to protect the environment in which farmers operate. The Plan will work with a view to shift towards a new agricultural model, which respects the use of natural resources and commits to preserving and improving them.

Cyprus aims to increase the sustainability and resilience of the agricultural sector by expanding the production of high-quality agricultural products while improving the economic viability of small and medium-sized holdings. Due to the importance of halloumi cheese (a registered Protected Designation of Origin (PDO), the main Cypriot agricultural export), the Cypriot Plan aims to enhance the sheep and goat farming sector. It will financially support the income of small sheep and goat farmers and will introduce measures to modernise farms and improve animal welfare, in order to increase productivity and the average holding size. Cyprus aims to improve farm competitiveness and market orientation and will do so by contributing to investments, both in the primary sector and in the sector processing agricultural products. Farm modernisation and improvements in the production processes will help address the shortfalls in capital productivity and in turn the ability of Cypriot farms to operate on the international market. The farmers' position in the value chain will be improved by strengthening their negotiating position by fostering participation in collective schemes.

Cyprus aims to increase its environmental and climate ambition as the country faces major challenges in these areas. Water management (quantity and quality) and soil preservation (fighting soil erosion and pollution) have been identified as the most important priorities. Nevertheless, the CAP plan also addresses other important issues, such as the mitigation of, and adaptation to, climate change, the protection of biodiversity, forests and air quality.

Industry Members Club

EAAP started in 2023 a new initiative to create closer connections between European livestock industries and the animal science network. Therefore, the "EAAP Industry Club" was shaped with the specific aim of bringing together the important industries of the livestock sector with our European Federation of Animal Sciences. All companies dealing with animal production (nutrition, genetic, applied technologies, etc.) are invited to join the "EAAP Industry Club" because industries will have opportunity to increase their visibility, to be actively involved in European animal science activities, and to receive news and services necessary to industries. In addition, through the Club, industries will enlarge their scientific network and will receive specific discounts on sponsoring activities.

The Industries that already joined the "EAAP Industry Club" are:

The Club gives:

Visibility • Company name and logo at EAAP website and all relevant documents • Slides with name and logo at Official Events • Priority links with EAAP Socials • Invite, through EAAP dissemination tools and socials, people to events organized by your company • Information disseminated through a brand new Industry Newsletter • Networking • Joining the Study Commissions and Working Groups • Suggest topics to be considered for Annual Meetings Scientific Sessions • Organize Professional Panel through the EAAP platforms • Economic Benefits • One free registration to each Annual Meeting and at every meeting organized by EAAP • Five individual memberships at no cost • Many possible discounts (-30%) to increase company visibility through: EAAP Newsletter, EAAP website, EAAP Annual Meetings and workshops • Support young scientist by sponsoring scholarships named by the company • Co-Organize and sponsor webinars

Make yourself more visible within the livestock industry via the animal science network!

For more information please contact eaap@eaap.org

YoungEAAP

What is the YoungEAAP?

YoungEAAP is a group of young scientists organized under the EAAP umbrella. It aims to create a platform where scientists during their early career get the opportunity to meet and share their experiences, expectations and aspirations. This is done through activities at the Annual EAAP Meetings and social media. The large constituency and diversity of the EAAP member countries, commissions and delegates create a very important platform to stay up-to-date, close the gap between our training and the future employer expectations, while fine-tuning our skills and providing young scientists applied and industry-relevant research ideas.

Committee Members at a glance
- Ines Adriaens (President)
- Jana Obsteter (Vice President)
- Giulia Gislon (Secretary)

YoungEAAP promotes Young and Early Career Scientists to:
- Stay up-to-date (i.e. EAAP activities, social media);
- Close the gap between our training and future employer expectations;
- Fine-tune our skills through EAAP meetings, expand the special young scientists' sessions, and/ or start online webinars/training with industry and academic leaders;
- Meet to network and share our graduate school or early employment experiences;
- Develop research ideas, projects and proposals.

Who can be a Member of YoungEAAP?
All individual members of EAAP can join the YoungEAAP if they meet one of the following criteria: Researchers **under 38 years of age** OR within **10 years after PhD-graduation**.

Just request your membership form (ines.adriaens@kuleuven.be) and become member of this network!!!

EAAP Study commissions

Commission on Animal Genetics

Filippo Miglior	President	Guelph University, Canada	fmiglior@uoguelph.ca
Marcin Pszczola	Vice-President	Poznan University of Life Sciences, Poland	marcin.pszczola@gmail.com
Morten Kargo	Vice-President	Aarhus University, Denmark	morten.kargo@qgg.au.dk
Ewa Sell-Kubiak	Vice-President	Poznan University of Life Sciences, Poland	ewa.sell-kubiak@puls.edu.pl
Francesco Tiezzi Mazzoni Della Stella Maestri	Secretary	University of Florence, Italy	francesco.tiezzi2@unifi.it
Christa Egger-Danner	Industry rep.	Zuchtdata, Austria	egger-danner@zuchtdata.a
Ivan Pocrnic	Young Club	Roslin Institute, UK	ivan.pocrnic@roslin.ed.ac.uk
Pauline Martin	Young Club	INRAè, France	pauline.martin@inrae.fr
Giuseppina Schiavo	Young Club	University of Bologna, Italy	giuseppina.schiavo2@unibo.it

Commission on Animal Nutrition

Luciano Pinotti	President	University of Milan, Italy	luciano.pinotti@unimi.it
Susanne Kreuzer-Redmer	Vice-President	Vetmed Vienna, Austria	susanne.kreuzer-redmer@vetmeduni.ac.at
Latifa Abdenneby-Najar	Vice-President	IDELE, France	latifa.najar@idele.fr
Maria José Ranilla García	Secretary	Universidad de León, Spain	mjrang@unileon.es
Sokratis Stergiadis	Secretary	University of Reading, UK	s.stergiadis@reading.ac.uk
Javier Alvarez Rodriguez	Secretary	University of Lleida, Spain	javier.alvarez@udl.cat
Kar Soumya	Secretary	Wageningen University & Research, Netherlands	soumya.kar@wur.nl
Daniele Bonvicini	Industry Rep	Prosol S.p.a, Italy	d.bonvicini@prosol-spa.it
Geert Bruggeman	Industry Rep	Nusciencegroup, Belgium	geert.bruggeman@nusciencegroup.com
Eric Newton	Young Club	University of Reading, UK	Newtoeri000@gmail.com
Giulia Foggi	Young Club	University of Pisa, Italy	giulia.foggi@agr.unipi.it

Commission on Health and Welfare

Name	Role	Institution	Email
Laura Boyle	President	Teagasc, Ireland	laura.boyle@teagasc.ie
Flaviana Gottardo	Vice-President	University of Padova, Italy	flaviana.gottardo@unipd.it
Giulietta Minozzi	Vice-President	University of Milan, Italy	giulietta.minozzi@unimi.it
Isabel Blanco Penedo	Secretary	University of Lleida, Spain	isabel.blancopenedo@udl.cat
Mirjam Holinger	Secretary	Research Institute of Organic Agriculture FiBL, Switzerland	mirjam.holinger@fibl.org
Angela Trocino	Secretary	University of Padova, Italy	angela.trocino@unipd.it
Julia Adriana Calderon Diaz	Industry Rep	Genusplc, Spain	juliaadriana.calderondiaz@genusplc.com
Mariana Dantas de Brito Almeida	Young Club	University of Tras-os-Montes and Alto Douro, Portugal	mdantas@utad.pt
Vincenzo Lopreiato	Young Club	University of Messina Italy	vincenzo.lopreiato@unime.it
Liat Morgan	Young Club	University of Tel Aviv Israel	liatmorgan@gmail.com

Commission on Animal Physiology

Name	Role	Institution	Email
David Kenny	President	Teagasc, Ireland	david.Kenny@teagasc.ie
Kate Keogh	Vice-President	Teagasc, Ireland	kate.keogh@teagasc.ie
Alan Kelly	Secretary	University College Dublin, Ireland	alan.kelly@ucd.ie
Yuri Montanholi	Secretary	North Dakota State University, USA	yuri.montanholi@ndsu.edu
Maya Zachut	Secretary	Volcani Institute, Israel	mayak@volcani.agri.gov.il
Federico Randi	Industry Rep.	Ceva Sante Animale, France	federico.randi@ceva.com
Olaia Urrutia	Young Club	University of Navarra, Spain	olaia.urrutia@unavarra.es

Commission on Livestock Farming Systems

Michael Lee	President	Harper Adams University, UK	MRFLee@harper-adams.ac.uk
Enrico Sturaro	Vice-President	University of Padova, Italy	enrico.sturaro@unipd.it
Tommy Boland	Secretary	University College Dublin, Ireland	tommy.boland@ucd.ie
Ioanna Poulopoulou	Secretary	Free University of Bozen, Italy	Ioanna.Poulopoulou@unibz.it
Vincent Thenard	Secretary	INRAe, France	vincent.thenard@inra.fr
Jordana Rivero-Viera	Secretary	Rothamsted Research, UK	jordana.rivero-viera@rothamsted.ac.uk
Saheed Salami	Industry Rep.	Alltech, UK	saheed.salami@alltech.com
Tiago T. da Silva Siqueira	Young Club	INRAe, France	tiago.teixeira.dasilva.siqueira@gmail.com

Commission on Cattle

Massimo De Marchi	President	Padova University, Italy	massimo.demarchi@unipd.it
Paul Galama	Vice-President	Wageningen Livestock Research, The Netherlands	paul.galama@wur.nl
Joel Berard	Vice-President	Agroscope, Switzerland	joel.berard@agroscope.admin.ch
Jean François Hocquette	Secretary	INRAe, France	jean-francois.hocquette@inra.fr
Poulad Pourazad	Industry Rep.	Delacon Biotechnik GmbH, Austria	poulad.pourazad@delacon.com
Angela Costa	Young Club	University of Bologna, Italy	angela.costa@unipd.it

Commission on Sheep and Goat Production

Georgia Hadjipavlou	President	Agricultural Research Institute, Cyprus	ghadjipavlou@ari.moa.gov.cy
Lorenzo E Hernandez Castellano	Vice-President	Universidad de Las Palmas de Gran Canaria, Spain	lorenzo.hernandez@ulpgc.es
Antonello Cannas	Secretary	University of Sassari, Italy	cannas@uniss.it
Siham A. Rahmatalla	Secretary	Albrecht Daniel Thaer Institut for Agricultural and Horticultural Sciences, Germany	rahmatas@hu-berlin.de
Francis Campion	Secretary	Teagasc, Ireland	francis.campion@teagasc.ie
Ebru Emsen	Industry Rep	ERGEN R&D company, Turkey	ebru.emsen@er-gen.com
Christos Dadousis	Young Club	University of Parma, Italy	christos.dadousis@unipr.it

Commission on Pig Production

Sam Millet	President	ILVO, Belgium	sam.millet@ilvo.vlaanderen.be
Paolo Trevisi	Vice-President	Bologna University, Italy	paolo.trevisi@unibo.it
Giuseppe Bee	Vice-President	Agroscope Liebefeld Posieux ALP, Switzerland	giuseppe.bee@alp.admin.ch
Katja Nilsson	Secretary	Swedish University of Agricultural Science, Sweden	katja.nilsson@slu.se
Katarzyna Stadnicka	Secretary	UTP University of Science and Technology in Bydgoszcz, Poland	katarzynakasperczyk@utp.edu.pl
Grzegorz Brodziak	Industry Rep	Goodvalley Agro S.A., Poland	grzegorz.brodziak@goodvalley.com
Tristan Chalvon-demersay	Industry Rep	Metex-noovistago, France	tristan.chalvon-demersay@metex-noovistago.com
Lisanne Verschuren	Young Club	Topigs Norsvin, The Netherlands	lisanne.verschuren@topigsnorsvin.com

Commission on Horse Production

Rhys Evans	President	Norwegian University College of Green Development, Norway	rhys@hgut.no
Celine Vial	Vice-President	INRAe, France	celine.vial@inrae.fr
Roberto Mantovani	Vice-President	University of Padua DAFNAE, Italy	roberto.mantovani@unipd.it
Isabel Cervantes Navarro	Vice-President	Complutense University of Madrid, Spain	icervantes@vet.ucm.es
Pasquale De Palo	Secretary	University of Bari, Italy	pasquale.depalo@uniba.it
Jackie Tapprest	Secretary	Animal health laboratory (ANSES), France	jackie.tapprest@anses.fr
Claire Neveux	Industry Rep	Ethonova, France	ethonovaep2i@gmail.com
Kirsty Tan	Young Club	Christian-Albrechts-Universität zu Kiel, Germany	kirsty.tan89@gmail.com

Commission on Insects

Laura Gasco	President	University of Turin, Italy	laura.gasco@unito.it
Anton Gligorescu	Vice-President	Aarhus University, Denmark	angl@bio.au.dk
Christoph Sandrock	Secretary	Research Institute of Organic Agriculture FiBL, Switzerland	christoph.sandrock@fibl.org
David Deruytter	Secretary	INAGRO, Belgium	david.deruytter@inagro.be
Maria Martinez Castillero	Industry Rep	Betabugs, UK	maria@betabugs.uk
Ridmantas Zelionka	Industry Rep	ENTOGAMA, Lithuania	ridmantas@entogama.com
Thomas Lefebvre	Industry Rep	Ynsect, France	thomas.lefebvre@ynsect.com
Marisa Santos	Industry Rep	ThunderFoods, Portugal	marisa.santos@thunderfoods.pt
Francesco Boatta	Industry Rep	Agronutris France	francesco.boatta@agronutris.com
Christophe Trespeuch	Industry Rep	Mutatec France	c.trespeuch@mutatec.com
Sara Bellezza Oddon	Young Club	University of Turin, Italy	sara.bellezzaoddon@unito.it
Cassandra Maya	Young Club	University of Copenhagen, Denmark	casma@nexs.ku.dk
Ilaria Biasato	Young Club	University of Turin, Italy	ilaria.biasato@unito.it
Somaya Naser El Deen	Young Club	Wageningen Livestock Research, The Netherlands	somaya.nasereldeen@wur.nl

Commission on Precision Livestock Farming

Jarissa Maselyne	President	ILVO, Belgium	jarissa.maselyne@ilvo.vlaanderen.be
Francisco Maroto Molina	Vice-President	University of Cordoba, Spain	g02mamof@uco.es
Claire Morgan-Davies	Vice-President	Scotland's Rural College (SRUC), UK	claire.morgan-davies@sruc.ac.uk
Ines Adriaens	Vice-President	KU Leuven, Belgium	ines.adriaens@kuleuven.be
Jean-Marc Gautier	Vice-President	IDELE, France	jean-marc.gautier@idele.fr
Shelly Druyan	Secretary	ARO, The Volcani Center, Israel	shelly.druyan@mail.huji.ac.il
Radovan Kasarda	Secretary	Slovak University of Agriculture in Nitra, Slovakia	radovan.kasarda@uniag.sk
Michael Odintsov	Secretary	Regrowth s.r.l.s, Italy	m.odintsov.vaintrub@gmail.com
Maria-Anastasia Karatzia	Secretary	Research Institute of Animal Science, Greece	karatzia@elgo.gr
Daniel Foy	Industry Rep	AgriGates, USA	d.foy@agrigates.io
Michael Odintsov Vaintrub	Industry Rep	InVento Lab B-Corp, Israel	m.odintsov.vaintrub@gmail.com
Victor Bloch	Young Club	Luke, Finland	victor.bloch@luke.fi
Adrien Lebreton	Young Club	Institut de l'élevage, France	adrien.lebreton@idele.fr

Scientific programme

Session 1. Animal genetic resource management in harsh environments: Current status, challenges and potential advantages

Date: Wednesday 24 April 2024; 15:00 - 17:30
Chair: Ligda / Charvolin-Lemaire

Theatre Session 1

Breed diversity in the Mediterranean region, setting the scene   **25**
G. Leroy, L. van der Giessen, P. Boettcher, R. Baumung

Implementing the GPA: the importance of monitoring the Transboundary breeds in Europe.   **25**
E. Charvolin-Lemaire, D. Tsiokos, E. Sturaro, C. Ligda

The European Regional Focal Point (ERFP) Ex Situ Conservation Working Group: stronger together in the sustainable use of Animal Genetic Resources.   **26**
F. Tejerina, C. Danchin, M. Castellanos

EUGENA - bringing together the nationally designated AnGR gene banks in Europe   **26**
Z. Duchev, F. Tejerina, SJ. Hiemstra

Status of implementation of (EU) 2016/1012 for endangered breeds: Status quo and challenges in Mediterranean countries   **27**
L. Balzar, H. Göderz, J. Wider, C. Danchin, S. J. Hiemstra, M. Spoelstra

Implementing a farmer aid scheme for innovative phenotyping and high-throughput genotyping studies of Cyprus sheep and goats   **27**
G. Maimaris, A. C. Dimitriou, S. Andreou, S. Panayidou, T. Christofi, L. Koniali, P. Savvides, P. Markou, G. Hadjipavlou

Ibero-American Society on the Conservation of the Local Domestic Animal Biodiversity for the Sustainable Rural Development. CONBIAND NETWORK   **28**
J. V. Delgado Bermejo

Fostering cooperation for the management of animal genetic resources in the Mediterranean region   **28**
C. Ligda, E. Sturaro, G. Hadjipavlou, E. Charvolin-Lemaire

Poster Session 1

Biodiversity loss due to the overgrowing in the harsh Mediterranean area of Slovenian karst   **29**
D. Bojkovski, T. Flisar, M. Simčič

Monitoring of population size in small ruminants in Slovenia   **29**
T. Flisar, D. Bojkovski, M. Simčič, A. Cividini

Inbreeding trends and genetic diversity in the population of Ile de France sheep breed in Bulgaria   **30**
Z. Duchev, E. Achkakanova

Session 2. Combining the diversity of genetic resources and farming practices to ensure resilience at different scales, in the Mediterranean and other harsh environments

Date: Thursday 25 April 2024; 9:00 - 11:00
Chair: Hadjipavlou / Rosati / Casasús

Theatre Session 2

Session 3. Novel apiculture and alternative animal species research findings

Date: Thursday 25 April 2024; 14:00 - 16:30
Chair: Ligda / Hadjipavlou

Theatre Session 3

Session 4.   Nutrients, feed, feed additives and product quality in a changing environment

Date: Thursday 25 April 2024; 14:00 - 16:30
Chair: Pinotti

Theatre Session 4

Poster Session 4

Session 5. Climate change adaptation and mitigation strategies at animal, feed production and farming system level

Date: Friday 26 April 2024; 9:00 - 12:00
Chair: Hadjipavlou / Omirou

Theatre Session 5

Poster Session 5

Session 6. Enhancing opportunities and tackling challenges for Livestock Farming Systems in the Mediterranean and less favoured areas: from animal to farm level

Date: Friday 26 April 2024; 9:00 - 11:30
Chair: Poulopoulou

Theatre Session 6

Poster Session 6

Breed diversity in the Mediterranean region, setting the scene
G. Leroy[1], L. van der Giessen[1], P. Boettcher[1], R. Baumung[1]
[1] Food and Agriculture Organization of the United Nations, Vialle delle Terme de Caracalla, 00153 Roma, Italy

With 1497 livestock breeds from 23 species reported by 23 countries in the Domestic Animal Diversity Information System, the Mediterranean basin is host to a wealth of biodiversity for animal genetic resources. The region accounts for 18% of all reported breeds worldwide, and more specifically for 44% of rabbit, 33% of sheep, 30% of goat, and 31% of ass breeds. These breeds are recognized for their ecosystem services, especially the locally adapted and native ones. When it comes to monitoring and in situ conservation of breeds, challenges vary significantly between European and non-European Mediterranean countries. For the latter, the risk status is unknown for more than 73% of breeds (compared to less than 36% for European countries). In contrast, among breeds with known status, more than 69% are considered at risk of extinction for European Mediterranean countries (compared to less than 30% for non-European ones). In terms of cryoconservation, approximately 29% of national breed populations are reported to have cryomaterial collected, with this proportion being higher for European countries (33%) than non-European ones (8%). This underscores the need to support the collection and storage of cryomaterial in all Mediterranean countries. The Mediterranean basin is home to approximately 30 regional transboundary breeds, most of which are small ruminants. Collaborative management of these transboundary breeds could help improve the resilience of the regional livestock production systems in the face of challenges such as climate change in the region.

Implementing the GPA: the importance of monitoring the Transboundary breeds in Europe.
E. Charvolin-Lemaire[1], D. Tsiokos[2], E. Sturaro[3], C. Ligda[4]
[1] Université Paris-Saclay, INRAE, GABI, GIBBS, 78350 Jouy-En-Josas, France, [2] Hellenic Agricultural Organization, RIAS, Paralimni, 58100 Pella, Greece, [3] University of Padova, Agripolis Viale dell'università, 16, 35020 Padova, Italy, [4] Hellenic Agricultural Organization, VRI, Thermi Campus, 57001 Thermi, Greece

Efficient breeding and conservation programmes for livestock breeds with small population size face difficulties due to several reasons, both technical and economical. In this context, the existence of such breeds in two or more countries, could be an opportunity to improve their management. The first Strategic Priority of FAO's Global Plan for Action refers to the characterization, inventory and monitoring of the breeds. DAD-IS /EFABIS is the common tool used by the countries for the above purposes. It includes information on whether a breed is considered as transboundary and classification as Native, Locally adapted and Exotic breeds. The information recorded is used to develop the relevant SDG indicators. An ERFP Ad Hoc Action has been developed on the Transboundary breeds in Europe, as this category of breeds could be an example for the cooperation between countries. The analysis of the data, extracted from DAD-IS shows the current picture in Europe concerning the monitoring of transboundary breeds. The 17% of the breeds in Europe are characterized as transboundary, while the 6% of them are reported only in the region. Furthermore, the 88% of the European Transboundary breeds are « At Risk » or « Unknown » category. The 38% of the breeds under the « Unkown » category, without any population data, reveals one of the main gaps in DAD-IS. This analysis helps to identify the gaps and common errors of classification and to improve data quality and utilisation of DAD-IS/EFABIS.

The European Regional Focal Point (ERFP) Ex Situ Conservation Working Group: stronger together in the sustainable use of Animal Genetic Resources.

F. Tejerina[1], C. Danchin[2], M. Castellanos[1]
[1] Ministerio de Agricultura, Pesca y Alimentación, C, Almagro 33, 28010 Madrid, Spain, [2] Institut de l'Elevage, 149 rue de Bercy, F-75595 Paris, France

The European Regional Focal Point for Animal Genetic Resources (ERFP) is the regional platform to support the conservation and sustainable use of animal genetic resources (AnGR) and to facilitate the implementation of FAO's Global Plan of Action. The tasks of the ERFP are developed by working groups which members are experts in the respective task . The Ex Situ Conservation Working Group (Ex-situ WG) is in charge to facilitate the collaboration and networking of relevant stakeholders in the European region in relation to cryo-conservation and genebanks. Currently, the Ex-situ WG is made up of 33 experts, from 28 different countries and 3 international organizations. The main task of the Ex-situ WG is the development of the European Genebank Network for AnGR (EUGENA). EUGENA is a network of nationally recognized genebanks in European countries. The development was initiated in 2016 and, currently, EUGENA is composed of 14 genebanks which store 2,070,618 samples from 15 different species. Other relevant activities of the Ex-situ WG include supporting countries in the development of genebanks. To achieve this objective, various guidance documents have been formulated. These documents encompass developing agreements for the use or acquisition of materials, providing practical recommendations for the establishment of genebanks, and offering guidance on databases for genebank management. Currently, the Ex-situ WG is in the process of developing guidelines with recommendations for the design of national animal health derogations for materials intended to be stored in genebanks in collaboration with the European Union Reference Centre for Endangered Animal Breeds.

EUGENA - bringing together the nationally designated AnGR gene banks in Europe

Z. Duchev[1], F. Tejerina[2], SJ. Hiemstra[3]
[1] Institute of Animal Science – Kostinbrod, Agricultural Academy, Pochivka stn, 2232 Kostinbrod, Bulgaria, [2] Ministerio de Agricultura, Pesca y Alimentación, C/ Almagro, 33, 28071 Madrid, Spain, [3] Wageningen University & Research, Centre for Genetic Resources, the Netherlands (CGN), P.O. Box 338, 6700 AH Wageningen, Netherlands

The European Regional Focal Point for Animal Genetic Resources (ERFP) has established the European Genebank Network for Animal Genetic Resources (EUGENA) to support the conservation and sustainable use of AnGR in Europe and to improve the efficiency of developing ex situ in vitro collections. The network consists of genebanks, officially recognized by their respective national authorities as repositories for ex situ conservation. A Steering Board, composed by one representative of each member country, coordinates the activities of EUGENA in order to implement its objectives. By the end of 2023, there are 14 member gene banks, hosting more than two million samples of semen, embryos, hair, blood, DNA, somatic cells, ovarian tissue, stem cells and primordial germ cells. With the time the network has grown not only in number of samples, but also in number of represented species, including ass, cattle, chicken, dog, duck, goat, goose, guinea fowl, horse, pig, pigeon, rabbit, sheep, turkey and even honey bee. The uniform data about these collections are present in the EUGENA Portal, which also shares data with the Domestic Animal Diversity Information System of the Food and Agriculture Organization of the United Nations in order to facilitate the combination of ex situ and in situ conservation strategies. EUGENA supports the countries in monitoring the SDG indicator 2.5.1b, promotes the harmonization of acquisition and access terms for ex situ conservation and facilitates a quality improvement of the genebanks in European countries.

Status of implementation of (EU) 2016/1012 for endangered breeds: Status quo and challenges in Mediterranean countries

L. Balzar[1], H. Göderz[1], J. Wider[1], C. Danchin[2], S. J. Hiemstra[3], M. Spoelstra[3]
[1] Bundesanstalt für Landwirtschaft und Ernährung, Deichmanns Aue 29, 53179 Bonn, Germany, [2] Institut de l'Élevage, 149 Rue de Bercy, 75012 Paris, France, [3] Wageningen University & Research, Droevendaalsesteeg 4, 6708 PB Wageningen, Netherlands

Based on the EU Regulation 2022/2077, the European Commission designated a consortium for the establishment and implementation of the new European Union Reference Center for Endangered Animal Breeds led by Wageningen University and Research. Partners in this consortium are the Institut de l'Élevage and the Federal Office for Agriculture and Food. The centre started its two-year work programme on 1st January 2023. One of the main actions in 2023 was a European wide survey and mapping process to show the status of implementation of Regulation (EU) 2016/1012 for endangered breeds. The status of implementation of the Regulation concerning breeding programmes for endangered breeds and the special derogations in those programmes were analysed. The survey also focussed on differences between species, countries, their respective policies and procedures at national level, and aimed to identify challenges and obstacles indicated by breed societies and/or national competent authorities.Mediterranean breed societies from France, Spain (including its islands) and Slovenia took part in the survey. Furthermore, National Competent Authorities for Animal Breeding and National Coordinators for AnGR from nine Mediterranean countries also participated.The presentation will give a detailed overview of the submissions of Mediterranean countries and will analyse their special characteristics and differences with Non-Mediterranean countries.

Implementing a farmer aid scheme for innovative phenotyping and high-throughput genotyping studies of Cyprus sheep and goats

G. Maimaris[1], A. C. Dimitriou[1], S. Andreou[1], S. Panayidou[1], T. Christofi[1], L. Koniali[1], P. Savvides[1], P. Markou[1], G. Hadjipavlou[1]
[1] Agricultural Research Institute, Animal Production, P.O. Box 22016, 1516 Lefkosia, Cyprus

A beneficiary Aid Scheme through the Cyprus Resilience and Reform Plan was approved for supporting new phenotyping technology implementation and genomic analyses of local Cyprus Chios sheep and Damascus goats in private farms. It was initiated in 2022 with funding from the EC-NextGenerationEU, under Agricultural Research Institute (ARI) coordination. The Scheme is connected with the national research project AGRICYGEN and aims to upgrade the sheep and goat farming sector in Cyprus by granting targeted subsidies to sheep and/or goat breeders to pursue advanced recording practices, improved reproductive and overall livestock and breeding unit management on farm, as well as ARI-led genetic evaluation services. The long-term goal of AGRICYGEN and the Aid Scheme is to implement research outcomes to achieve advanced genetic improvement in a considerable number of animals from the studied breeds by 2026, resulting in significant increase in farm productivity, mainly in terms of milk production. Commencement of three pillars of the aid scheme has been successful within 2023, with about 1.5 million euros provided as subsidies to selected beneficiaries, and so far, more than 5000 animals from private flocks being included in the ARI pipeline for genomic evaluations. Findings from the initial stages of project implementation are promising and signify the importance of stakeholder engagement in the initial stages of applied research efforts to promote the advancement of the sheep and goat sector in semi-extensive Mediterranean systems, such as the one predominantly present in Cyprus.

Ibero-American Society on the Conservation of the Local Domestic Animal Biodiversity for the Sustainable Rural Development. CONBIAND NETWORK

J. V. Delgado Bermejo[1]
[1] University of Córdoba, Genetics, C

The meeting between two worlds happen in the XVth Century with the arrival of Columbus to the American continent supposes a complete revolution for the domestic animals taking part of the agrobiodiversity of those times. Iberia had a starring role in the process, for this reason in 1999 research groups of these countries created an excellence network where 6 Latin American countries were involved, the purpose was the animal diversity in this cultural context in both sides of the Atlantic. The initial funding come from the Iberoamerican Program of Science and Technology for the Development Program. This network was continuously growing, when finished the CYTED funding in 2006 also involving new countries out the Ibero-America, such as France, Italy, and Germany, reaching today the 23 partnerships. The main objectives of CONBIAND are the study of the animal biodiversity, the traditional management systems, the original products of the local breeds, and finally the social and ecological impacts of the breeds and systems. These objectives are pursued with some internal structures such as TRANSIBER, dedicated to the family back-ground production, GASTRIBER focused in the recuperation of traditional disses based on local products, the FARMER Forum for the transference between the sector and the Science. Finally the CONSORTIA for the genetic diversity studies for all the species, showed a wide scientific production about charactetization, genetic relationships and diversity.

Fostering cooperation for the management of animal genetic resources in the Mediterranean region

C. Ligda[1], E. Sturaro[2], G. Hadjipavlou[3], E. Charvolin-Lemaire[4]
[1] Hellenic Agricultural Organization, Veterinary Research Institute, Thermi Campus, 57001 Thessaloniki, Greece, [2] University of Padova, Agripolis - Viale dell'università, 16, 35020 Padova, Italy, [3] Agricultural Research Institute, P.O. Box 22016, 1516 Lefkosia, Cyprus, [4] Université Paris-Saclay, INRAe, AgropParisTech, GABI, GIBBS,, 78350 Jouy-en-Josas, France

The scope of this work is to provide some ideas that could foster cooperation and exchange on the management of animal genetic resources in the Mediterranean region. The presentation is based on the experience of the ERFP WG Documentation and Information. Its activities focus on approaches to improve the documentation and monitoring of Animal Genetic Resources (AnGR) and support the cooperation within Europe. The experience of the WG since 2011, in connection with recent developments (GENRES BRIDGE project and the establishment of the EU Reference Centre for Endangered Animal Breeds), provide the basis for moving forward. Recent outputs, as the development of a tool to evaluate risks and trends based on socio-economic and environmental parameters, indicators for monitoring status and trend of honeybees and pollination ecosystem services, monitoring of trans-boundary breeds in Europe (joint action with in-situ and ex situ WGs) can be of broader interest. The new era requires to extend cooperation, linking territories facing similar challenges, across geographical borders. Building networks of scientists, breeders, local actors across the Mediterranean basin can help bridge the gaps between countries and improve common understanding. This process is not straightforward; it requires forward thinking and anticipation of future challenges and continuous collaboration to effectively respond to current and emerging social and environmental issues.

Biodiversity loss due to the overgrowing in the harsh Mediterranean area of Slovenian karst
D. Bojkovski[1], T. Flisar[1], M. Simčič[1]
[1] Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, 1000 Ljubljana, Slovenia

The total karst landscape covers a third of the Slovenian landscape and is considered one of the oldest cultural landscapes in Europe. The area of Mediterranean karst covers 58ha and is rich in biodiversity. The overgrowth of that area has undergone major changes. While 16.9% of the area was covered with forest in 1787, the proportion of forest cover reached 75 % by 2023. The area has therefore changed from a grassland landscape to a forest landscape. The decline in livestock size, the reduction of pastures and the intensification of agricultural activity can be observed in Mediterranean Europe, and the Slovenian Karst is no exception. The consequences of such changes are a loss of biodiversity and species diversity. The abandonment of livestock grazing in this area has led to the spread of shrubs and forest cover and consequently a devastating fire in 2022 which destroyed 3600 ha of forest and other land. Increasing livestock size in this area through the CAP should be prioritised. Breeders of local breeds adapted to the local pastures and the harsh environment of the Mediterranean karst could be an effective tool to prevent forest fires and preserve biodiversity. Using the selected case study, we have analysed the overgrowth in the Natura 2000 area of the Mediterranean Karst in Slovenia in the context of the abandonment of livestock farming in this area, the consequences and the proposed policy support for the conservation and management of local breeds. The conservation of local breeds in a combination with the harsh Mediterranean karst would help to overcome degradation of karst ecosystems.

Monitoring of population size in small ruminants in Slovenia
T. Flisar[1], D. Bojkovski[1], M. Simčič[1], A. Cividini[1]
[1] University of Ljubljana, Biotechnical Faculty, Department of Animal Science, Jamnikarjeva 101, SI-1000 Ljubljana, Slovenia

The paper presents the monitoring, population status and information flow of AnGR diversity in small ruminants in Slovenia. Monitoring activities are undertaken through the Register of breeds with zootechnical assessment within the national program for conservation of AnGR. Population data, such as the number of purebred females and males as well as population size estimates, are important for identifying trends and future management and conservation priorities and provide a basis for assessing the threat status of the breed. Within national program for conservation of AnGR following data are obtained from the herdbook: the population size, the number of purebred animals, the geographical distribution of farms, the rate of inbreeding, and the percentage of purebred matings. The additional information on population size is provided by the Department for Animal Identification and Registration and Information Systems (SIRIS) in the Ministry of Agriculture, Forestry and Food. Individual registration for small ruminants was introduced at the beginning of 2023. We compared and analyzed the population size data in herdbook and SIRIS for local breeds of small ruminants. The largest differences are found in two of the most widespread sheep breeds – the Improved Jezersko-Solčava and the Jezersko-Solčava sheep. The reliability of the data in the herdbook is certainly higher, as the identification and traceability of AnGR is the responsibility of the breeding programme. The most important sources of information are therefore the officially approved breeding organisations that carry out the activities specified in the breeding programmes. However, additional source is information on the size of the potential gene pool.

Inbreeding trends and genetic diversity in the population of Ile de France sheep breed in Bulgaria

Z. Duchev[1], E. Achkakanova[1]
[1] Institute of Animal Science–Kostinbrod, Agricultural Academy, Pochivka, 2232 Kostinbrod, Bulgaria

The first animals from the French meat breed Ile de France were imported in Bulgaria in 1968, mainly for testing and acclimatization. Since 1973, two more imports were done, followed by a long period of closed selection. In 2005, the Association for breeding of Ile de France sheep in Bulgaria was established, and its breeding programme got approved in 2006. Here we report the assessment of the pedigree quality, the changes in the population structure, rate of inbreeding and generation interval. The pedigree data included 25404 animals. Animals born in 2019-2022 were used as reference population (8407 individuals). The pedigree quality is relatively low. Although the average pedigree completeness index for one generation since 2019 is close to 100%, for 3 generations it is between 48.1% and 72.4%. The average number of equivalent complete generations is 2.2. This is a result of non-uniform way of recording the animal identifications and recent gaps in the pedigree. The population size is steadily increasing, from 885 in 2005 to 8296 animals in 2023. The average age of sires is 3.1-3.4 years, higher for the dams: 3.1-3.8. The calculated inbreeding coefficient for 88% of the reference population was less than 5%, which is probably underestimation, due to the pedigree quality. Less than 1% of the animals have inbreeding coefficient over 25%, which should be considered in the management of the breeding programme. The rate of inbreeding went up from 0.53% in 2019 to 1.47% in 2022, and this can be partially explained by the accumulation of pedigree data. The generation interval for the whole population is 3.8, and in the reference population, it vary between 4.3 and 4.5 years.

Genetic resources of sheep in Slovakia

J. Tomka[1], J. Huba[1], I. Pavlík[1]
[1] NPPC - Research Institute for Animal Production Nitra, Hlohovecká 2, 95141 Lužianky, Slovakia

The period of Valachian colonization brought and boosted sheep breeding, especially in hilly and mountainous regions of Slovakia. Despite the long history of sheep breeding, population size and number of registered females have decreased in the last few years. This is evident also in traditional breeds including Improved Valachian (IV) and Tsigai (C) sheep. Their population size decreased by 27% (IV) and 30% (C) between 2010 and 2022. Financial support (since 2016) has helped to stabilize the number of registered females. There is also a small endangered population of Valachian sheep in the country. In this case, financial support helped to continually increase the number of registered females (since 2010) as well as the population size. These breeds are mainly kept in hilly and mountainous regions. Their milk production is not competitive with the production of milk breeds and improves only slightly over time. In the second half of the 1990s, crossbreeding with Lacaune and East Friesian sheep started, which resulted in a new breed – Slovak dairy sheep. Data provided by Breeding Services of SR showed, that milk production of the new breed is higher by 50% compared to IV and C. However, this may lead to further loss of traditional breeds. It seems that the solution to maintaining the numbers of traditional breeds lies in recognition of their non-production services. In some cases, farmers have already reported the degradation of pastures by invasive plant species after leaving them without livestock presence. On the other hand, initiatives from the environment and public sectors have been using livestock species to maintain protected areas that were abandoned by farmers. Collaboration between the environment and agriculture is essential to setting optimal conditions and support for existing farmers.

Building ex situ conservation strategy from polish perspective

E. Sosin[1], A. Chełmińska[1]
[1] National Research Institute of Animal Production, Department of Farm Animal Biodiversity Protection and Horse Breeding, Sarego 2, 31-047 Krakow, Poland

In Poland there are 89 breeds/lines and more than 117 k of farm animals covered by the conservation programes. Very first activities on the field of AnGR conservation were conducted in 70. XX century, also on the ex situ conservation area. After more than 30 years of well-organized in situ conservation since a few years more attention has been put on ex situ activities. Strategic documents like European Strategy for AnGR highlighted the role of ex situ methods in full protection of breeds. Other documents like Delegated Regulation 2020/686 facilitate creating new genebanks and use of old material in breeding programmes. In 2014 National Genebank for Biological Material was established and building of ex situ strategy for AnGR has started. Like in many countries, in a case of cattle, where the biotechnological protocols are well known and are well operational AI stations, only system solutions were needed. From 2023 the subsidies for rare breed bulls from Rural Development Programme were running and it was the milestone not only for cattle but also indirectly for other species. Now more financial support can be directed to collecting embryos or other material from different species, e.g. for horses where until now, many institutional and financial obstacles occurred. Moreover, more attention on ex situ conservation during the conferences and meetings with the decision makers caused more interest in ex situ conservation problems and resulted in more projects focused on ex- situ conservation. New methods like cryoconserved or lyophilized stem cells for cattle, sheep, goats, pigs and ducks were implemented. The semen from roosters and drones were collected and trainings of collecting semen from ducks, goose and fur animals were started.

Genome-wide assesment of inbreeding (FROH) in Pag sheep

A. Kasap[1], M. Špehar[2], V. Držaić[1], B. Mioč[1], D. Barać[2], Z. Barać[3], J. Ramljak[1]
[1] University of Zagreb Faculty of Agriculture, Svetošimunska cesta 25, 10000 Zagreb, Croatia, [2] Croatian Agency for Agriculture and Food, Svetošimunska cesta 25, 10000 Zagreb, Croatia, [3] Ministry of Agriculture, Ulica grada Vukovara 78, 10000 Zagreb, Croatia

The study aimed to examine genomic inbreeding with the runs of homozygosity (ROH) in the population of Pag sheep which is a Croatian native dual-purpose breed. ROH methodology is one of the most recommended in the conservation genetic studies, not only due to ability to estimate genome-wide and chromosome-wide inbreeding, but also due to ability to distinguish recent from ancient inbreeding. The results have important practical contribution since they provide the baseline for implementation of the optimum contribution selection (OCS), the strategy that seeks to provide selection progress with minimal loss of genetic variability (initiated by the project OPTI SHEEP, CSF, IP: 2019-04-3559). The study was conducted on 749 genotyped (Ovine 50K SNP BeadChip) animals from 10 flocks, but after quality control, 705 of them retained in the final inferential statistical analysis. The detection of ROH segments having different size was obtained using the PLINK toolset (v1.09), while the estimation of genomic FROH was conducted in R programme (FROH = Σ_i length (ROHi)/Lgenome). Only large ROH segments (>5 Mb) were used to estimate FROH. Individual FROH (>5Mb) ranged from 0.002 to 0.363 with an average of 0.026, while mean flock FROH (>5Mb) ranged from 0.012 to 0.058. In addition to unrevealing the level of genomic inbreeding, another important contribution of the study for conservation of the Pag sheep is development of "pipelines" for calculation and inclusion of FROH in the routine genetic (genomic) evaluation following the basic principles of OSC.

**Genetic and Phenotypic Diversity Assessment of Local Chicken Populations in Algeria:
Insights from the PRIMA SCALA-MEDI Project**

N. Tabet Aoul[1], F. Z. Mahammi[1], S. F. Boudali[1], S. Ayad[2], G. Zitouni[3], S. B. S. Gaouar[2], and the SCALA-MEDI consortium[1]
[1] *Laboratoire de Génétique Moléculaire et Cellulaire, Département de Génétique Moléculaire Appliquée,
USTO-MB, BP 1505, El M'naouer, 31000 Oran, Algeria,* [2] *Applied Genetic in Agriculture, Ecology and Public
Health Laboratory,, SNV/STU, , university of Tlemcen, 13000 Tlemcen, Algeria,* [3] *Institut Technique des Elevages, Birtouta, 16000 Alger, Algeria*

The PRIMA SCALA-MEDI project aims to assess the genetic and phenotypic diversity of local chicken breeds
in the Mediterranean region and examine their adaptability to challenging environments. The workplan in Algeria
comprises two steps: (1) characterizing the farming systems and the diversity of local populations, (2) establishing
a breeding center with two local lines of contrasted origins. For step 1, field surveys were conducted over 100
farms distributed across five distinct agroecological and climatic zones in the country. Farming methods as well
as morpho-biometric characteristics and zootechnical performance were recorded. Results suggested that farming
is essentially done by women and showed a large phenotypic variation among birds. Blood samples were collected for 200 females and 50 males. Furthermore, 100 local chickens were added from a closed herd maintained
at "ITELV". DNA samples were genotyped with the IMAGE001v2 DNA array (around 10k SNPs). Fst values
and Principal Component Analysis (PCA) distinguished animals of ITELV from all village chickens. There was
a rather high level of diversity and a low level of genetic differentiation of local chickens among zones. Recent
crossbreeding with imported chickens was detected in Eastern villages. These data are guiding the sampling of
founder animals for the breeding centers.

The breeders' associations - the future of native breeds

E. Sosin[1], A. Chełmińska[1], B. Smulska[1]
[1] *National Research Institut of Animal Production, Department of Farm Animal Biodiversity Protection and
Horse Breeding, Sarego 2, 31-047 Krakow, Poland*

National Strategy for the Sustainable Use and Protection of Farm Animals in Poland includes activities aimed
at promotion and popularization of native breeds. Breeders associations dedicated to specify breeds are natural
entities involved in promotion and popularization process. In case of native breeds of cattle and horses covered
by conservation programs in Poland, breeders' associations are well represented. In the case of horses covered
by conservation programs, all breeding work is managed by the Polish Horse Breeders Association, within which
there are 16 district associations that cooperate with the Association. In addition, there are 13 registered horse
breed associations, including 5 dedicated to native protected breeds. In the case of cattle, all breeding work is
managed by the Polish Federation of Cattle Breeders and Milk Producers. Currently, there are 4 associations dedicated to the specific breeds: 1 to White-backed, 2 to Polish Red and 1 to Simmental which is not covered with the
conservation programme. The oldest – cattle breeders association, for Polish Red, was established in 1874. Two
of the cattle breeds enrolled in conservation programmes still need the assistance. It should be emphasized that
breed associations do a gigantic job in the area of promotion of native breeds, their utility, historical and cultural
value, as well as products maintained from them. An important aspect of disseminating this knowledge is also
a continuous dialogue with the public, especially in the field of the negative impact of farm animals on climate
change. Although the native breeds of horses and cattle are represented in great extent there is need to establish
the breeders association for those breeds which does not have representation.

Transhumance and local breeds, the ad hoc action of the ERFP
F. Pilla[1]
[1] University of Molise, Agricultural Environment and Food, Via De Sanctis, 86100 Campobasso, Italy

Transhumance, a practice characterized by the seasonal and systematic movement of livestock along established routes to optimize pasture utilization, is a globally prevalent production system. Within Southern Europe, two primary transhumance modalities are distinguished: the long-range, involving the transfer of livestock between winter and summer pastures in disparate geographical areas, and the short-range, entailing movements from valley to high-altitude pastures. This system is predicated upon the harmonious integration of human, animal, and environmental elements, yielding not only sustenance but also shaping landscapes, fostering knowledge, preserving traditions, and forging regional identities. Significantly, transhumance has facilitated the selection and preservation of livestock breeds adapted to its exigencies. Acknowledging its cultural significance, UNESCO recently designated transhumance as intangible cultural heritage of humanity. Moreover, there is a growing trend of leveraging transhumance for tourism purposes. In light of its multifaceted benefits, transhumance emerges as a pivotal strategy for the in-situ preservation and sustainable utilization of local breeds. Accordingly, the European Regional Focal Point for Animal Genetic Resources has initiated a targeted initiative focused on fostering collaboration among breeders, academia, and institutions to inventory best practices, discuss conservation strategies, and harness the tangible and intangible values of transhumance for the conservation of animal genetic resources.

Precision livestock farming to increase the resilience of Mediterranean grazing systems
F. Maroto Molina[1], E. Padrón Tejera[1], M. J. García García[1]
[1] University of Cordoba, Animal Production, Rabanales Campus. Madrid-Cadiz Rd. km 396, 14014 Cordoba, Spain

Grasslands play a key role in Mediterranean food production, but they also provide many environmental ecosystem services, such as carbon sequestration, water supply and erosion control. These services are crucial for adapting to and mitigating climate change, to which Mediterranean systems are particularly vulnerable. Adequate provision of environmental services depends on grazing management, which is based on four principles: animal species, stocking rate, timing of grazing and spatial distribution. In terms of livestock species and stocking rates, the last few decades have seen a substitution of small ruminants by cattle and an increase in livestock numbers driven by market forces, making the appropriate management of the spatio-temporal components of grazing even more important. Precision livestock farming tools, particularly GNSS tracking, can help farmers make decisions to improve grazing management. In fenced paddocks, animals tend to congregate near water throughs and avoid stepper slopes, which can lead to overgrazing in some areas, while leaving other areas understocked. Optimising livestock distribution by monitoring animal locations in real time can help make Mediterranean grazing systems more resilient, for example by allowing better use of grazing areas that animals tend to avoid. On the other hand, there is genetic variability in the spatial use of pasture by grazing animals. These behavioural traits are not included in current breeding programmes because the phenotypes are difficult to measure, but PLF may allow the selection of environmental adaptation traits. The opportunities and challenges of PLF monitoring to increase the resilience of Mediterranean grazing systems are discussed in this plenary.

Towards sustainable and innovative Mediterranean pastoral systems

A. Ragkos[1]
[1] Hellenic Agricultural Organization - DIMITRA, Agricultural Economics Research Institute, Kourtidou 56-58, 11145 Athens, Greece

Mediterranean pastoral systems exhibit significant diversity, with a gradient of intensification, involving numerous species, breeds, products and different uses of labor and capital. These systems provide a wide range of ecosystem services and play multiple roles towards sustainable and inclusive development: biodiversity, culture, income and employment in marginal areas with resources in risk of abandonment. "Pastoral food" has many of the characteristics that the EU Circular Economy Action Plan calls for (high-quality, functional, safe, efficient and affordable). However, pastoral farms face challenges regarding their sustainability. Lower yields and productivity, excessive use of external resources, dependence on subsidies, low levels of farmer organization lead to abandonment and limited access to markets with an increase in intensive production. Modernization has altered their land-livestock-labour configuration, including gender and generational cleavages. This presentation outlines pastoral Innovations and Business Models (IBM) that have been identified within PASTINNOVA project in 12 different Mediterranean countries and deal with value chains and products; technology and management; organizational aspects; cooperation and training. As part of the co-creation approach of the project, Regional Living Labs have been put into place to upscale these IBM and promote their adaptation to different Mediterranean territories. Specific focus is given on the analysis of the economic performance of pastoral systems and on the role of enabling policies that will account effectively for the specific characteristics of pastoral systems and people. PASTINNOVA is part of the PRIMA Programme, supported by the European Union's HORIZON 2020 Research and Innovation Programme

Breeding sheep fit for the future: how do we make them more resilient?

J. Conington[1]
[1] SRUC, Agriculture & Land-based Engineering, W Mains Rd, EH9 3JG Edinburgh, United Kingdom

Breeding sheep to be more resilient is now the focus for several sheep breeding programmes internationally. Being able to reproduce and deliver meat, milk and wool from sheep despite environmental, nutritional and disease challenges is desirable to ensure they are fit for the future [1], including sheep that can maintain production whilst emitting lower levels of greenhouse gas emissions (GHG), or are more feed-efficient. Breeding programmes have largely focussed on production-only traits including those measured on lambs (e.g. growth rate and carcass traits) and those measured on breeding ewes (e.g. aspects of fertility and milk production characteristics) and a combination of the two for management metrics (such as Kg lamb weight reared / Kg ewe live weight). These underpin sheep production system efficiency for profitable sheep farming, yet with high costs associated with sheep production, the focus is on the identification of animals that save costs, such as that of labour input. This can be achieved by identifying animals that need extra attention for disease management, dealing with problems at around parturition and offspring survival, amongst others. Specifically, breeding for resistance to endemic diseases [2] leads to the reduction in handling occasions and treatment requirements. Including the new definitions of resilience such as deviations in expected production levels and reaction norm slopes, help to identify more resilient animals particularly if disease traits are not included in the selection index [3]. 1.Sánchez-Molano et al., 2019. BMC Genet. 20,84 https://doi.org/10.1186/s12863-019-0787-z ; 2.Mucha, et al., 2022. Animal 16: 3 100456. https://doi.org/10.1016/j.animal.2022.100456 3.Berghof et al., 2019. Front. Genet. 9 https://doi.org/10.3389/fgene.2018.00692

Bison: wildlife preservation, culture and farming

Y. Montanholi[1]
[1] Universidad De La Republica, Faculdad de Agronomia, Av. Gral. E. Garzón 780, Montevideo, Uruguay

North America Bison (Bison bison subsp. bison or subsp. athabascae) are wildlife currently utilized as indigenous livestock and commercially raised for meat and fiber. With a Canadian bison herd of 120,000 animals and 975 national producers, the production of bison continues to evolve, supporting the maintenance and re-introduction of animals in their natural habitat and assisting indigenous communities to re-establish their herds. While bison can be successfully managed on rangelands and in feedlot settings, this species is adversely impacted by excessive handling. As a result, limited opportunities exist to routinely access animal performance in commercial settings. The development of remote technologies to assist with husbandry practices of grazing livestock is of paramount relevance for the bison industry. This is particularly due to the inherent peculiarities of herding, managing, and monitoring bison safely and towards optimal production. Therefore, this study aimed to investigate, via literature review and consultancy with stakeholders, non-contact and/or remote sensing technologies that could be adopted in bison farming. The main technologies considered were visual, thermal and LiDAR imaging, automated weigh scale, GPS collars, drone monitoring, radio-transmitting, and identification ear tags. With the utilization of these sensors, producers may be able to monitor the growing performance, health status and welfare of the bison without interfering with their routine, therefore, avoiding major distresses, loss of productivity and even death in this species. While the basic instrumentation is commercially available for the applications indicated, it is important to note that considerable work needs to be done for adjusting their utilization in bison farming. The development of "sensing stations" where several assessments could be made concomitantly (i.e., imaging, body weight, etc.) is also encouraged. A highly desirable technology still not available is an approach for assessing fatness remotely. Currently, bison is sold only by weight without considering the degree of fatness of the animals, which is a major issue for producers. Technology uptake should be supported by demonstrations and extension service.

Camel hair-types - preliminary results from a phenotype-genotype analysis

S. Bruno[1], E. Ciani[1], K. M. Akbar[2], H. Alhaddad[2]
[1] University of Bari, Biosciences, Biotechnologies and Environment, Via Orabona 4, 70125 Bari, Italy, [2] Kuwait University, Department of Biological Sciences, NA, NA Kuwait, Kuwait

The dromedary coat exhibits variations in color, length, and shape. We present here preliminary results of a genotype-phenotype analysis on hair crimp, contrasting "straight" vs. "wavy" phenotypes using SNP genotypes from the Illumina CamelSNP60 array. The case-control study resulted in a significant signal on chromosome 3, in the interval where HOMER1, TENT2 and CMYA5 are annotated. TENT2 is known to be associated with trichothiodystrophy, a disease characterized by altered structural hair conformation. HOMER1 has been shown to play different roles in Ca++ signaling, mainly via the PI3-AKT-mTOR pathway. CMYA5 is one of the proteins forming the myospryn complex, which play a role in the assembly of ryanodine receptor clusters, with ryanodine receptors channels having a pivotal function in cellular Ca++ signaling. Interestingly, Ca++ signaling has been recently associated with curly hair in Mangalitza pigs. In addition, differential gene expression in curly vs. wavy haired goats highlighted a significant enrichment in the PI3K-AKT signaling pathway. Furthermore, an involvement of Ca++ signaling in hair morphogenesis has been also provided in mice, where TRPV3, a Ca++ flux pathway, tightly associated with the TGF-α/EGFR signaling complex orchestrating keratinocyte terminal differentiation and the occurrence of hair phenotypes similar to the wavy hair and curly whiskers phenotype of spontaneous loss-of-function mouse mutations in TGF-α and in the EGFR genes. Although preliminary, the above results, taken together, point to a possible biological relevance for the identified genome region that deserve further association study through larger sample set availability of phenotyped animals.

Patterns of linkage disequilibrium in wild and farmed European seabass and gilthead seabream Mediterranean populations

J. Fernández[1], R. López de la Torre[1], A. Fernández[1], M. Saura[1], G. Mir-Arribas[1], C. S. Tsigenopoulos[2], B. Villanueva[1]
[1] INIA-CSIC, Animal Breeding, Ctra. Coruña Km 7,5, 28040 Madrid, Spain, [2] HCMR, Thalassocosmos, 71500 Gournes, Crete, Greece

Patterns of linkage disequilibrium (LD) may help to detect selection signatures due to natural (local adaptations) or artificial selection (regions controlling important commercial traits). Recent and historical effective population size (Ne) can be also estimated from LD data. Thus, LD knowledge is of great importance in the management of populations. LD patterns of wild and farmed populations of sea bream (Sparus aurata) and sea bass (Dicentrarchus labrax), the principal marine fish species farmed in the Mediterranean, were evaluated and compared. Populations analysed included 11 wild sea bream and 9 sea bass populations and 12 farmed sea bream and 15 sea bass populations, distributed throughout the Mediterranean Sea. Samples were genotyped with a SNP chip (~60K), combined for both species (~30K for each species). The measure of LD used was the $r2$ statistic (the squared correlation between allele frequencies of pairs of SNPs). The results showed that, for any distance, LD levels were higher in sea bass than in sea bream. However, no clear differentiation between wild and farmed populations for both species could be observed. Even so, LD patterns were different with great variation between the populations of both species. These findings indicate that wild populations show no indications of local adaptations, which is in agreement with previous studies that found little genetic differentiation between these populations. Farm populations exhibit larger heterogeneity of LD patterns but this seems to be unlinked to differential breeding objectives in each species/breeding company.

DonKeyWorld: a comprehensive study on Equus asinus from biodiversity management to milk nutraceutical and technological properties

M. Ablondi[1], S. Chessa[2], E. Ciani[3], C. Cipolat-Gotet[1], V. Landi[4], F. Tiezzi[5]
[1] University of Parma, Veterinary Sciences, Strada del Taglio 10, 43126 Parma, Italy, [2] University of Turin, Veterinary Sciences, Largo Paolo Braccini 2, Grugliasco, 10095 Torino, Italy, [3] University of Bari, Biosciences, Biotechnologies and Environment, Via Orabona 4, 70125 Bari, Italy, [4] University of Bari, Veterinary Medicine, Strada Provinciale Casamassima, KM. 3 Valenzano, 70010 Bari, Italy, [5] University of Florence, Agriculture, Food, Environment and Forestry, Piazzale delle Cascine18, 50144 Firenze, Italy

The overarching goal of the "DonKeyWorld" project is to generate fundamental knowledge on the Italian donkey sector potentially impacting worldwide. To reach this overall goal, the main gaps still present in the donkey sector will be addressed. Those gaps can be summarized as follows: I) difficulty to manage genetic/genomic variability due to the absence of a genotyping platform with known polymorphic markers (SNP, Single Nucleotide Polymorphism) for this species, II) lack of a comprehensive characterization of donkey milk towards its nutraceutical and technological properties on large sample size. Thus, DonKeyWorld will tackle three specific objectives to unravel the crucial points where interventions are needed to reinforce the strengths of the donkey sector, notably (i) SNP discovery, via genotyping by sequencing analysis of 160 animals from 8 Italian breeds; (ii) characterization of donkey milk from at least 3 breeds, with phenotypes collected from fresh and powder milk samples together with genotype data of the sampled animals; (iii) 16S analysis of buccal and fecal samples from 80 foals for assessing which milk characteristics might have a beneficial or antagonistic effects towards foal's health in terms of microbiota.

Is beekeeping sustainable in the Mediterranean under Climate Change?

J. Filipi[1], N. Adjlane[2], L. Charistos[3], Š. Kolega[1], M. Kovačić[4], F. Requier[5], C. Riva[5], F. Hatjina[3]
[1] University of Zadar,, Department of Ecology, Agronomy and Aquaculture, Ulica Mihovila Pavlinovića bb,, 23000 Zadar,, Croatia, [2] Faculty of Sciences,, University of Boumerdes, Department of Agronomy, Route de la Gare Ferroviaire,, 35000 Boumerdes,, Algeria, [3] ELGO 'DIMITRA',, Department of Apiclture, Nea Mouda-nia,, 63200 Nea Moudania,, Greece, [4] Faculty of Agrobiotechnical Sciences,, Dept. of Animal Production and Biotechnology, Ul. Vladimira Preloga 1,, 31000 Osijek, Croatia, [5] Université Paris-Saclay, CNRS, IRD,, UMR Évolution, Génomes, Comportement et Écologie, 12 route 128,, 91190 Gif-sur-Yvette,, France

The overall objective of the PRIMA project 'SafeAgroBee' is to contribute to adaptation and mitigation of the effects of climate change and other drivers negatively influencing the sustainability and the resilience of the agricultural system in the Mediterranean basin, ensuring the income of farmers and beekeepers and of food security. Under the umbrella of the 'SafeAgroBee' the adaptation of specific honey bee local populations from Algeria, Croatia, France and Greece are tested in their area of origin as well as in a second area of the same country, with different environmentalconditions, and under conventional or organic management systems. The year-round performance of the populations, as well as the prevalence of diseases and parasites is of a major importance. The same populations are tested against Suppressed Mite Reproduction (SMR) and Recapping (REC) behavior to identify indicators of possible resistance to varroa. Furthermore, the capacity of these populations to cope with the lack or abundance of proteinic food supplements during dry seasons is also under investigation. By evaluating climatic influence on prevalence of diseases and honey bee queen performance we will produce guidelines to ensure the resilience of beekeeping in different climatic and pasture regions.

Future climate assessments in Mediterranean basin countries and possible impact on bee-keeping and pollination requirements of crops

K. Tolika[1], F. Requier[2], A. Varnava[3], M. Stavrinides[3], G. Sperandio[3,4], G. Gilioli[5], A. De Franscesco[5], A. Simonett0[5], F. Hatjina[6]
[1] Aristotle University of Thessaloniki, School of Geology,, Department of Meteorology and Climatology,, Meteorological Observatory,, 54124 Thessaloniki,, Greece, [2] 2Université Paris-Saclay, CNRS, IRD,, UMR Évolution, Génomes, Comportement et Écologie,, 12 route 128,, 91190 Gif-Sur-Yvette,, France, [3] 3Cyprus University, of Technology, 30 Archbishop Kyprianos Street,, 3036 Limassol,, Cyprus, [4] Marche Polytechnic University,, Department of Agricultural, Food and Environmental Sciences,, Via Brecce Bianche, 60131 Ankona,, Italy, [5] University of Brescia,, DICATAM,, Via Branze 43,, 25123 Brescia,, Italy, [6] ELGO 'DIMITRA,, Department of Apiculture, Nea Moudania,, 63200 Nea Moudania,, Greece

Climate change is suspected to affect honey bees (Apis mellifera) with disturbances in food resource (nectar and pollen) availabilities associated to temperature and lack of precipitation. In this work we aim at assessing the influence of climate on landscape structure, land use, and on both honey bees and wild pollinators. The assessment was performed using an up-to-date Regional Climate model considering a baseline climatic scenario (1981-2000) and two future scenarios (2041-2060 and 2081-2099). Data used were daily precipitation and daily maximum and minimum air temperature. By evaluating the influence of climate on pollination efficiency, biodiversity of bees, prevalence of diseases, honey bee queen performance and honey yields we will produce guidelines to ensure the income of farmers, the resilience of the agroecosystems. Furthermore, the results will allow the assessment of the role of climate on i) the distribution and availability of feed sources for Apis and non-Apis bees, and ii) honey bee health and productivity. The results are part of the PRIMA- SafeAgroBee project

Diversity of breeding goals and practices of organic and non organic beekeepers: the cases of beekeepeers from selection groups in southern France

A. Lauvie[1], J. Labatut[2], O. Eck[3], C. Lepagnol[4]
[1] INRAE UMR SELMET, 2 place Viala, 34060 Montpellier Cedex 01, France, [2] INRAE UMR LISIS, UMR GABI, Domaine de Vilvert, 78530 Jouy en Josas, France, [3] AgroParisTech M2 student, place de l'agronomie, 91123 Palaiseau, France, [4] Ecole d'ingénieurs de Purpan student, Voie du TOEC, 31076 Toulouse, France

In France, a number of local breeding initiatives led by small groups of beekeepers have emerged in the last decade. Their aim is to better adapt bees to their farming conditions. Frequently, beekeepers with different farming systems, including organic beekeepers, are gathered within the same local breeding groups. Our aim is to analyse the diversity of practices and selection objectives of beekeepers from local groups. This allows us to discuss how collective breeding choices can be suited to this diversity of systems, including organic beekeeping. We conducted semi-structured interviews (face to face, by phone or videoconference) with beekeepers in four selection groups in Southern France. Nineteen interviews were conducted by the second to last author in 2022 and twenty one interviews by the last author in 2023. These interviews revealed that even if practices, breeding objectives, and their rankings are diverse, the main objectives are shared by both organic and non organic beekeepers. There are many variables that play a role to explain beekeepers' breeding objectives (workload, work organization, targeted types of honey, economic factors, limiting inputs, values etc.). Three of the groups concerned by the interviews were situated (or partly situated) in the Mediterranean area, and shared features such as the strong reliance upon wild vegetation for production. Extending this research to include other geographical areas would diversify the situations studied.

Ewes' diets affect fresh cheese texture parameters

M. R. Marques[1], A. T. Belo[1], J. M. B. Ribeiro[1], C. C. Belo[1], J. Almeida[1,2]
[1] INIAV IP, Pólo de Inovação da Fonte Boa, Av. Professor Vaz Portugal, 2005-424 Vale de Santarém, Portugal,
[2] CIISA/FMV/AL4AnimalS, Av. Universidade Técnica, 1300-477 Lisboa, Portugal

The quality of raw sheep milk depends on feeding management. It determines the milk's physicochemical properties and impacts the cheesemaking process and cheese's quality. The use of silage in sheep diets is viewed with mistrust, mainly because it is believed to impair raw milk cheese quality. Serra da Estrela ewes were assigned one of the following diet: pasture supplemented with barley and soybean meal (20% CP in the diet); high-quality maize silage supplemented with wheat and soybean meal (13% and 15% CP in the diet). Milk batches' composition [fat, protein, lactose, total solids (TS), and solids non-fat (SNF) contents], and MPC parameters acidity (pH), clotting time (R, sec.), curd firmness (AR), curd firmness after $2{\times}R$ (A2R), curd firmness after 20 (A20) and 40 min (A40), and firming rate (0K20, sec.) were monitored at days 60, 75, 90, and 120 of lactation. Cheeses were produced, and after 24 and 96 hours, weight loss and texture profile analysis parameters (hardness, firmness, fracturability, adhesiveness, cohesiveness, springiness, gumminess, chewiness, and resilience) were determined to reveal the impact of the diets on the characteristics of both milk and cheeses. Diets did not affect the composition of the milk batch or its MPC parameters, however, they did influence all texture parameters ($P<0.001$). Lactation days affects milk contents ($P<0.05$), but not the MCP parameters. However, texture traits changed with lactation days ($P<0.001$), except for springiness, and also changed along refrigeration until 96 hours ($P<0.05$), except for cohesiveness. In conclusion, while ewes' diets did not affect milk traits, they impacted the texture traits of fresh cheese. Funding: Project PTDC/CVT/112054/2009 funded by FCT.

Species comparison (cows and goats) regarding fat metabolism in response to olive cake feeding

O. Tzamaloukas[1], AL. Hager-Theodorides[2], M. C. Neofytou[1], D. Sparaggis[3], D. Miltiadou[1]
[1] Cyprus University of Technology, Department of Agricultural Sciences, Biotechnology and Food Science, 30 Arch. Kyprianos Str., 3603 Limassol, Cyprus, [2] Agricultural University of Athens, Department of Animal Science, Iera Odos, 11855 Athens, Greece, [3] Agricultural Research Institute, P.O.Box, 22016 Nicosia, Cyprus

The present study aimed to evaluate the dietary inclusion of ensiled OC on bovine and caprine fat metabolism (milk fat and gene expression) and its possible use as a forage replacement. Twenty-four mid lactating Holstein cows and 72 Damascus goats were fed with iso- nitrogenous and iso-energetic diets containing 0% (OC0), 10% (OC10) or 20% (OC20) of ensiled OC. Milk yield, milk composition and fatty acid (FA) profile were evaluated. At the end of the trials mammary and perirenal tissues were sampled for gene expression analysis using quantitative RT- PCR. Changes in mRNA abundance of selected genes involved in FA synthesis (ACACA, FASN, G6PDH), FA uptake and/ or translocation (VLDLR, LPL, SLC2A1, CD36, FABP3), FA saturation (SCD1) and transcriptional regulation (SREBF1, PPARγ) in mammary and adipose lipid metabolism, were assessed. The results of milk composition indicated that in both animal species milk yield was not affected, while fat yield and fat content was increased in cows and goats, respectively. Moreover, OC feeding improved the FA profile of bovine and caprine milk by significantly decreasing the concentration of saturated FA, and increasing long – chain, unsaturated FA concentration. The gene expression results showed differences in two species. Overall, the milk FA profiles observed in the milk of cows and goats were improved with OC feeding and was not associated with adverse changes in the expression of mammary and adipose lipogenic genes.

Evaluation of selected winter forage legumes under Mediterranean rain-fed conditions

I. Poulopoulou[1], A. Papageorgiou[2], T. Chatzigeorgiou[2], I. Hadjigeorgiou[2]
[1] Free University of Bolzano, Faculty of Agricultural, Environmental and Food Sciences, Piazza Universita 5, 39100 Bolzano, Italy, [2] Agricultural University of Athens, Animal Science, Iera Odos 75, 11855 Athens, Greece

Semi-arid Mediterranean areas can provide feed for ruminant farming systems, but their productivity is affected by climatic change which has an impact on livestock production. Although knowledge of the cultivation and utilization of forage legumes has increased significantly in temperate regions and new species and varieties have been produced, information on their efficient cultivation in the Mediterranean is still missing. The present comparative study aimed to test under the pedoclimatic conditions of southwestern Greece, conventional and new forage legume germplasm of Mediterranean origin. The following forage legumes species were sown in a randomized design with three replicates: Trifolium alexandrinum, Trifolium dasyurum, Trifolium pratense, Trifolium incarnatum, Trifolium michelianum, Trifolium subterraneum, Hedusarum coronarium, Biserulla pelecinus, Ornithopus sativus, Ornithopus compressus Medicago polymorpha. Quantity and quality characteristics (ash, crude protein (CP), crude fiber (CF), NDF, ADF) of the forage produced were recorded. Data were analysed using one way analysis of variance and least significant difference at 0.05 level identified significant differences between species. It was observed that T. incarnatum and T. michelianum were the most productive species in forage DM, but M. polymorpha was competitive against weeds. Forage nutritional characteristics were similar between species, (CP ranged from 8.9 to 14.5%, NDF from 38.3 to 54.8%). In conclusion, the productivity and competitiveness, against weeds, of a forage species is a critical factor to produce forage of sufficient quality under rainfed conditions in the Mediterranean environments.

Changes of corn silage nutritional quality in the in Po Valley (Italy) over the last 5 years

M. Ottoboni[1], R. Abbate[1], E. Grandi[2], L. Pinotti[1]
[1] University of Milan, Department of Veterinary Medicine and Animal Sciences, via dell'università, 26900 Lodi, Italy, [2] ARAL, Laboratorio Alimenti, Via Kennedy, 26013 Crema, Italy

Corn is the primary crop in cattle livestock system of Northern Italy. Corn silage is predominantly used as base ingredient in dairy farm. Thus, monitoring the variability in the nutrient content of this primary ingredient is mandatory to meet animal requirements. Typically, drought-stressed corn silage is lower in energy overall; 2022 was hottest, driest year in Italy. Accordingly, the objective of this paper is to bring to light a significant volume of data on corn silage nutritional composition in Northern Italy. The Regional Breeders Association of Lombardy has been conducting a survey program to monitor corn silage nutritional composition over the last five years (2018-2023). Over the 5 years survey 6952 corn silage samples, equally distributed by year, have been collected and analysed for main nutritional traits. Nutritional composition was determined by NIRs while dry matter was also determined by oven drying. Mean value recorded over the experimental survey period were dry matter 34.6%, neutral detergent fibre (NDF) 45%, acid detergent fibre (ADF) 26.2%, acid detergent lignin (ADL) 2.7%, starch 29.1, crude protein 7.3%, crude fat 2.4%, ash 3.9%, and forage unit (UF/100 kg) 29.6. Average value observed for nutritional composition were in line with literature results. However, considering the starch content lower value were observed for 2022 silage crop, furtherly numerous samples were below the 2nd quartile, indicating a reduced starch content. Consequently, we should pay attention to the climate warming and precipitation change, at least for forage nutritional quality.

Preservation of sweet potato co-products as silage for ruminant feed

K. Paulos[1,2], C. Costa[3], J. M. S. Costa[1], P. V. Portugal[1], S. P. Alves[4,5,6], F. Lidon[2], M. R. Marques[1], E. Jerónimo[7,8], M. T. P. Dentinho[1,5]
[1] INIAV, Pólo de Inovação da Fonte Boa, Av. Professor Vaz Portugal, 2005-424 Vale de Santarém, Portugal, [2] FCT-NOVA, Geobiotec, FCT, 2829-516 Caparica, Portugal, [3] FeedInov CoLab, Av.Professor Vaz Portugal, 2005-424 Vale de Santarém, Portugal, [4] FMV, Av. da Universidade Técnica, 1300-477 Lisboa, Portugal, [5] CII-SA-FMV, Av. da Universidade Técnica, 1300-477 Lisboa, Portugal, [6] AL4AnimalS, Av. da Universidade Técnica, 1300-477 Lisboa, Portugal, [7] CEBAL, R. de Pedro Soares, 7800-309 Beja, Portugal, [8] MED | Universidade de Évora, Pólo da Mitra, Apartado 94, 7006-554 Évora, Portugal

Sweet potato (SP) co-products (rejected SP) and SP plant (leaves and stems; SPLS) can be used in animal feed, assuring nutritious and cost-effective diets. These co-products have high nutritional value but must be preserved due to their high moisture content. This study aims to chemically and nutritionally characterize these co-products preserved as silages. Two silages were designed to have a dry matter content (DM) of 30%, thus grass hay (GH) was added to attain this DM. Two silages were carried out: 1) SPLS/SP silage was 55% SPLS+20% SP+25% GH, while 2) SPLS silage was 75% SPLS+25% GH. Silages with low pH (4.32 ± 0.19 and 4.43 ± 0.08 in SPLS/SP and SPLS, respectively), NH3-N<10% of total N, and soluble N<50% of total N were obtained after four months of ensiling. The organic matter digestibility was lower in SPLS ($47\% \pm 2.41$) than in SPLS/SP silage (56.35 ± 4.17) due to the large amount of silica in the SPLS derived from soil contamination. Ensiling these co-products in mixes is an effective way of preserving them, resulting in stable feeds for ruminant nutrition.

Ewes' diets affect fresh cheese sensory properties

J. Almeida[1,2], A. T. Belo[1], J. M. B. Ribeiro[1], C. C. Belo[1], M. R. Marques[1]
[1] INIAV IP, Pólo de Inovação da Fonte Boa, Av. Professor Vaz Portugal, 2005-424 Vale de Santarém, Portugal,
[2] CIISA/FMV/AL4AnimalS, Av. Universidade Técnica, 1300-477 Lisboa, Portugal

The inclusion of silage in the diet of dairy ewes is perceived as detrimental as it may transmit odd flavours to the milk and the cheese, and to impair its acceptance by the consumer. Aiming to disclose the effect of diet on sensory characteristics of fresh cheese, cheeses were made from the milk of Serra da Estrela ewes receiving one of the diets: pasture supplemented with barley and soybean meal (20% CP in the diet); high-quality maize silage supplemented with wheat and soybean meal (13% and 15% CP in the diet). The cheeses were made at days 75, 90 and 120 of lactation. Sensory evaluation was done at 96 hours after cheesemaking, by eight trained panellists, evaluating ten sensory attributes: intensity of sheep's milk odour; presence and intensity of foreign odours; grain size; the intensity of sour, sweet, and sheep's cheese flavours; bitterness; presence and intensity of foreign flavours; and flavour and overall acceptance. The diet affected the grain size (higher in the silage diets; $P<0.05$), and the presence ($P<0.01$) and intensity ($P<0,05$) of foreign flavours, which were higher in the silage diets, but without affecting flavour and overall acceptance ($P>0.05$). Changes in cheese sensory characteristics related to lactation day were found for the intensity of sheep's milk odour (increased from day 90 to 120 lactation; $P<0.01$); the grain size (lower at day 90; $P<0.001$); the intensity of sour flavour ($P<0.001$) and flavour acceptance ($P<0,05$) which increased with lactation day. The results show that the inclusion of silages in the ewes' diets had no impact on the overall acceptance of fresh cheeses. Funding: Project PTDC/CVT/112054/2009 funded by FCT.

The effects of synbiotic combinations of grape and camelina by-products mix and Lactobacilli on the inflammatory and antioxidant response in ex vivo intestinal explants

G. C. Pistol[1], D. E. Marin[1], V. C. Bulgaru[1], A. M. Pertea[1], I. A. Grosu[1], I. Taranu[1]
[1] INCDBNA-IBNA, National Research - Development Institute for Animal Biology and Nutrition, Laboratory of Animal Biology, Calea Bucuresti no 1, 077015 Balotesti, Romania

The current challenge for the pig research is to find new strategies to promote the gastrointestinal health of piglets. The agro-industrial by-products, probiotics, and synbiotic combinations may be good potential alternatives for the in-feed antibiotics. The aim of the present study is to evaluate the effects of two synbiotic combinations between mixtures of grape seed meal and camelina by-products as prebiotic and a mixture of three Lactobacilli as probiotic, in an ex vivo experimental system. Briefly, the intestinal explants obtained from weaned piglet`s jejunum were cultured in the presence of two synbiotic combination of grape seed and camelina meals mixes and Lactobacilli mix: G3C1Lb and G1C3Lb. At the end of the experiment, the supernatants and cultured explants were collected. The concentrations of IL-1beta, IL-6 and IL-8 pro-inflammatory markers were analyzed using specific kits and the genes coding for enzymes belonging to antioxidant system were assessed by qPCR. The obtained results showed that both synbiotic combinations decreased the concentration of IL-8 pro-inflammatory cytokine in ex vivo supernatant. The qPCR data demonstrated that the synbiotic treatments had significant effects on CAT, GPx and SOD genes. In conclusion, this study highlights the anti-inflammatory and antioxidant potential of the synbiotic combination of prebiotics (grape and camelina by-products) and probiotics (Lactobacilli strains), suggesting that these synbiotics could be used in nutritional strategies in maintenance of gastrointestinal tract homeostasis.

Assessment of the capacity of alternariol mycotoxin to induce oxidative stress in swine epithelial intestinal cell line IPEC-1

D. E. Marin[1], C. V. Bulgaru[1], A. Pertea[1], I. Grosu[1], G. C. Pistol[1], I. Taranu[1]
[1] National Research and Development Institute for Biology and Animal Nutrition IBNA Balotesti, Laboratory of Animal Biology, Calea Bucuresti no.1, Balotesti, Ilfov, 077015 Balotesti, Romania

Alternariol (AOH) is a metabolite produced by Alternaria fungus that can contaminate a variety of food and feed materials. Exposure to Alternaria mycotoxins was associated with different negative effects on human and animal health, including cytotoxic, mutagenic, genotoxic and carcinogenic effects. Pigs, through the consumption of a diet rich in cereals, are particularly exposed to the mycotoxin contamination. However, there are few studies concerning the toxic effect of Alternaria toxins on pig gut health. The aim of the present study was to obtain a deeper knowledge concerning the effects of AOH on pig intestinal health using an epithelial intestinal cell line model. Proliferating IPEC-1 cells were exposed to AOH (5-10μg/mL) for 24 h and the toxin effect on different markers associated with oxidative stress were investigated. Our results have shown that exposure to AOH was associated with a significant decrease of the activity of superoxide dismutase and catalase activity by 9.2% and 52%, respectively for AOH 5μg/mL and by 38.8% and 47.4% for AOH 10μg/mL. AOH exposure has no effect on glutathione peroxidase activity. AOH exposure has increased the concentration of protein carbonyl, thiobarbituric acid reactive substances and 8-Oxo-2'-deoxyguanosine indicating a capacity of this mycotoxin to increase oxidation of proteins, lipids and DNA in IPEC-1 cells. In conclusion, alternariol exposure can increase the oxidative stress in swine epithelial intestinal cells, with important consequences for gut health.

Ex vivo study on pig jejunum explants exposed to E. coli-LPS and hydrogen peroxide to evalaute the alleviating effect of a mustard by-product extract used as an alternative to medicinal zinc oxide.

I. Taranu[1], C. Bulgaru[1], G. C. Pistol[1], D. E. Marin[1], AM. Pertea[1]
[1] INCDBNA-IBNA, Animal Biology, Cl. Bucuresti, no. 1, 077015 Balotesti, Romania

Animal explants model is superior to cellular ones, preserving better than cells specific in vivo particularities, such as different types of cells and the architecture of the organ. By using pig jejunum explant culture, this study compared the antimicrobial potential of zinc oxide (ZnO), medicinal that will be banned by the European Commission, with a rich in bioactive compounds extract obtained from mustard seed meal (EM) in response to E. coli-LPS and hydrogen peroxide stressors. Small pieces of jejunum, derived from 3 piglets were cut opened, fixed on sponges and placed in 6-well culture plates with Williams medium. Explants were incubated either with 50μM of ZnO or 1/50 EM for 2h and further challenged with 100 μg/ml LPS or 600μM H2O2 for another 4h. As expected, E. coli LPS induced a pro-inflammatory response by increasing the level of pro-inflammatory cytokines at both gene expression and protein synthesis as well as the nitric oxide synthesis in comparison to control. By contrast, H2O2 decreased the gene expression and the activity of antioxidant enzymes SOD, CAT and GpX. The presence of ZnO and mustard extract counteracted the LPS or H2O2 action toward that of control. The effectiveness of the mustard extract was similar to that of ZnO, which suggests that agro-industrial by-products can be alternative antibacterial sources to medicinal ZnO.

Amino acids in silkworms Bombyx mori L products and their potential applications

M. Habeanu[1], A. Gheorghe[1], M. F. Andrei[1], T. Mihalcea[1]
[1] Research Station for Sericulture Baneasa-Bucharest, Soseaua Bucharest Ploiesti 69st-Ploiesti, 013685 Bucharest, Romania

The nutrients required by the silkworm Bombyx mori derive from mulberry leaves. A total of 72–86% AAs associated with lipids and fatty acids, carbohydrates, cellulose, vitamins and minerals, and flavonoids are taken by larvae from mulberry leaves. This paper explores the occurrence of AA in larvae, pupae (SP), and silk products generated throughout silkworm metamorphosis and its potential applications. AAs are involved in physiological processes and are part of the chemical structure of hormones, enzymes and peptides with physiological functions. Silkworm larvae have ~55% protein, SP ~60% on DM base, and 18 types of AA, of which 8 are essential for human health. According to published data, higher values of glutamic acid (15% of total AA) were noticed in SP, possibly due to its presence in the mulberry leaves (~12.4%). Methionine (4.17%) and lysine (6.45%) are present at a high level in SP. These AAs are limiting for monogastric animals, which suggests the pupae can be beneficial protein alternatives. In larvae, a higher level of glycine is recorded (16.7%). The AAs found in the structure of silk proteins are distinctive: glycine, alanine, serine, and tyrosine make up over 85% of the overall AAs content. Intracellular AAs play an essential role in protein and phospholipid synthesis and are important energy sources or support for morphogenetic processes. The AA contents in silkworms are twice as high as in pork and four times higher than in eggs and milk. We conclude that the products generated throughout the chain are rich in protein with a high biological value given by their composition in AA and can be used in various fields such as animal feeding, cosmeceuticals, additives, tissue engineering, and medicine.

Dietary coccidiostat influences the relative expression of selected genes in broiler chickens reared on recycled litter

V. Pirgozliev[1], S. C. Mansbridge[1], I. M. Whiting[1], S. P. Rose[1]
[1] Harper Adams University, The National Institute of Poultry Husbandry, Edgmond, Shropshire, TF10 8NB NEWPORT, United Kingdom

Six-hundred-and-forty, day old Ross 308 male chicks were allocated to 32 floor pens. The floor bedding was a mixture of wood shavings, including 30% fresh and 70% from previous study. Chickens were fed one of two diets; control (C), a wheat-soybean based diet; MX was the C plus a coccidiostat (Maxiban, Elanco Animal Health, UK). Each diet was fed to 16 pens flowing randomisation. The birds were reared following standard industry conditions as the feeding regimen involved starter, grower and finisher phases. Feed intake (FI), weight gain (WG), feed conversion ratio (FCR) and mortality were determined / recorded for each period. Birds had free access to feed and water. At the end of the study, at 35d old, one bird from each pen was electrically stunned and then killed by exsanguination, and the left caecal tonsil was collected and analysed for the expression of the genes of interest. Data were analysed with one-way ANOVA. Bird mortality was low, less than 3%, and not influenced by dietary treatments. The average bird weight at 35d age was 1663g vs the expected 2300g. Birds fed MX diet had the same FI (81 vs 80 g/d; $P > 0.05$) as C fed birds, grew faster (48 vs 44 g/d; $P < 0.05$) and had lower FCR (1.440 vs 1.539; $P < 0.05$). Feeding MX diet led to an increase in INFG, IL10, IL18, Il1B, TNFSF15 expression, but reduction in IL17F expression ($P<0.05$). Dietary MX improved growth performance of chickens and upregulated proinflammatory responses. Where birds are reared on recycled litter the use of coccidiostats should be considered, however, further research into the responsible use and possible risk of resistance is required to inform practice.

Microproteomic based analysis on goat milk protein synthesis pathway

L. Chen[1], T. Hiroaki[1], E. Bagnikca[1]
[1] Institute of Genetics and Animal Biotechnology, Polish Academy of Sciences, Jastrzębiec, 05-552 Jastrzębiec, Poland

Goat milk has been consumed by humans since ancient times and is an important source of nutrition for all age groups. The content of casein in goat milk is the predominant evaluation of milk quality. The synthesis of milk protein is controlled by a complex network with many signal pathways. In this light, the objective of the present study aims to clearly depict the signal pathways involved in milk protein synthesis network in goat mammary epithelial cells (GMECs) by using the state of art technique microproteomic and select key gene involved in signal pathway. Our study showed that more than 2253 proteins were identified, and 323 pathways were annotated from the identified proteins in GMECs based on the microproteomic analysis. GO annotation and KEGG as well as KOG analysis depicted the enrichment and signal pathways of proteins in GMECs.The harvested information will provide novel insight into the mechanism of milk protein synthesis system in GMECs.

Dietary xylanase increases hepatic carotenoid concentration in chickens

V. Pirgozliev[1], K. Kljak[2], S. C. Mansbridge[1], I. M. Whiting[1], S. P. Rose[1]
[1] Harper Adams University, The National Institute of Poultry Husbandry, Edgmond, Shropshire, TF10 8NB NEWPORT, United Kingdom, [2] University of Zagreb, Faculty of Agriculture, Zagreb, 10000 Zagreb, Croatia

Xylanase (XYL) enzymes are commercially added to poultry diets for improved performance and intestinal health. Although XYL is known to improve antioxidant status of birds, there is limited knowledge on the impact of graded XYL levels on hepatic carotenoids concentration in broilers. This experiment assessed the effects of feeding graded levels of endo-1,4-beta XYL produced by Aspergillus oryzae (Ronozyme WX, DSM, Switzerland) at 0, 200, 400, 600 and 800 FXU/kg in a wheat-soy-based diet on hepatic carotenoid concentration of broiler chickens. A basal diet was mixed and split into five parts. Part one was fed as is (control; C), and each of the other parts were supplemented with one of the graded XYL levels. Each of the five diet was fed to 8 pens of male Ross 308 broilers (from 7 to 21d age), following randomization. At the end of the study one bird per pen was sacrificed and its liver was analyzed for concentration of beta carotene, zeaxanthin and lutein. Data were analyzed by ANOVA and polynomial contrasts were performed to test for linear (L) and quadratic (Q) relationships between XYL dose and the carotenoids. Birds fed XYL had higher concentration of hepatic beta carotene compared to the control fed birds ($P < 0.05$) and the response to XYL levels was curvilinear ($L < 0.05$; $Q = 0.05$). Feeding 800 FXU/kg XYL had higher lutein concentration than the C fed birds ($P < 0.05$). The response to XYL was inconsistent ($P > 0.05$). No response was observed for zeaxanthin ($P > 0.05$). The results suggest that feeding XYL to broilers can improve their hepatic antioxidant status. Further research in XYL dose response in warranted.

Plants extract efficiency in mulberry silkworm nutrition

A. Gheorghe[1], M. Habeanu[1], M. F. Andrei[1], T. Mihalcea[1], A. R. Moise[2], G. Dinita[3]
[1] Research Station for Sericulture, 69 Bucharest-Ploiesti, 013685 Baneasa-Bucharest, Romania, [2] University of Agricultural Science and Veterinary Medicine Cluj-Napoca, 3-5 Manastur St., 400372 Cluj-Napoca, Romania, [3] University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Boulevard, 011464 Bucharest, Romania

The mulberry silkworm growth, development and productivity are mainly influenced by nutrition. The nutritional composition of mulberry leaves, which represent the unique feed source for silkworms, affects the cocoon production and quality of silk. Although mulberry leaves provide balanced nutrients for silkworms, variations in the quantity of mulberry plants, their management, and environmental conditions influence their quality. Research studies have recently shown that fortifying mulberry leaves with plant extracts enhances their quality, improving silkworm-rearing efficiency, productivity and silk quality. Plant extracts are a rich source of phytochemicals that positively impact the insects' metabolic activities (i.e. protein metabolism and catabolism). Some plant extracts exert growth-promoting effects by stimulating feed intake and disease resistance/ tolerance due to their anti-microbial, anti-inflammatory, and antioxidant properties. This review highlighted the bioactive compounds of various plant extracts (i.e. Aloe Vera, Moringa oleifera, Nigella sativa, Ocimum basilicum L., Ocimum sanctum L., Amaranthus hybridus L.) used to supplement the mulberry leaves in silkworm and their effects on larval and cocoon traits, as well as health response. Keywords: mulberry silkworm, plant extracts, production traits, health. Acknowledgement: This research work was funded by the Romanian Ministry of Agriculture and Rural Development, project ADER 24.1.2/2023.

Evaluation of the impact of the dietary inclusion of salty and sugary former food products on the liver and plasma profile of pigs through OMICS approaches

M. Manoni[1], A. Altomare[2], S. Nonnis[1,4], G. Ferrario[2], S. Mazzoleni[1], M. Tretola[3], G. Bee[3], G. Tedeschi[1,4], G. Aldini[2], L. Pinotti[1,4]
[1] University of Milan, Department of Veterinary Medicine and Animal Science, Via dell'Università, 26900 Lodi, Italy, [2] University of Milan, Department of Pharmaceutical Sciences, Via Mangiagalli 25, 20133 Milan, Italy, [3] Agroscope, Institute for Livestock Sciences, Rte de la Tioleyre 4, 1725 Posieux, Switzerland, [4] University of Milan, CRC I-WE, Coordinating Research Centre: Innovation for Well-Being and Environment, Via Festa del Perdono 7, 20122 Milan, Italy

Alternative feed ingredients can replace cereals to reduce feed-food competition. Former food products (FFPs) drop out from the industrial food chain and are no more suitable for humans but still for animals for their high nutrients and energy content. We applied omics tools to evaluate the dietary inclusion of salty or sugary FFPs in pig diet on liver proteome and plasma peptidome. Thirty-six Swiss Large White male pigs were assigned to the groups control (CTR), 30% CTR replaced with salty FFPs (SA), and 30% CTR replaced with sugary FFPs (SU) from the growing phase until slaughtering. Blood and liver tissue were collected and processed according to the omics approaches. The proteomics showed potential modulation of lipid metabolism in SA and SU groups, but the low number of differentially regulated proteins and the lack of metabolic interaction among regulated proteins indicated a limited impact on liver function and related metabolic pathways. The peptidomics showed low variability in the plasma peptidome of all dietary groups and identified three possible bioactive peptides associated with anti-hypertension and vascular homeostasis in the SA group. Overall, the limited impact of SA and SU diets on liver proteome and plasma peptidome enhanced the idea of reusing FFPs as alternative and sustainable feed ingredients for pig production.

How to select a heat tolerant cow?

I. Misztal[1]
[1] University of Georgia, Animal and Dairy Science, Riveroad, 30602 Athens, United States

Genetic selection usually works by redirecting energy to production traits at a cost of secondary traits. Any deterioration is either unimportant or compensated by improved management, with some improvement due to the selection index. Genomic selection intensifies the selection process, possibly in both directions. Continued selection for production caused deterioration of heat tolerance, however, cows produce well with heat mitigation devices such as fans and sprinklers. Such devices are justified in areas with a long hot season and high milk prices, and less otherwise. Methodology exists to calculate GEBV for heat tolerance, however, cows that maintain production during the peak of heat stress are more likely to be disposed of, and effects of calving during the peak of the heat cycles can be permanent. Both risks depend on the presence of heat mitigation devices. In environments where intensive management is too expensive, an ideal cows would maintain production during favorable weather, would reduce production during heat stress, and would resume production after the stress is over. Such cows would be identified by larger than expected fluctuations during the lactation. Such fluctuations need to be associated with stress, as general fluctuations are usually associated with health problems (canalization).

Economic weights for traits of economic interest in dairy sheep breeding programs under the context of climate change

M. Ramon[1], M. J. Carabaño[1], C. Díaz[1], D. Martín-Collado[2], M. J. Milán[3]
[1] INIA-CSIC, Mejora Genética Animal, Crta de la Coruña km 7,5, 28040 Madrid, Spain, [2] CITA, Departamento de Ciencia Animal, Avda. Montañana 930, 50059 Zaragoza, Spain, [3] UAB, Departamento de Ciència Animal i dels Aliments, Travessera dels Turons, s/n, 08193 Bellaterra, Spain

Developing a breeding strategy involves the definition of a breeding objective and the estimation of economic weights of the traits that conform to the breeding objective. Climate change (CC) impacts production systems in many ways; on one side CC currently affects individual performances but also it creates a lot of uncertainty about future climatic and economic scenarios. This work aimed at estimating the economic weights of main traits of economic interest for dairy sheep breeding programs under different climatic scenarios. A deterministic bioeconomic model was developed to estimate the profit of a typical local sheep production system and derive economic values under some future breeding scenarios. Economic values of 0.96 €/l; 17.5€/%; and 18.5 €/% per ewe for milk yield and fat and protein contents, respectively, were obtained for the current scenario. Decays in production due to more frequent exposure to high temperatures in the mid-term were estimated at 0.5 to 1,5%, which would result in a reduction in the economic value of 1.24, 2.08 and 1.76% for milk yield and fat and protein contents, respectively, and this reduction could exceed 10% under worse scenarios. Consequently, it is crucial to assess potential economic losses in future CC scenarios and estimate the economic value of each breeding objective component. This approach is vital for adapting breeding strategies to forthcoming climatic scenarios, by putting emphasis on traits related to adaptation over those solely focused on production.

Validation of selection signatures for coat color in the Podolica gray cattle breed

S. Bruno[1], G. Rovelli[3], V. Landi[2], F. Sbarra[4], A. Quaglia[4], F. Pilla[5], E. Lasagna[3], E. Ciani[1]
[1] University of Bari, Biosciences, Biotechnologies and Environment, Via Orabona 4, 70125 Bari, Italy, [2] University of Bari, Veterinary Medicine, Strada Provinciale Casamassima, KM. 3, 70010 Valenzano, Italy, [3] Università degli Studi di Perugia, Scienze Agrarie, Alimentari e Ambientali, Borgo XX Giugno, 74, 06121 Perugia, Italy, [4] Associazione Nazionale Allevatori Bovini Italiani da Carne (ANABIC), Strada del Vio Viscioloso, 21 San Martino in Colle, 06132 Perugia, Italy, [5] Università degli Studi del Molise, Agricoltura, Ambiente e Alimenti, Via Francesco De Sanctis 1, 86100 Campobasso, Italy

The grey coat color, combined with pigmented skin, common in many grey cattle breeds, has been demonstrated to confer better adaptation to solar radiation and thermal stresses. In a previous study, adopting the FST-outlier approach, we identified genomic regions differentially selected in a set of grey cattle breeds, including Podolica, contrasted with four non-grey cattle breeds. The more supported signals were detected on BTA 2, 4, 14 and 26, encompassing several genes known to be directly or indirectly related with one or more steps in pigment biology. Here, we aimed at validating the previously observed signals by using the same approach, applied to three Podolica new sample sets (N = 30 animals each, selected as representative of the Podolica Italiana population at three different time-frames, roughly separated by 10 years intervals each), typed at 23,027 quality-controlled SNP loci. To this aim, we also analyzed the above dataset using the haplotype-based approach implemented in the hapFLK sotfware. Both the FST-outlier and the hapFLK approaches consistently detected the signals on chromosomes 2, 4, 14 and 26 in all of the pair-wise contrasts with the non-grey breeds. These results expand our knowledge about the molecular mechanisms underlying pigment phenotypes in mammals.

Using the Illumina 50k SNP Array as a tool in barley breeding for the first time in Cyprus

N. Price[1], E. Christofidou[1], M. Omirou[1], D. A. Fasoula[1]
[1] Agricultural Research Institute, P.O.Box 22016, Nicosia, 1516, Cyprus, 1516 Nicosia, Cyprus

Barley (Hordeum vulgare) serves as a significant forage crop for ruminants worldwide, encompassing regions such as the Mediterranean. Changes in local abiotic/biotic conditions, and an increase in commercial demand, require a better understanding of the map between genotype and important barley traits such as yield, grain quality, disease resistance, and drought tolerance. With the advent of fast and low-cost genotyping, one of our aims at ARI is to exploit locally developed germplasm to examine allele associations underlying important phenotypic variation under local conditions at the scale of large field trials. With the recent acquisition of an Illumina Tecan genotyping platform, we began to functionally characterize the Barley 50k iSelect SNP Array. More specifically, we examined the fraction of genes covered by the SNP array, their expression level in over 50 RNAseq studies, and their functional constraint across multiple grass species. In addition to functional annotation of the SNP array, we genotyped 31 locally adapted varieties, and studied their phylogenetic relationship to a global barley panel. Subsequently, we identified chromosomal regions showing high genetic differentiation between phylogenetic distinct groups of barley lines. Our results so far, show that the SNP array positions cover ~50% of the predicted genes across the genome; which interestingly show significantly higher expression than the rest. Phylogenetic analysis of local varieties, resulted in two genetically differentiated groups, that segregated in row type (2-row/6-row). Chromosomal regions showing high allele frequency divergence between the two groups include interesting genes, such as VRS1, which has been found to affect the row number in barley.

From Barn to Biosphere: Tracing Summer Emissions from Goat and Cow Manure in Cyprus

K. Philippou[1], A. M. Savvides[1], A. Phokas[1], G. Themistocleous[1], D. Sparaggis[2], G. Hadjipavlou[2], M. Omirou[1], I. M. Ioannidis[1]
[1] Agricultural Research Institute, Agrobiotechnology, P.O. Box 22016, 1516 Lefkosia, Cyprus, 1516 Lefkosia, Cyprus, [2] Agricultural Research Institute, Animal production, P.O. Box 22016, 1516 Lefkosia, Cyprus, 1516 Lefkosia, Cyprus

The surge in global meat and dairy consumption has increased farming, consequently escalating manure production. Manure is a critical source of NH3 and greenhouse gas (GHG) emissions which are critical contributors to global warming. This study provides a comprehensive assessment of these emissions from dairy cow and goat manure in Cyprus during summer, aiming to elucidate the emission dynamics and their driving factors. GHG and NH3 emissions from dried manure samples were measured with automated chambers and were analyzed with a cavity ring-down spectrometer. Halfway through the experiment, water was added to the manure to simulate a summer rainfall event. Manure samplings were conducted to assess the physicochemical properties and functional bacterial guilds. The results revealed that the GHG emissions were different between manure types, likely due to differences in the composition and digestibility of the feedstock used. Before the simulated rainfall, emissions were relatively low in the dry manure during summer. However, the addition of water notably increased NH3, CO2, and N2O emissions, while CH4 emission decreased sharply, indicating the great impact of manure moisture on triggering biological and chemical activities. This study highlights the pivotal role of moisture in regulating GHG and NH3 emissions from manure, particularly under increased temperatures. These insights are crucial for developing strategies to mitigate emissions in the context of global climate change.

The Effects of Thermal Stress on Dairy Cattle: Global Predictions from a High-Resolution Analysis

M. Neira[1], P. Georgiades[1], T. Economou[1], Y. Proestos[1], J. Araya[1], J. Lelieveld[1,2]
[1] The Cyprus Institute, Climate and Atmosphere Research Center (CARE-C), 20 Konstantinou Kavafi Street, 2121 Nicosia, Cyprus, [2] Max Planck Institute for Chemistry, Hahn-Meitner-Weg 1, 55128 Mainz, Germany

Thermal stress in cattle is influenced by a variety of environmental factors, including temperature, relative humidity, wind speed and solar radiation. The Temperature-Humidity Index (THI) is a widely used and well-validated scale for estimating thermal stress in livestock, which combines effects of environmental temperature and relative humidity. We created a high-resolution dataset by using historical climate data (ERA5 global dataset) to train a machine-learning model to downscale daily data to hourly THI values. The validated model was used to run inference on 12 CMIP6 models for the years 2020-2100, considering two emissions scenarios (SSP245 and SSP585). Consequently, we obtained a data set that provides hourly THI predictions on a global scale, until the year 2100, with a spatial definition of 0.25o. We combined predicted THI values with well-established physiological thresholds specific for dairy cattle. We selected the value of 68.8 as threshold for mild thermal stress (onset of negative effects on productivity), and the value of 84 as the threshold for severe stress (emergency conditions, including elevated mortality risk). We calculated future thermal stress duration (hours above threshold) and intensity (THI load above threshold), and produced average estimates for selected time periods. By plotting these results, we obtained maps displaying components of the predicted thermal stress for dairy cattle. This allows for the identification of regions where expected shifts in environmental conditions are likely to be particularly challenging for dairy farming, and therefore might require the implementation of specific adaptation and mitigation measures.

Quantifying Methane Emissions from Cattle Farming in the Mediterranean: Insights from the CH4LKIDIQY Campaign

R. Papaconstantinou[1], M. Kezoudi[1], PY. Quehe[1], C. Keleshis[1], JD. Paris[1,2], J. Sciare[1]
[1] *The Cyprus Institute, Climate and Atmosphere Research Center (CARE-C), 20, Konstantinou Kavafi Street, Aglantzia, 2121 Nicosia, Cyprus,* [2] *Laboratoire des Sciences du Climat et de l'Environnement (LSCE/IPSL), CEA-CNRS-UVSQ, Université Paris-Saclay, 91191 Gifsur-Yvette, France*

The rise in atmospheric abundance of cattle farm emissions, specifically carbon dioxide (CO_2) and methane (CH_4) is of particular concern in the Mediterranean. As the second most significant anthropogenic greenhouse gas (GHG) after CO_2, CH_4 holds a global warming potential 28 times greater than CO_2 over 100 years, emphasising the urgency to address its emissions. Although policies on reducing GHG emissions heavily rely on accurate emission estimation through atmospheric measurements, current estimates are mainly based on inventory studies. CH_4 measuring methods have significantly advanced over the past 20 years, ranging from ground-based, mobile approaches to remote-sensing methods using aircraft, unmanned aerial vehicles (UAVs) and satellites. Owing to their ease of mobility, UAVs enable the quantification of point and facility-scale sources, where conventional methods may fall short. The "CH4LKIDIQY" campaign, conducted from January 15-18 2024, aimed to examine the ability of a UAV-based system to detect a CH_4 source during controlled-release experiments. The gas analyser integrated on-board, successfully captured the tracer gas at a low release rate (0.15 kg/h) below a height of 5 meters above the release point. We extended our investigation to quantify CH_4 emissions from a cattle farm in Orounda, Cyprus. The system provided valuable CH_4 concentration measurements over several flight days contributing to better understanding of emissions, facilitating strategies to mitigate the environmental impact of livestock farming in the Mediterranean and similar extreme environments.

Monitoring and modelling water use of rainfed barley to assess livestock feed production in a changing Mediterranean climate

A. Bruggeman[1], H. Djuma[1], I. Sofokleous[1], M. Eliades[3], N. Christodoulou[1], D. Fasoula[4], G. Zittis[2], C. Zoumides[1]
[1] *The Cyprus Institute, Energy, Environment and Water Research Center, Konstantinou Kavafi Street 20, 2121 Aglantzia, Cyprus,* [2] *The Cyprus Institute, Climate and Atmosphere Research Center, Konstantinou Kavafi Street 20, 2121 Aglantzia, Cyprus,* [3] *Eratosthenes Center of Excellence, Department of Environment and Climate, 82 Franklin Roosevelt, 3012 Limassol, Cyprus,* [4] *Agricultural Research Institute, Production Division, P.O. Box 22016, 1516 Nicosia, Cyprus*

Barley is a drought-tolerant crop, grown in marginal agricultural lands for livestock feed, throughout the Mediterranean region. The objective of this research is to assess the water use of rainfed barley cropping in Cyprus. An eddy covariance system was installed in a barley field in the Mesaoria Plain of Cyprus in Nov 2020. The area receives an average annual rainfall of 315 mm (1980-2010). The eddy covariance system measured the water and carbon fluxes over the field. Rootzone soil moisture was recorded at 10-, 30- and 50-cm depth. Daily reference evapotranspiration was computed with the meteorological observations of the eddy covariance system and a nearby meteorological station for the 2020-2021 and 2021-2022 crop seasons. The observed soil moisture and reference evapotranspiration were used to compute daily actual evapotranspiration (green water use) of the barley field. The green water use was evaluated with the water fluxes observed with the eddy covariance system. The water balance components were used to adjust the parameters of a dual crop coefficient water balance model. Green water use was simulated for all barley fields in Cyprus, using 1-km gridded, daily meteorological data for 1980-2010 and 3 downscaled, bias-corrected regional climate model simulations for 2030-2060, under RCP8.5. The results showed a highly variable future for rainfed barley production in Cyprus.

Climate change and extremes in the island of Cyprus: from historical trends to future projections

G. Lazoglou[1], G. Zittis[1], P. Hadjinicolaou[1]
[1] The Cyprus Institute, CARE-C, 20 Konstantinou Kavafi Street, 2121 Nicosia, Cyprus

Cyprus is a European island state situated in the eastern Mediterranean climate change hotspot. Despite being a relatively small island, it has different climatic zones, ranging from semi-arid regions to more temperate and mountainous zones. Given the accelerated rate of environmental changes in the region, the present study aims to identify and update observed trends of critical climate parameters, highlighting vulnerable climatic regions within the island. Moreover, since nationwide multi-model assessments of future climate conditions are limited or outdated, we aim to investigate the range of future climate projections. Besides mean climatic conditions, we analyze a range of extreme climate indicators that are, among other applications, relevant to socio-economic activities such as agriculture, ecology, tourism, energy and water resources. Our results showed a statistically significant increasing trend of temperature throughout Cyprus, which is more pronounced during the summer and spring months, particularly for maximum temperature. The moderating effect of the surrounding sea makes the coastal areas less vulnerable to temperature increases. Regarding precipitation, the southeastern coast and the inland areas near the capital city of Nicosia are substantially drier and more prone to further precipitation reductions due to climate change. The projections for the rest of the 21st century, according to a high-forcing scenario (RCP8.5), indicate that Cyprus is likely to experience an annual temperature increase of over 4°C and an approximate 20-30% reduction in annual rainfall. These projections highlight an alarming trend that requires urgent attention and proactive measures to mitigate the potential impacts of climate change on the island.

Grazing behaviour of transhumant goats under climate pressure – the case of western Macedonia, Greece

M. Karatzia[1], M. Amanatidis[2], Z. Basdagianni[4], P. Mitliagka[3], E. Kasapidou[2]
[1] Hellenic Agricultural Organization-Demeter, Research Institute of Animal Science, Paralimni, 58100 Giannitsa, Greece, [2] University of Western Macedonia, Department of Agriculture, Terma Kontopoulou, 53100 Florina, Greece, [3] Aristotle University of Thessaloniki, Department of Animal Production, School of Agriculture, AUTH Campus, 54124 Thessaloniki, Greece, [4] University of Western Macedonia, Department of Chemical Engineering, Koila, 50100 Kozani, Greece

Climate variability and depletion of grazing matter reserves have compelled alterations in the seasonal migratory routes of transhumant farmers. In western Macedonia-Greece, a predominant destination of transhumant flocks in search of rich summer pastures, grazing routes and animal feeding behaviour have been altered significantly in recent years. In order to estimate the effect of heat stress on the aforementioned factors, the grazing routes of two transhumant goat flocks in the areas of Metaxa/Kozani and Ziaka/Grevena, were recorded using GPS tracking collars, as well as distance, duration of grazing and resting points. Twenty grazing routes to two mountain pastures in Metaxa and Ziaka were processed between July/August 2022. For each grazing route, the distance travelled, the altitude at which the herds moved and the grazing time were calculated, along with the Temperature-Humidity index (THI). On average, the Metaxa flock travelled a longer distance than the Ziaka one (10.04 km vs. 6.47 km), in a shorter time (5.5 hours vs. 7.5 hours) and at a higher altitude (1,255 m vs. 950 m), due to the sufficiency of the pasture at Ziaka which facilitated the manifestation of normal grazing behaviour and long-term grazing, even under heat stress conditions (THI≥22.2). Acknowledgement: This work was supported by the "AGROTOUR" (MIS 5047196) project, (NSRF 2014–2020).

When the perceived adaptation of a local breed contributes to its geographical extension: the example of the Corsican sheep breed

A. Lauvie[3], C. Artis[2], L. Garçon[1]
[1] INRAE SELMET LRDE, Quartier Grossetti, 20250 Corte, France, [2] Institut Agro Montpellier student, 2 place Viala, 34060 Montpellier, France, [3] , INRAE UMR SELMET, 2 place Viala, 34060 Montpellier, France

The Corsican sheep breed is a local breed that is the main breed used for sheep milk production in the Corsican island. Now, it is also raised out of the island, as there are some Corsican ewes' flocks in continental France. Knowing better the farmers who chose this breed, out of its cradle of origin, is key to understand the global dynamics of the breed. Our aim is to understand better the reasons why farmers made this choice and doing so, participate to understand how the breed is related to different systems and areas. We conducted 9 semi structured interviews (face to face, except for 3 conducted by phone) with farmers located in continental France (mainly in the Mediterranean area but not systematically) and using the Corsican breed. Among of the themes of the interview' s guide were: choice of the breed and point of view about the breed, genetic management practices, collective involvement etc. A qualitative thematic analysis was conducted. We show that when explaining why they chose this breed, most of the farmers underline its adaptation to their farming environment and/or farming system. They can mention for instance the relevance of the breed due to the pastoral dimension of their systems, or the Mediteranean environment, but also the use for cheese processing. Adaptation or resistance qualities can also be mentioned when farmers are questioned about the breed characteristics. All the farmers mention at a moment or another of the interview the breed robustness (rusticité in French). We finally discuss how the study of this situation and dynamics can give food for thought about local breeds' adaptation and its management.

Strategies for the production of beef calves by dairy cows – The STAR(T) BEEF project

T. Tsiligianni[1], E. Krystallidou[2], S. Tsiligianni[1], E. Souglis[2], A. Saratsi[1], Z. Kazlari[1], C. Rekkas[1], F. Samartzi[1], C. Ligda[1]
[1] HAO-DIMITRA, Veterinary Research Institute, Campus ELGO Thermi, 57001 Thessaloniki, Greece, [2] American Farm School of Thessaloniki, Marinou Antipa 54, 57001 Thessaloniki, Greece

The project aims to develop strategies for the production of calves suitable for fattening (beef x dairy male or purebred beef calves) from dairy cows, contributing to the sustainable use of genetic resources. The work plan focuses on the use of innovative techniques and protocols for: a) estrus synchronization (ES) and determination of the proper time for Artificial Insemination (AI) of dairy cows with sexed semen of beef breeds, b) embryo collection from purebred beef cattle, cryopreservation and embryo transfer to dairy cows, c) fattening of the calves in controlled conditions, d) evaluation of meat quality after slaughter, and e) sustainability assessment of the proposed strategies. The project is structured in 6 work packages. The Operational Group consists of 5 partners (VRI, AFS, Politikos company – calf fattening farm, Diamelas meat – Butcher shop, and Agricultural Cooperative – Farms of Central Macedonia). Meta-ovsynch (OS) protocols (OS+meloxicam i.m. after AI) were used for ES. Before AI, pH and crystallization of cervical mucus were checked, with simple and easy to use methods (using pH-indicator papers and a pocket size portable microscope, respectively). A noteworthy calving rate (total 60%) was recorded after 1 or 2 AIs with sexed semen; no difficulty in calving was recorded so far. Cryopreserved embryos from beef cattle breeds have already been transferred to dairy heifers and calving is expected. So far, the results are promising. Funded: RDP, Region of Central Macedonia, Greece

Solar grazing in Greece: Current situation and future prespectives

M. Karatzia[1], V. Kotsampasi[1], Z. Basdagianni[2]
[1] Hellenic Agricultural Organization-Demeter, Research institute of Animal Science, Paralimni, 58100 Giannit-sa, Greece, [2] Aristotle University of Thessaloniki, Department of Animal Production, AUTH Campus, 54124 Thessaloniki, Greece

As Greece has officially entered solar farm era, it now holds the second position in solar energy production potential worldwide. Solar panels are preferably installed away from cropland areas, as to not compete with food production. Consequently, underutilized areas are preferred, which are often grazing lands for sheep. A novel approach towards compromise on land use between energy production and grazing of flocks is solar grazing within an integrated agrivoltaic system. Taking into account the novelty of the issue, a preliminary exploratory study has been designed. The aim of the study is to investigate the opinions and perceptions of sheep farmers regarding solar grazing and the alterations of land usage that accompany the emergence of solar farms. The study is conducted through the use of questionnaires to 20 sheep farmers in two areas of northern Greece; central Macedonia (in marginal-high salinity grasslands) and in western Macedonia (in overgrazed areas). Furthermore, grazing management strategy and its' effects on sheep welfare are explored, in an effort to determine whether sheep flocks can remain productive within an integrated agrivoltaic system and which grazing stategy may be more efficient. Grazing underneath solar panels may increase grazing pressure (total number of grazing hours per day) as a result of reducing heat stress and protecting from other harsh weather conditions and solar radiation, subsequently improving feed efficiency and water use for sheep, while providing landscape management by the regulation of vegetation at the solar farm. Additionally, undesired selective grazing can be alleviated due to the abundance of grazing matter.

Valorisation of the unique characteristics of extensive livestock for the production of certified antibiotic-free products

D. Tsiokos[1], MA. Karatzia[1], D. Loukovitis[3], D. Chatziplis[2], A. Parianos[4]
[1] HELLENIC AGRICULTURAL ORGANISATION-DIMITRA, Research Institute of Animal Science, Paralimni Giannitson, 58100 Pella, Greece, [2] International Hellenic University, Laboratory of Agrobiotechnology and Inspection of Agricultural Products, Department of Agriculture, School of Geosciences, Sindos, 57400 Thessaloniki, Greece, [3] University of Patras, Department of Fisheries and Aquaculture, School of Agricultural Sciences, Messolonghi, 30200 Messolonghi, Greece, [4] GMCert – Green Mediteranean Certification, 25th of March Street 105, 54249 Thessaloniki, Greece

Extensive production systems in Greece rely primarily on the use of resilient,disease resistance local breeds and the extensive use of grazing that provides a diet rich in antioxidants. These facts result in the limited to zero reliance on antibiotics.The advantage of producing dairy & meat with no traces of antibiotics remains untapped,as the value of products is not differentiated on the market."NON ANTIBIOTIC CERT" project,aims to certify the non-use of antibiotics,through a developed Standard.Questionnaires were completed in 10 dairy sheep and goat and 15 fattening cattle farms,rearing local breeds and grazing for the majority of the year.The objective was to describe the production systems and provide insight into the practices regarding the safeguarding against diseases. The questionnaire was structured in categories relating to farm-pasture management,nutrition,health,breeding and genetic improvement,hygiene,product marketing,and protection of the environment.The results indicate common patterns in farms,focusing on low input practices,wide use and knowledge of the grazing areas.Management is mostly performed through experience rather than with the aid of advisors,indicating the apparent need to utilize this knowledge in combination with modern practices.Funded by the RDP 2014-2020.

Perinatal mortality of the Cyprus Chios sheep breed, primary analysis of a reference population

T. Christofi[1], G. Hadjipavlou[1]
[1] Agricultural Research Institute, Animal Production, P.O.Box 22016, 1516 Lefkosia, Cyprus

Farm sustainability and growth is mainly driven by animal production and survival. Average mortality rate for newborn lambs is estimated at ~15% worldwide. There are a number of aspects that contribute to lamb mortality such as environmental factors like adverse climatic conditions, starvation, dystocia and diseases. Several studies investigated the genetic basis of this trait in commercial breeds and found low heritability indexes that range between 0.00 – 0.10. The prospect of incorporating genetic information and breeding values for lamb survival in future breeding programs is challenging, but if successful, promises substantial economic benefits. This study aims to investigate the genetic parameters for lamb survival in the Cyprus Chios sheep breed. Data were collected over a period of 30 years for about 18000 animals from a nucleus herd at the Athalassa farm in Nicosia, Cyprus. Analyses performed included univariate animal mixed models with significant environmental factors as fixed effects. Direct heritability and maternal effects have been calculated with generalized REML and threshold models. Initial assessment indicates that gestation length, litter size, birth weight, day of birth, sex, age of dam, lactation period and season have significant effects on survival. In addition, moderate heritabilities were estimated for survival at birth, and from birth up to weaning. Currently, there is also a genome wide study of all animals present in the farm with Illumina SNP50 genotyping that with enrich our database and advance our studies in identifying possible SNP polymorphisms for these traits. Collectively, these tools will offer the means for accurate evaluation and selection in breeding programs aiming at improving lamb survival.

Effect of extender composition on the liquid storage and cryopreservation of Skopelos buck semen

A. Saratsi[1], F. Samartzi[1], D. Tsiokos[2], I. Panagiotidis[3], C. Ligda[1]
[1] Hellenic Agricultural Organization - VRI, 57 001 Thermi Campus, P.O. Box 60 272 Thessaloniki, Greece, [2] Hellenic Agricultural Organization - RIAS, Paralimni, 58100 Pella, Greece, [3] Ministry of Rural Development and Food, Veterinary Center of Thessaloniki, Dept of Animal Reproduction & Artificial Insemination, 9 Verias Str., 57008 Thessaloniki, Greece

The Skopelos goat breed is a local breed of Greece, characterized of high fertility and production traits and fully adapted to the Mediterranean production systems. The efficacy of liquid storage and cryopreservation protocols of Skopelos buck semen, using commercial extenders in combination with antioxidants was examined. A 48h liquid storage experiment (5_oC) compared the effectiveness of four extenders [1. OviXcell® (SL), 2. Andromed® (SL), 3. Steridyl® (EY), 4. basic extender (no lecithin)] on the preservation of semen quality characteristics. Total or progressive motility (CASA) was significantly higher in extender 2 compared to extender 1. Sperm viability (eosin-nigrosin), acrosome integrity (SpermBlue®) and membrane integrity (HOST) were significantly higher in lecithin extenders compared to extender 4. Extender 3 significantly enhanced membrane integrity, while acrosome integrity was significantly higher in extender 3. Furthermore, we tested the effect of fumaric acid (0-30mM) addition to OviXcell® on the quality characteristics of frozen/thawed buck semen. Fumaric acid at 2.15mM enhanced frozen-thawed buck sperm viability, acrosome integrity, plasma membrane functional integrity and mitochondrial function (Rhodamine 123/SYBR-14/PI). Statistical analysis was performed by one-way ANOVA, followed by Duncan's test.

Portable nanosensor for rapid detection and characterization of botulinum neurotoxins in cattle

G. Shtenberg[1]
[1] ARO - Volcani Instittute, Institute of Agricultural Engineering, HaMaccabim Rd. 68, 7505101 Rishon LeZion, Israel

Aim: Botulinum neurotoxins (BoNT) are the most potent toxins produced by Clostridium botulinum strains, which can cause life-threatening disease in both humans and animals. The available in vivo mouse assay is inadequate for real-time and on-site assessment of outbreaks. Herein, we present a reflective-based approach for the detection of BoNT while estimating its activity. Materials and Methods: Two adjacent Fabry–Pérot interferometers are simultaneously utilized to detect minute BoNT/B, BoNT/C and BoNT/D concentrations by competitive immunoassay and endopeptidase activity. The reflectivity signals of each interferometer are amplified by biochemical reaction products infiltration onto the sensing scaffold or by peptide fragments modified with zinc oxide nanoparticles detachment from the nanostructure, respectively. Results and Discussion: The optical assay is highly sensitive in compliance with the in vivo approach by presenting detection limits < 0.87 pg mL^{-1} in 90 min of reaction. The specificity and selectivity of the developed platform are cross-validated against counterpart toxoids. Finally, as a proof of concept, the analytical performances of both interferometers for real-life scenarios are demonstrated using actual toxins (serotypes B, C and D) while depicting excellent adaptability to complex media analysis. Conclusion: Overall, the presented sensing concept offers an efficient, rapid and label-free methodology for potential bio-diagnostic elucidation of botulism outbreaks in cattle.

Economic performance of sheep farms in Cyprus

S. Sokratous[1], A. Theodoridis[1], A. Ragkos[2], G. Arsenos[1]
[1] Aristotle University, School of Veterinary Medicine, Panepistimioupoli, Thessaloniki, Greece, [2] Agricultural Economics Research Institute, Agriculture Economics Research Institute (AGRERI), Athens, Greece

Dairy Sheep farming is an integral part of Cyprus' economy with considerable contribution to Gross Domestic Product, environmental sustainability, and social cohesion. The sector is characterised by rapid growth and business potential, largely fuelled by exports of haloumi, PDO cheese. The latter is Cyprus primary export commodity accounting for about 20% of total product exports. In 2022, production of halloumi reached 44.200 tons valued at €308 million; exports were 41.000 tons valued at €285 million. Demand for halloumi cheese in foreign markets resulted in increased milk production and intensification of sheep and goat farms. Making of halloumi requires milk with high fat and protein content, which is the case of sheep milk. Hence, over the past 15 years, the national flock of sheep increased approximately 35% whereas, during the same period, goat population decreased by 33%. The sheep sector is undergoing a transition from an extensive, pasture-based, low-input system to intensive systems that rely heavily on capital investments, purchased feedstuff, and hired labor. The growing number of large intensive farms in Cyprus, has prompted our interest to examine the impact of this transition on the economic performance of the sector. An economic analysis utilizing technical and economic data gathered from 50 sheep farms in Cyprus was undertaken. Data were collected through a comprehensive farm management survey conducted in 2023 and 2024. Through this analysis, we estimate the economic performance of surveyed farms, delineating main financial outcomes and calculating the production cost of milk. These insights shed light on the sustainability and resilience of diverse sheep farm types, providing valuable contributions to the discourse surrounding the overall sustainability of sheep and goat farming in the region amidst emerging economic, environmental, and market challenges. Acknowledgement The paper is funded through PASTINNOVA project. PASTINNOVA is part of the PRIMA Programme, supported by the European Union's HORIZON 2020 Research and Innovation Programme

HaloSheep: Promoting sheep and goat agroecological production systems in Mediterranean saline areas

E. N. Sossidou[1], M. A. Karatzia[1], O. Elmaz[2], I. Gülle[2], C. García-Estrada[3], E. Fernández[3], D. Gruffat[4], D. Andueza[4], L. Giglio[5], A. Palamara[5], M. Mekki[6], L. Majdoub- Mathlouthi[6]
[1] *ELLINIKOS GEORGIKOS ORGANISMOS-DIMITRA, Veterinary Research Institute, ELGO Campus, 57001 Thessaloniki, Greece,* [2] *Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Istiklal Campus, 15030 Burdur, Turkey,* [3] *Universidad de León, Departamento de Ciencias Biomédicas, Campus de Vegazana s/n, 24071 León, Spain,* [4] *Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint-Genès-Champanelle, France,* [5] *Research Centre for animal productions, CRPA Soc. Cons. p. A. V.le Timavo, 43/2 42121 Reggio Emilia, Italy,* [6] *Université de Sousse, Institut Supérieur Agronomique de Chott-Mariem, Rue khalifa karoui sahloul, 4 Sousse, Tunisia*

Coastal regions of the Mediterranean basin are seriously inflicted by aridity and rise of sea levels, which in turn, contribute to the expansion of saline areas and the appearance of a wide range of spontaneous halophytes, that can be valorized for feeding sheep and goats. Within HaloSheep project, we develop an innovative agroecological farming system based on halophytes. Three case studies are examined, in the Archipelago of Kerkennah in Tunisia, in Burdur and Yarisli lakes in Turkey and in Pieria and Arta in Greece, all of which are areas in high risk of salinity.Flora is identified and the dynamic of halophytes and their biomass with is modelled. The nutritive value of available feed resources is assessed, along with the behaviour, welfare, and health of small ruminants, along with the antiparasitic, anthelminthic and antibacterial properties of the plants.The authors acknowledge the HaloSheep project that is part of the PRIMA Programme supported by the European Union's Horizon 2020 research and innovation programme.

Investigating the Role of the Gut Microbiome in Cypriot Cattle Farming

E. Gentekaki[1], D. Mavrides[1], M. Liapi[2], S. Malas[3], D. Ierodiakonou[4], A. Tsaousis[4,5]
[1] *University of Nicosia School of Veterinary Medicine, 93 Agiou Nikolaou Street, Engomi, 2408 Nicosia, Cyprus,* [2] *Cyprus Government Veterinary Services, Nicosia District Veterinary Office, Aglantzia, 1417 Nicosia, Cyprus,* [3] *The Cyprus Institute, 20 Konstantinou Kavafi Street, Aglantzia, 2121 Nicosia, Cyprus,* [4] *University of Nicosia Medical School, 93 Agiou Nikolaou Street, Engomi, 2408 Nicosia, Cyprus,* [5] *University of Kent, Giles Ln, CT2 7NZ, Canterbury, United Kingdom*

There is increasing evidence that the lower gut microbiome in ruminants plays a fundamental role in animal health, the development of the mucosal immune system, milk production efficiency and subsequent methane emissions. The major aim of this research project is to determine the composition and complexity of the lower gut microbiome in dairy cows from Cypriot farms. This will be associated with the presence of selected eukaryotic parasites. 37 dairy cow farms were selected based on their location and number of cows. Questionnaires were used to assess animal husbandry and management practices on farms. Through the use of PCR techniques, molecular genotyping and amplicon sequencing the lower gut microbiome will be analysed and pathogenic bacteria and microbial eukaryotes will be identified. Preliminary data from this project have shown widespread results on the detection of Cryptosporidium, a parasite of cattle that causes diarrhoea, from all districts on the island. Data obtained from microbiome sequencing of these cows will be analysed and subsequently correlated with the presence of Cryptosporidium detected in this study whilst also associated with information from questionnaires on animal husbandry practices to provide more evidence on the transmission dynamics of Cryptosporidium as well as any causal effect relationships.

Milk and milking parameters and their connection to somatic cell count: A pilot study in Cyprus Chios sheep

S. Panayidou[1], G. Hadjipavlou[1]
[1] *Agricultural Research Institute, P.O. Box 22016, 1516 Lefkosia, Cyprus*

Sub-clinical mastitis (SCM) is more prevalent than clinical mastitis, posing a substantial economic burden due to its challenging detection, impacting milk yield and composition. The high milk yield of Cyprus Chios sheep may elevate SCM risk due to heightened udder stress and increased exposure to environmental pathogens during milking. In ongoing research at the Agricultural Research Institute (ARI), data on daily milk yield, monthly milk quality traits, and additional parameters were gathered from 244 ewes between November 2021 and February 2023 (978 records). The objective of this study is to identify new potential predictors for SCM, to ensure early detection, enhancement of diagnostic accuracy, and overall management of the condition. Data were categorized into four groups ("Low", "Moderate", "High", and "Very High") based on the Somatic Cell Count (SCC) range. "Low" SCC indicates healthier animals, while "Very High" SCC indicates severe udder health issues. Mean and standard error values were computed for each SCC group, revealing significant differences in 6 out of the 9 parameters assessed. Lactose levels exhibit a noticeable decrease with increasing SCC (lac$_{lowSCC}$ = 4.88±0.02, lac$_{moderateSCC}$= 4.74±0.04, lac$_{highSCC}$ = 4.73±0.05, lac$_{v.highSCC}$ = 4.34±0.06). Statistically significant variations in lactose levels are observed when comparing "Low" with each of the other three SCC groups. Notably, a significant difference (p-value: 3.13×10^{-06}) between the "High" and "Very High" SCC groups is evident only for lactose levels. This implies a strong correlation between lactose levels and small changes in SCC within the ARI Cyprus Chios sheep. In conclusion, these initial findings deserve further investigation to examine lactose as a potential predictor of SCM in Cyprus Chios sheep.

Perinatal mortality in Cyprus Damascus goats: incidence and risk factors

L. Koniali[1], S. Andreou[1], T. Christofi[1], G. Hadjipavlou[1]
[1] *Agricultural Research Institute, Animal Production, P.O. Box 22016, 1516 Nicosia, Cyprus*

Perinatal mortality, including losses at birth (stillbirths) and losses in the first month after birth, represents a significant economic loss for livestock producers. Numerous environmental and animal-related parameters have been linked to perinatal mortality in various breeds and environments. The current study sought to determine the incidence of perinatal mortality and identify key genetic and non-genetic factors influencing perinatal mortality in Cyprus Damascus kids, with a view to facilitating the design of prevention strategies and the development of more effective genetic selection programs. Data from 3621 litters in the Cyprus Damascus goat herd maintained at the Agricultural Research Institute's experimental farm over an 18-year period (2005 to 2023) were used in the study. The percentage of stillbirths per year ranged from 2.9% to 18.2% (mean = 7.1%); whereas mortality for the entire weaning period ranged from 8.9% to 40.8% (mean = 21.8%). The potential effect of survival-related factors was analyzed with the use of logistic and binomial analysis. Twelve variables were included in the analysis, such as kid gender, litter size (1 vs. 2 vs. 3 vs. 4), kidding day, season (fall vs. winter) and year, live weights at birth (BW) and at weaning (WW), the rearing system used (natural suckling vs. artificial feeding), age and lactation number of the dam (1-10) and goat kids' survival at birth (day 0), at weaning (day 50). Preliminary findings indicated that litter size, birth weight, and kidding day all had a significant effect on the incidence of stillbirths and mortality after birth. Gestation length and dam's kidding age were found to also significantly influence pre-weaning kid mortality.

Sheep and goat production systems in saline areas of Türkiye, Tunisia and Greece: Preliminary results

C. Sipahi[1], R. Aloulou[2], E. Sossidou[3], MA. Karatzia[3], L. Majdoub- Mathlouthi[2], O. Elmaz[1]
[1] Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Istiklal Campus, 15030 Burdur, Turkey, [2] Institut Supérieur Agronomique de Chott-Mariem, Université de Sousse, Rue khalifa karoui sahloul, 4 Sousse, Tunisia, [3] Ellinikos Georgikos Organismos-Dimitra, Veterinary Research Institute, ELGO Campus, 57001 Thessaloniki, Greece

The study aims to study data regarding the sheep/goat production system in three saline regions in Türkiye (Burdur and Yarisli lakes, BY), Tunisia (Archipelago of Kerkennah, K) and Greece (Crete and Pieria, CP). Surveys concerned in total 75 farms, 24 in BY, 42 in K and 9 in CP. The mains preliminary results show that for the three case studies, sheep/goat farming is practiced by breeders of different age groups and levels of education. The average age is 49.8 years. It varies between 40 years for BY and 53 years for K and 58 years for GP. Breeders have an average work experience of 26, 19 and 42 years for BY, K and CP. The majority are Illiterate and of Primary level. In K, 45.2% of breeders have primary and secondary education level. Only 9.5% were illiterate. In CP, both 44.4% of breeders are illiterate and of high school education level. In BY, 75% of breeders have primary education. The distance to the nearest city for the majority of farms is less than 10 km (58.3% and 66.7%) for BY and CP. However, for K, it is between 20 and 30 km. The average flock size is 215 heads for BY, 129 heads for K and 241 heads for CP. For BY and CP, milk and meat sheep and goats are bred. However, for K, mostly meat sheep are raised. 75.9 % of breeders on average use saline areas rich in halophytes as a grazing area, with 33.3 % in BY, 95 % in K and 100 % CP. The preliminary results indicated also that in the three case studies, raising sheep and goats in saline areas is a traditional activity with mainly family workforce.

Water buffalo production in Greece: Challenges and prospects in a competitive environment

A. Ragkos[1], D. Skordos[1], D. Roustemis[2], A. Lymperopoulos[3]
[1] Hellenic Agricultural Organization – DIMITRA, Agricultural Economics Research Institute, Kourtidou 56-58, 11528 Athens, Greece, [2] Center for Animal Genetic Resources, Nea Mesimvria, 00000 Nea Mesimvria, Greece, [3] International Hellenic University, Department of Agriculture, Sindos, 57400 Thessaloniki, Greece

Greek water buffalo (GWB) is an indigenous breed which supports the operation of extensive and semi-intensive farms in Greece which play multiple environmental and sociocultural roles and interact with numerous actors, networks and businesses. The purpose of this communication is to record and summarize the current situation and prospects of the production system of CWB through a SWOT analysis. The approach focuses equally on the internal organization of farms and the system (Strengths and Weaknesses) as well as on the external environment (Opportunities and Threats) across the value chain and related Organizations and systems. The results showcase that the system operates under internal constraints such as small farm size and inefficient farm organization which are counterbalanced by significant strong elements such as the recognizability of products. However, the most notable elements are reported in the external environment where threats (such as lack of advisory support and competition from imported products) and opportunities (including increased public awareness) generate a complex environment where farmers are asked to operate and provide for consumer expectations together with environmental and cultural services. Value chain interventions, business models and policy interventions are suggested. This paper is funded by the Rural Development Programme of Greece 2014-2022 through the Sub-Measure 16.1-16.2 of Measure 16 "Cooperation" (project acronym "Quality Bubalis"; Project number M16ΣΥN2-00193)

Author index

Giglio, L.	55	Lepagnol, C.	38
Gilioli, G.	37	Leroy, G.	25
Göderz, H.	27	Liapi, M.	55
Grandi, E.	40	Lidon, F.	40
Grosu, I.	42	Ligda, C.	25, 28, 51, 53
Grosu, I.A.	41	López de la Torre, R.	36
Gruffat, D.	55	Loukovitis, D.	52
Gülle, I.	55	Lymperopoulos, A.	57

H

M

Habeanu, M.	43, 45	Mahammi, F.Z.	32
Hadjigeorgiou, I.	39	Maimaris, G.	27
Hadjinicolaou, P.	50	Majdoub- Mathlouthi, L.	55, 57
Hadjipavlou, G.	27, 28, 48, 53, 56	Malas, S.	55
Hager-Theodorides, AL.	39	Manoni, M.	45
Hatjina, F.	37	Mansbridge, S.C.	43, 44
Hiemstra, S.J.	27	Marin, D.E.	41, 42
Hiemstra, SJ.	26	Markou, P.	27
Hiroaki, T.	44	Maroto Molina, F.	33
Huba, J.	30	Marques, M.R.	38, 40, 41

I

		Martín-Collado, D.	46
Ierodiakonou, D.	55	Mavrides, D.	55
Ioannidis, I.M.	48	Mazzoleni, S.	45

J

		Mekki, M.	55
Jerónimo, E.	40	Mihalcea, T.	43, 45

K

		Milán, M.J.	46
Karatzia, M.	50, 52	Miltiadou, D.	39
Karatzia, M.A.	55	Mioč, B.	31
Karatzia, MA.	52, 57	Mir-Arribas, G.	36
Kasap, A.	31	Misztal, I.	46
Kasapidou, E.	50	Mitliagka, P.	50
Kazlari, Z.	51	Moise, A.R.	45
Keleshis, C.	49	Montanholi, Y.	35
Kezoudi, M.	49		

N

Kljak, K.	44	Neira, M.	48
Kolega, Š.	37	Neofytou, M.C.	39
Koniali, L.	27, 56	Nonnis, S.	45

O

Kotsampasi, V.	52		
Kovačić, M.	37	Omirou, M.	47, 48
Krystallidou, E.	51	Ottoboni, M.	40

L

P

Labatut, J.	38	Padrón Tejera, E.	33
Landi, V.	36, 47	Palamara, A.	55
Lasagna, E.	47	Panagiotidis, I.	53
Lauvie, A.	38, 51	Panayidou, S.	27, 56
Lazoglou, G.	50	Papaconstantinou, R.	49
Lelieveld, J.	48	Papageorgiou, A.	39