Παραδοτέο E2.D2

Πρακτικά του εργαστηρίου «Απόβλητα Γεωργικής Παραγωγής και Βιοοικονομία»

Οκτώβριος, 2023

Το έργο LIFE18 IPE/GR/000013 συγχρηματοδοτείται από το πρόγραμμα LIFE της ΕΕ.
Το έργο LIFE18 IPE/GR/000013 συγχρηματοδοτείται από το Πράσινο Ταμείο.

LIFE-IP CEI-Greece | LIFE18 IPE/GR/000013
Circular Economy Implementation in Greece
Εφαρμογή της Κυκλικής Οικονομίας στην Ελλάδα

Τίτλος:	Proceedings of the workshop on 'Agro-food waste and bio-economy' Πρακτικά του εργαστηρίου «Απόβλητα Γεωργικής Παραγωγής και Βιοοικονομία»
Εταίροι / Ομάδα Μελέτης:	Χαροκόπειο Πανεπιστήμιο www.hua.gr
Δράση E2	EU-level and international dissemination and networking Διάχυση αποτελεσμάτων και δικτύωση με άλλα έργα και πρωτοβουλίες σε ευρωπαϊκό και διεθνές επίπεδο
Υποδράση E2.2	EU and International Thematic workshops Ευρωπαϊκά και διεθνή θεματικά εργαστήρια
Παραδοτέο:	E2.D2
Ημερομηνία	Οκτώβριος 2023
Είδος Αρχείου:	Παραδοτέο Διάχυσης Πληροφορίας, Έγγραφο Ελεύθερης Πρόσβασης
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Το έργο LIFE-IP CEI-Greece (LIFE18IPE/GR/000013) συγχρηματοδοτείται από το Πράσινο Ταμείο.

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The project LIFE-IP CEI-Greece (LIFE18 IPE/GR/000013) is co-funded by the Green Fund.

Περίληψη

Στο πλαίσιο του ευρωπαϊκού έργου LIFE-IP CEI-Greece «Εφαρμογή της Κυκλικής Οικονομίας στην Ελλάδα», το Χαροκόπειο Πανεπιστήμιο, σε συνεργασία με το Υπουργείο Περιβάλλοντος και Ενέργειας, με το συντονισμό της Καθηγήτριας κ. Κάτιας Λαζαρίδη, διοργάνωσαν διεθνές θεματικό εργαστήριο στο πλαίσιο της δράσης Ε2.2 «Ευρωπαϊκά και Διεθνή Θεματικά Εργαστήρια», η οποία αφορά στη διοργάνωση εργαστηρίων για τις πτυχές εφαρμογής της εθνικής στρατηγικής για την κυκλική οικονομία στην Ελλάδα. Το αντικείμενο του 2ου Διεθνούς Θεματικού Εργαστηρίου του έργου, αφορούσε στα απόβλητα αγροτικής παραγωγής/ τροφίμων και στη βιοοικονομία, με δεδομένο ότι ο αγροδιατροφικός τομέας στην Ελλάδα είναι ιδιαίτερα σημαντικός για την οικονομία της χώρας. Για το σκοπό αυτό, η χρησιμοποίηση των αποβλήτων της αγροτικής παραγωγής σε νέους κύκλους αξιοποίησης μέσω συνεργατικών προσεγγίσεων μεταξύ των διαφορετικών τομέων της εφοδιαστικής αλυσίδας των τροφίμων έχει καίρια σημασία. Στο εργαστήριο ειδικοί εμπειρογνώμονες ανέπτυξαν τα επιστημονικά τους επιχειρήματα για το στάδιο του αγροδιατροφικού τομέα σε άξονες που αφορούν στην ενίσχυση της πρόληψης της σπατάλης και των απωλειών τροφίμων σε επίπεδο (Ευρωπαϊκής) πολιτικής και πράξης, στη βελτίωση της αξιοποίησης των απορριμμάτων τροφίμων σε προϊόντα υψηλής αξίας, στην ανάπτυξη και την εφαρμογή τεχνολογικών και κοινωνικών καινοτομιών, στις αρχές της κυκλικής οικονομίας επί των οικοσυστημάτων, κ.α.
Το εργαστήριο φιλοξενήθηκε από το Διεθνές Επιστημονικό Συνέδριο RETASTE 2023: Rethink Food Resources, Losses, and Waste, (https://retaste.gr/), το οποίο πραγματοποιήθηκε 27-29 Σεπτεμβρίου 2023 στο Χαροκόπειο Πανεπιστήμιο. Συγκεκριμένα, το εργαστήριο πραγματοποιήθηκε τη Πέμπτη 28 Σεπτεμβρίου, 11.30-13.30, στην αίθουσα τελετών του Χαροκοπείου Πανεπιστημίου, Ελ. Βενιζέλου 70, Καλλιθέα, 17676, Αττική, Νέο Κτίριο. Επιπλέον, υπήρχε δυνατότητα εξ' αποστάσεως παρακολούθησης. Η γλώσσα διεξαγωγής ήταν η αγγλική.
Το εργαστήριο συγκέντρωσε το ενδιαφέρον περίπου 50 συμμετεχόντων.

Summary

As part of the LIFE Integrated Project - Circular Economy Implementation in Greece LIFE-IP CEI-Greece - LIFE18 IPE/GR/000013, the Harokopio University of Athens, in collaboration with the Hellenic Ministry of Environment and Energy, under the coordination of Professor Katia Lazaridi, organized an international thematic workshop as part of sub-action E2.2, focusing on EU and international thematic workshops. This sub-action involves the organization of workshops related to the implementation of the national strategy for the circular economy in Greece.
The second international thematic workshop of the project specifically addressed agricultural and food waste and its connection to the bioeconomy. Given the significant role of the agri-food sector in Greece's economy, it emphasized the importance of utilizing agricultural waste in new cycles of value creation through cooperative approaches across different segments of the food supply chain. During the workshop, experts presented their scientific views and recommendations on several key aspects, such as strengthening food waste prevention at both European policy and practical levels, improving the utilization of food waste to create high-value products, developing and implementing technological and social innovations, and applying the principles of the circular economy to ecosystems, among others.
The Agro-Food Waste and the Bioeconomy Thematic Workshop took place within the framework of the International Scientific Conference RETASTE 2023: Rethink Food Resources, Losses, and Waste, (https://retaste.gr/), held from September 27th to September 29th, 2023, at Harokopio University of Athens. More specifically, the workshop occurred on Thursday, September 28th, from 11:30 AM to 1:30 PM, at the Harokopio University's ceremonial hall, located at 70 El. Venizelou Avenue, Kallithea, 17676, Attica, New Building. Additionally, remote participation was possible, and the language of communication was English.
This workshop attracted the interest of approximately 50 participants.

Περιεχόμενα

1. Πληροφορίες Εγγράφου

1.1. Εκδόσεις

Αριθμός	Ημερομηνία	Φορέας	Παρατηρήσεις
1.0	10/2023	Χαροκόπειο Πανεπιστήμιο	Τελικό Σχέδιο

2. Εισαγωγή

Στο πλαίσιο των δράσεων του ολοκληρωμένου Ευρωπαϊκού έργου LIFE «*Εφαρμογή Κυκλικής Οικονομίας στην Ελλάδα*» (LIFE-IP CEI-Greece - LIFE18 IPE/GR/000013), το **Χαροκόπειο Πανεπιστήμιο**, σε συνεργασία με το **Υπουργείο Περιβάλλοντος και Ενέργειας**, διοργάνωσαν διεθνές θεματικό εργαστήριο με αντικείμενο που αφορά στα αποβλητα γεωργικής παραγωγής/ τροφίμων και στη βιοοικονομία.

Στο εργαστήριο, ειδικοί **εμπειρογνώμονες** ανέπτυξαν τα **επιστημονικά** τους επιχειρήματα για το στάδιο του **αγροδιατροφικού** τομέα σε άξονες που αφορούν στην ενίσχυση της **πρόληψης** της σπατάλης και των απωλειών τροφίμων σε επίπεδο (Ευρωπαϊκής) **πολιτικής** και πράξης, στη βελτίωση της αξιοποίησης των απορριμμάτων τροφίμων σε προϊόντα υψηλής αξίας, στην **ανάπτυξη** και την εφαρμογή τεχνολογικών και κοινωνικών **καινοτομιών**, στις αρχές της κυκλικής οικονομίας επί των **οικοσυστημάτων**, κ.ά.

Το θεματικό εργαστήριο φιλοξενήθηκε από το Διεθνές Επιστημονικό Συνέδριο RETASTE 2023: Rethink Food Resources, Losses, and Waste, το οποίο διοργανώθηκε 27-29 Σεπτεμβρίου 2023 στο Χαροκόπειο Πανεπιστήμιο (Λεωφόρος Βενιζέλου 70, Καλλιθέα, 17676, Αττική), με αντικείμενο την πρόληψη και αξιοποίηση των αποβλήτων τροφίμων και γενικότερα των οργανικών υπολειμμάτων και αποβλήτων.

Η εκδήλωση έλαβε χώρα τη Πέμπτη 28 Σεπτεμβρίου 2023 στην Αίθουσα Τελετών του Χαροκοπείου Πανεπιστημίου, και διεξήχθη στη διεθνώς αναγνωρισμένη γλώσσα των επιστημών, την αγγλική.

4. Ομιλίες

Στο εργαστήριο ειδικοί **εμπειρογνώμονες** ανέπτυξαν τα **επιστημονικά** τους επιχειρήματα για το στάδιο του αγροδιατροφικού τομέα.

Συγκεκριμένα, ο **κ. Ναπολέων Μαραβέγιας**, Ομ. Καθηγητής και τ. Αντιπρύτανης του Πανεπιστημίου Αθηνών και π. Υπουργός Αγροτικής Ανάπτυξης και Τροφίμων υπογράμμισε ότι η λύση στο πρόγραμμα της πρόληψης και διαχείρισης των αποβλήτων τροφίμων στον αγροδιατροφικό τομέα άπτεται σε μεγάλο βαθμό στη δημιουργία οικονομικών κινήτρων, καθώς και άλλων κινήτρων με γνώμονα την αγορά.

Εικόνα 1. Στιγμιότυπο από την ομιλία του κ. Ναπολέων Μαραβέγια, Ομ. Καθηγητή και τ. Αντιπρύτανη του Πανεπιστημίου Αθηνών και π. Υπουργού Αγροτικής Ανάπτυξης και Τροφίμων

Η κ. **Δέσποινα Πανανικολάου**, Προϊσταμένη του Τμήματος Ζωικών Υποπροϊόντων του Υπουργείου Αγροτικής Ανάπτυξης και Τροφίμων, ανέλυσε λεπτομερώς πώς μέσω της υπεύθυνης διαχείρισης των ζωικών υποπροϊόντων και της τήρησης αυστηρών κανονισμών, μπορούμε να διασφαλίσουμε μια ασφαλή και βιώσιμη διαδρομή από τα τρόφιμα στις ζωοτροφές, προς όφελος τόσο των ζώων παραγωγής και συντροφιάς, όσο και της ευρύτερης αλυσίδας εφοδιασμού τροφίμων.

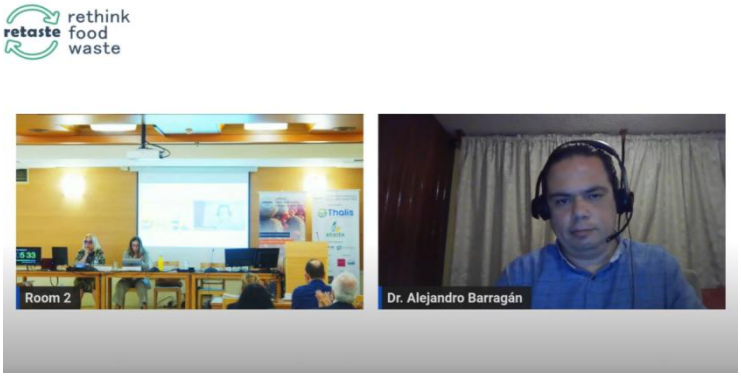
Εικόνα 2. Αριστερά: Προεδρεύουσα και συντονίστρια του Διεθνούς Εργαστηρίου κυρία Κάτια Λαζαρίδη, Καθηγήτρια Περιβαλλοντικής Διαχείρισης και Τεχνολογίας του Χαροκοπείου Πανεπιστημίου. Δεξιά: Η κ. Δέσποινα Πανανικολάου, Προϊσταμένη του Τμήματος Ζωικών Υποπροϊόντων του Υπουργείου Αγροτικής Ανάπτυξης και Τροφίμων την ώρα της ομιλίας της

Ο Καθηγητής και τ. Αντιπρύτανης του Ελληνικού Μεσογειακού Πανεπιστημίου κ. **Θρασύβουλος Μανιός** ανέδειξε μια καινοτόμο διαδικασία για τη μετατροπή των απορριμμάτων τροφίμων των

ξενοδοχείων σε ζωοτροφές, η οποία αναπτύχθηκε στο πλαίσιο του προγράμματος Life F4F «Τροφή από Τρόφιμα – Food for Feed».

Εικόνα 3. Στιγμιότυπο από την ομιλία του Καθηγητή και τ. Αντιπρύτανη του Ελληνικού Μεσογειακού Πανεπιστημίου κ. Θρασύβουλου Μανιού

Ο Καθηγητής κ. **Alejandro Barragan-Ocana** από το Εθνικό Πολυτεχνείο της πόλης του Μεξικό, συνδέθηκε διαδικτυακά και αναφέρθηκε στην πρόοδο της επιστήμη και της τεχνολογίας για την παραγωγή βιοκαυσίμων και προϊόντων προστιθέμενης αξίας από τη χρήση βιομάζας και γεωργικών υπολειμμάτων.



Εικόνα 4. Ο Καθηγητής κ. Alejandro Barragan-Ocana από το Εθνικό Πολυτεχνείο της πόλης του Μεξικό την ώρα της παρουσίασής του

Ο κ. **Daniel Pleissner**, Επικεφαλής Έρευνας του Ινστιτούτου Τροφίμων και Περιβαλλοντικής Έρευνας e.V. του Μπαντ Μπέλτσιγκ στο Βρανδεμβούργο της Γερμανίας και Επισκέπτης Καθηγητής του Πανεπιστημίου Leuphana Lüneburg παρέθεσε τη σημασία της χρήσης υποπροϊόντων από τον τομέα της υδατοκαλλιέργειας αξιολογώντας την παραγωγής ζωοτροφών από υποπροϊόντα, και ειδικότερα εξερεύνησε τα ενδιαφέροντα υλικά για την παραγωγή ετερότροφων μικροφυκών.

Εικόνα 5. Αριστερά: Προεδρεύουσα και συντονίστρια του Διεθνούς Εργαστηρίου κυρία Σμαράγδα Σωτηράκη, Διευθύντρια Ερευνών της ερευνητικής ομάδας του εργαστηρίου Παρασιτολογίας και Παρασιτικών νοσημάτων του Ινστιτούτου Κτηνιατρικών Ερευνών (ΙΚΕΘ) του ΕΛΓΟ-ΔΗΜΗΤΡΑ. Κέντρο: Προεδρεύουσα και συντονίστρια του Διεθνούς Εργαστηρίου κυρία Κάτια Λαζαρίδη, Καθηγήτρια Περιβαλλοντικής Διαχείρισης και Τεχνολογίας του Χαροκοπείου Πανεπιστημίου. Δεξιά: Ο κύριος Daniel Pleissner, Επικεφαλής Έρευνας του Ινστιτούτου Τροφίμων και Περιβαλλοντικής Έρευνας e.V. του Μπαντ Μπέλτσιγκ στο Βρανδεμβούργο της Γερμανίας και Επισκέπτης Καθηγητής του Πανεπιστημίου Leuphana Lüneburg κατά την έναρξη της ομιλίας του

Τέλος, η κ. **Σμαράγδα Σωτηράκη**, Διευθύντρια Ερευνών της ερευνητικής ομάδας του εργαστηρίου Παρασιτολογίας και Παρασιτικών νοσημάτων του Ινστιτούτου Κτηνιατρικών Ερευνών (ΙΚΕΘ) του ΕΛΓΟ-ΔΗΜΗΤΡΑ, αναφέρθηκε εκτενώς στις προσπάθειες που γίνονται για την επαναχρησιμοποίηση των αποβλήτων και των υποπροϊόντων της γεωργικής βιομηχανίας σε βιοδραστικές ζωοτροφές, προστατεύοντας την υγεία του εντέρου και ενισχύοντας την παραγωγικότητα των μικρών μηρυκαστικών, προωθώντας ουσιαστικά περιβαλλοντικά βιώσιμες πρακτικές καλλιέργειας χαμηλών εισροών και μειώνοντας την εξάρτηση από χημικά φάρμακα.Το πρόγραμμα του εργαστηρίου.

Εικόνα 6. Η κυρία Σμαράγδα Σωτηράκη, Διευθύντρια Ερευνών της ερευνητικής ομάδας του εργαστηρίου Παρασιτολογίας και Παρασιτικών νοσημάτων του Ινστιτούτου Κτηνιατρικών Ερευνών (ΙΚΕΘ) του ΕΛΓΟ-ΔΗΜΗΤΡΑ, ολοκληρώνοντας της ομιλία της

Παράρτημα Α. Πρόγραμμα

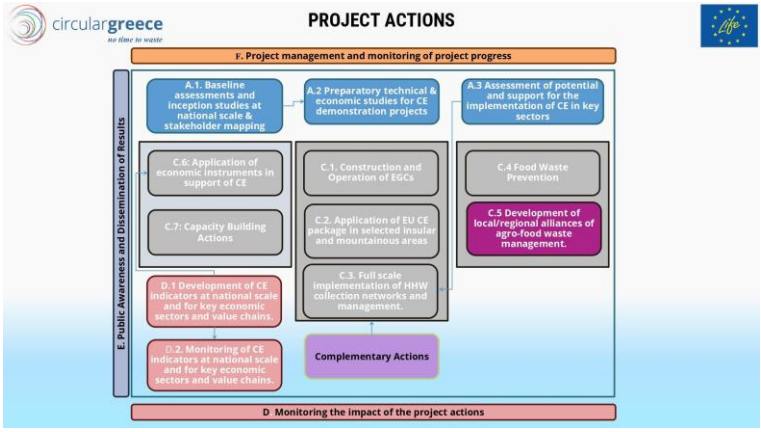
Agro-food Waste + Bioeconomy Workshop
Agenda

	LIFE-IP CEI-GREECE WORKSHOP - Agro-food waste and bio-economy Chair: Katia Lasaridi and Smaragda Sotiraki
11:30 - 11:35	Katia Lasaridi, Harokopio University Professor Welcome
11:35 - 11:45	Fay Nakou, Hellenic Ministry of the Environment and Energy Environmenetal Expert The LIFE-IP CEI-Greece "Circular Economy Implementation in Greece" Project
11:45 - 12:00	Napoleon Maravegias, University of Athens Em. Professor and f. Vice Rector, f. Minister of Rural Development and Food, Hellenic Republic Policy frameworks for sustainable agriculture.
12:00 - 12:15	Despina Papanikolaou, Head of Animal By-Product Department of Veterinary Public Health Directorate, Hellenic Ministry of Rural Development and Food Animal Proteins from Human Food to Animal Feed
12:15 - 12:30	Thrasyvoulos Manios, Hellenic Mediteranean University Professor LIFE -Food for Feed: An Innovative Process for Transforming Hotels Food Wastes into Animal Feed
12:30 - 12:45	Alejandro Barragan-Ocana, Instituto Politécnico Nacional Researcher-Professor, Mexico City Advances in science and technology for the production of biofuelas and value-added products from the use of biomass and agricultural residues
12:45 - 13:00	Daniel Pleissner, Institute for Food & Environmental Research e.V. Head of Science, Bad Belzig + Leuphana University Lüneburg Institute of Sustainable & Environmental Chemistry Adjunct Professor Heterotrophic growth of Galdieria sulphuraria on residues from aquaculture and fish processing industries
13:00 - 13:15	Smaragda Sotiraki, Veterinary Research Institute Hellenic Agricultural Organisation DEMETER SMARTWASTE: Reusing wastes and by-products of agricultural industry to develop bioactive livestock feeds
13:30 - 14:00	Coffee Break

Παράρτημα Γ. Παρουσιάσεις Ομιλητών

Fay Nakou
Environmental Expert, Ministry of Environment & Energy

The LIFE-IP "Circular Economy Implementation in Greece" project.
https://circulargreece.gr/wp-content/uploads/2023/10/LIFE-IP-CEI-GR_MEEN_2nd-Thematic-Workshop_27092023.pdf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PROJECT ACTIONS
F. Project management and monitoring of project progress
E. Public Awareness and Dissemination of Results
A.1. Baseline assessments and inception studies at national scale & stakeholder mapping
A.2 Preparatory technical & economic studies for CE demonstration projects
A.3 Assessment of potential and support for the implementation of CE in key sectors
C.6: Application of economic instruments in support of CE
C.7: Capacity Building Actions
C.1. Construction and Operation of EGCs
C.2. Application of EU CE package in selected insular and mountainous areas
C.3. Full scale implementation of HHW collection networks and management.
C.4 Food Waste Prevention
C.5 Development of local/regional alliances of agro-food waste management.
D.1 Development of CE indicators at national scale and for key economic sectors and value chains.
D.2. Monitoring of CE indicators at national scale and for key economic sectors and value chains.
Complementary Actions
D Monitoring the impact of the project actions


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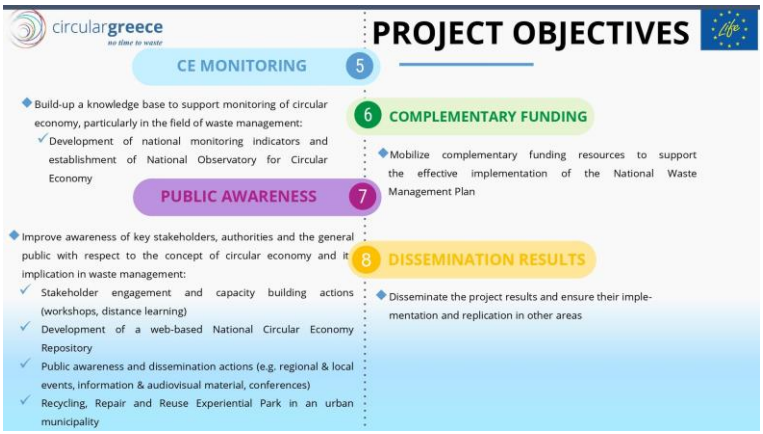
PROJECT OBJECTIVES
PILOT ACTIONS 1
Development of pilot actions in 9 municipalities and 1 region to promote the practical implementation of waste hierarchy:
Integrated Waste Management based on circular economy principles (5 insular, MoTh, MoP-Ant, MoAl, MoTi and 1 mountainous municipalities, MoN)
Preparation for reuse and separate waste collection, EGC's (3 urban municipalities, MoA, MoT, MoVVV)
Hazardous household waste management (1 urban municipality MoA and 1 region, Western Macedonia)
Implementation of financial tools, PAYT (1 urban municipality, MoVVV)
2 FOOD WASTE PREVENTION
Implement actions to promote food waste prevention:
Setting up measurement and annual reporting on national food waste generation in Greece
Elaboration of Special programme for food waste prevention
Development and operation of a Food Waste Prevention Hub
Food waste prevention demonstration actions
Establishment of Stakeholder Food Waste Prevention Forum
AGROFOOD WASTE PROCESSING WASTE VALORISATION & MANAGEMENT 3
Develop alliances for the agro-food waste management as part of circular economy
4 ECONOMIC INSTRUMENTS
Enhance the use of economic instruments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PROJECT OBJECTIVES
CE MONITORING 5
Build-up a knowledge base to support monitoring of circular economy, particularly in the field of waste management:
Development of national monitoring indicators and establishment of National Observatory for Circular Economy
6 COMPLEMENTARY FUNDING
Mobilize complementary funding resources to support the effective implementation of the National Waste Management Plan
PUBLIC AWARENESS 7
Improve awareness of key stakeholders, authorities and the general public with respect to the concept of circular economy and it implication in waste management:
Stakeholder engagement and capacity building actions (workshops, distance learning)
Development of a web-based National Circular Economy Repository
Public awareness and dissemination actions (e.g. regional & local events, information & audiovisual material, conferences)
Recycling, Repair and Reuse Experiential Park in an urban municipality
8 DISSEMINATION RESULTS
Disseminate the project results and ensure their implementation and replication in other areas


Get in touch
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social media: Circular Greece
Project Leaflet in English.
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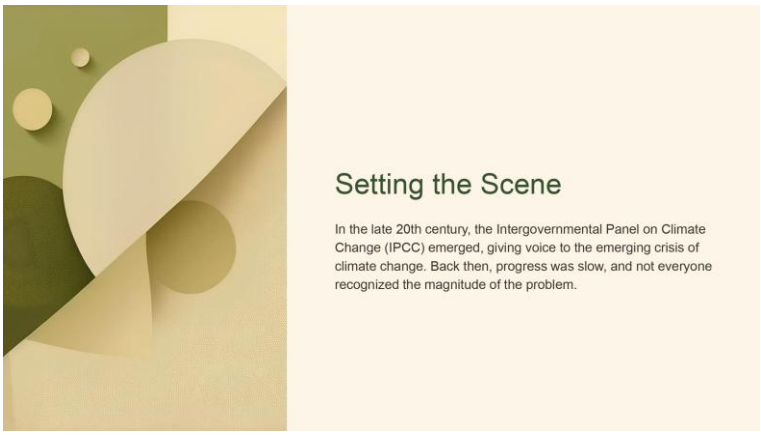
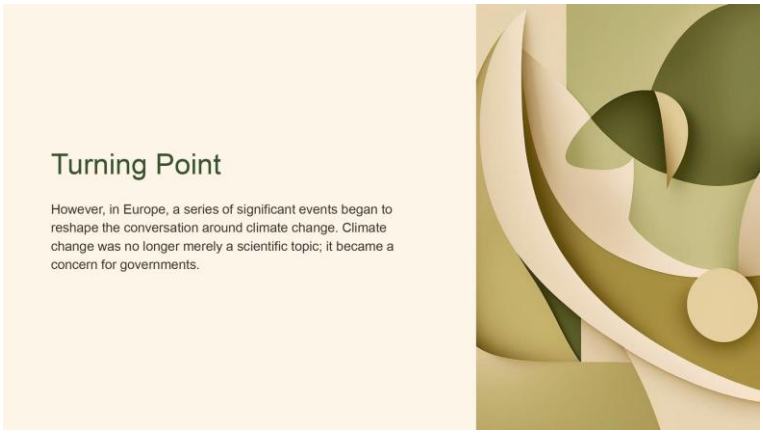
Napoleon Maravegias
University of Athens Em. Professor and f. Vice Rector,
f. Minister of Rural Development and Food, Hellenic Republic

Policy frameworks for sustainable agriculture.
https://circulargreece.gr/wp-content/uploads/2023/10/02.-MARAVEGIAS.pdf





Shift in Perspective

From a political science perspective, a paradigm shift was taking place. Climate change transitioned from being merely a regulatory problem to an economic opportunity waiting to be seized. This marked the era of ecological modernization, where the market-driven solutions aligned with the principles of sustainability.

Ecological Modernization

Ecological modernization, deeply rooted in institutionalism, advocates using monetary and market-driven incentives to foster environmental protection and sustainability. It is a departure from relying solely on regulations and emphasizes the power of innovation and economic principles in tackling climate change.

Application to Food Waste

Now, let's explore the parallel challenge of food waste. Imagine a world where food waste is not seen as a burden but as an untapped economic potential.

Historical Perspective

The EU's history of regulatory standards, such as the General Food Law, showcases the strategic deployment of standards as powerful tools in international trade negotiations, resulting in economic advantages for the EU. This historical context illuminates the importance of aligning the interests of businesses, consumers, and policymakers in addressing food waste.

Bringing It Full Circle

Imagine businesses throughout the agro-food chain actively participating in reducing food waste, earning credits and incentives that they can trade for financial benefits. This model creates a direct economic incentive for waste reduction, motivating businesses to adopt sustainable practices and reducing their impact on the environment.

Policymaker's Role

Policymakers play a pivotal role in reshaping economic calculations by introducing financial incentives such as tax breaks, grants, and subsidies to support businesses in their food waste reduction efforts. By providing the necessary resources, policymakers empower businesses to invest in technologies and processes that enhance efficiency and reduce waste.

Consumer Demand

Consumer awareness and demand have the power to drive change. By increasing awareness about the economic and environmental consequences of food waste, consumers can make conscious choices and prioritize products and services that prioritize waste reduction. Policy measures, such as awareness campaigns and labeling standards, can further amplify this consumer-driven change.

Closing

The parallels between climate change and food waste highlight the potential for economic incentives and opportunities to transform our future. By embracing a market-oriented approach, combined with financial incentives, institutional support, and consumer demand, we can unlock the promise of reducing food waste and mitigating its economic and environmental impacts.

Thank you!

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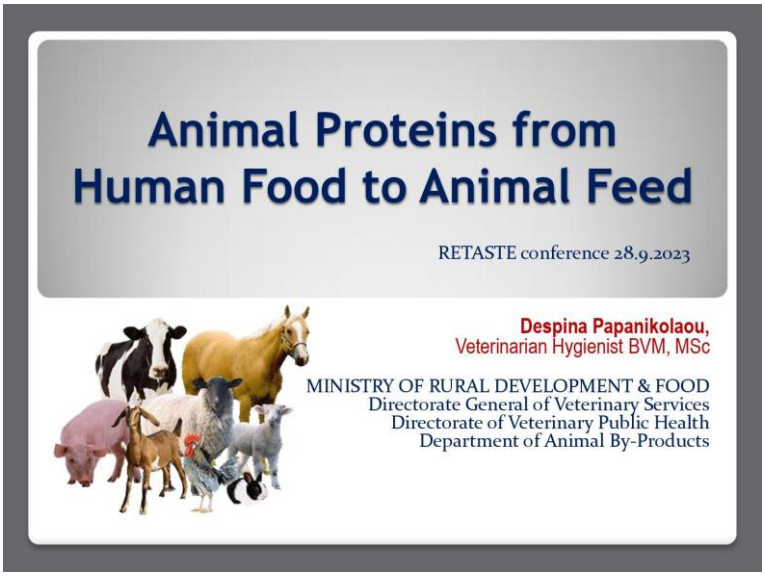
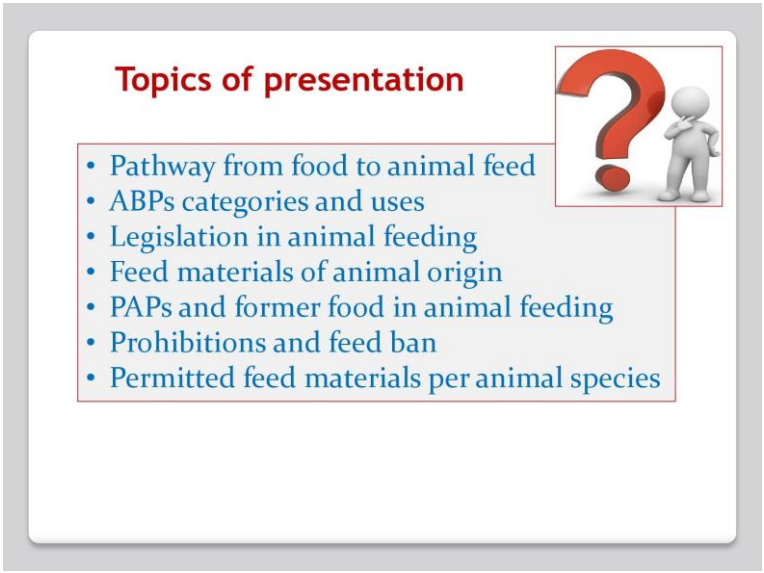
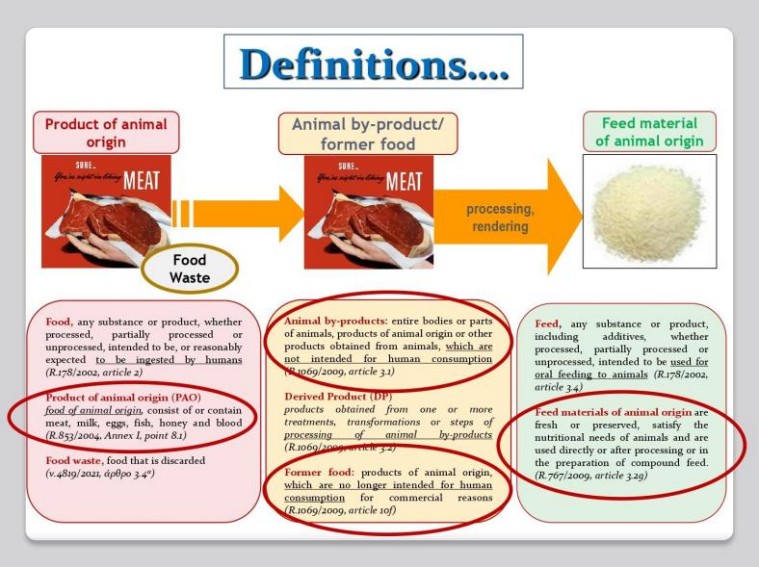
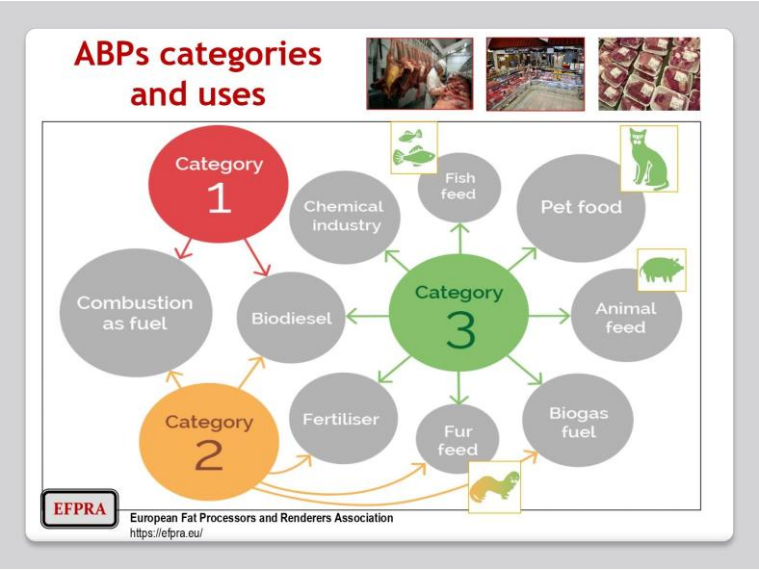
Animal Proteins from Human Food to Animal Feed.
https://circulargreece.gr/wp-content/uploads/2023/10/03.-AFF-425.pdf






Definitions....
Product of animal origin
Animal by-product/ former food
Feed material of animal origin
MEAT
MEAT
processing, rendering
Food Waste
Food, any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans (R.178/2002, article 2)
Product of animal origin (PAO) food of animal origin, consist of or contain meat, milk, eggs, fish, honey and blood (R.853/2004, Annex I, point 8.1)
Food waste, food that is discarded (ν.4819/2021, άρθρο 3.4°)
Animal by-products: entire bodies or parts of animals, products of animal origin or other products obtained from animals, which are not intended for human consumption (R.1069/2009, article 3.1)
Derived Product (DP) products obtained from one or more treatments, transformations or steps of processing of animal by-products (R.1069/2009, article 3.2)
Former food: products of animal origin, which are no longer intended for human consumption for commercial reasons (R.1069/2009, article 10f)
Feed, any substance or product, including additives, whether processed, partially processed or unprocessed, intended to be used for oral feeding to animals (R.178/2002, article 3.4)
Feed materials of animal origin are fresh or preserved, satisfy the nutritional needs of animals and are used directly or after processing or in the preparation of compound feed. (R.767/2009, article 3.29)


ABPs categories and uses
Category 1
Chemical industry
Fish feed
Pet food
Combustion as fuel
Biodiesel
Category 3
Animal feed
Category 2
Fertiliser
Fur feed
Biogas fuel
EFPRA
European Fat Processors and Renderers Association
https://efpra.eu/

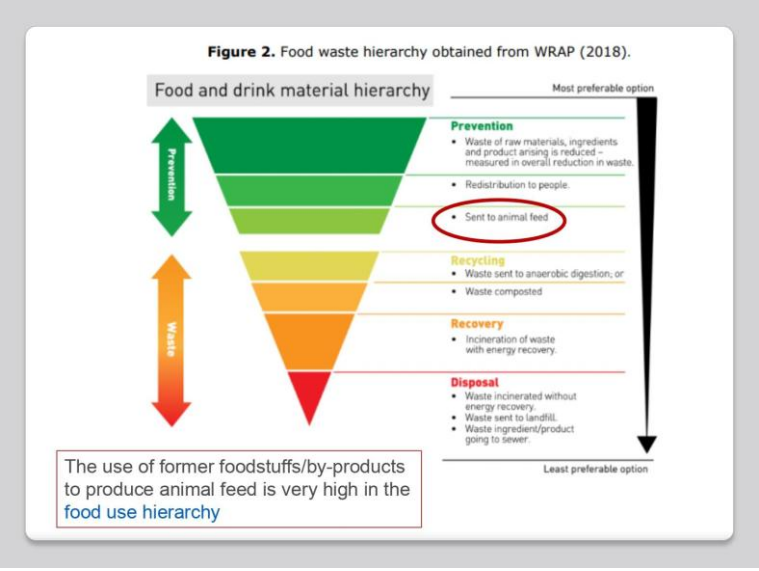
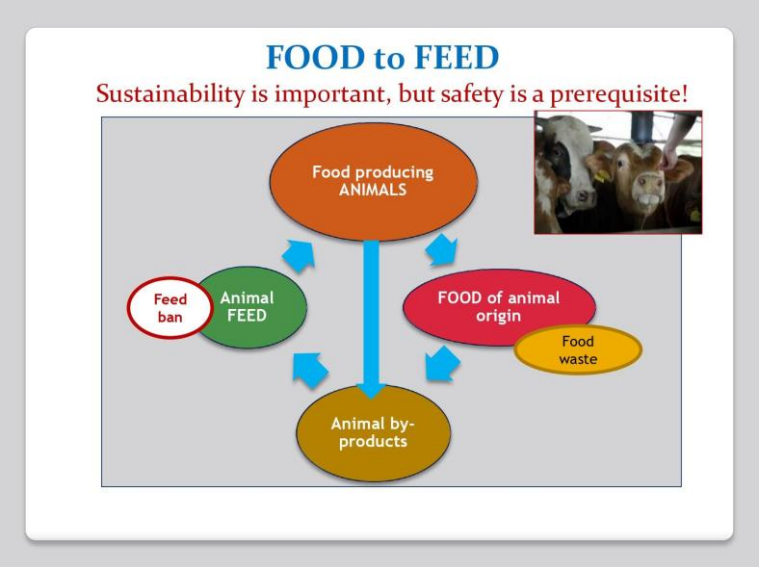
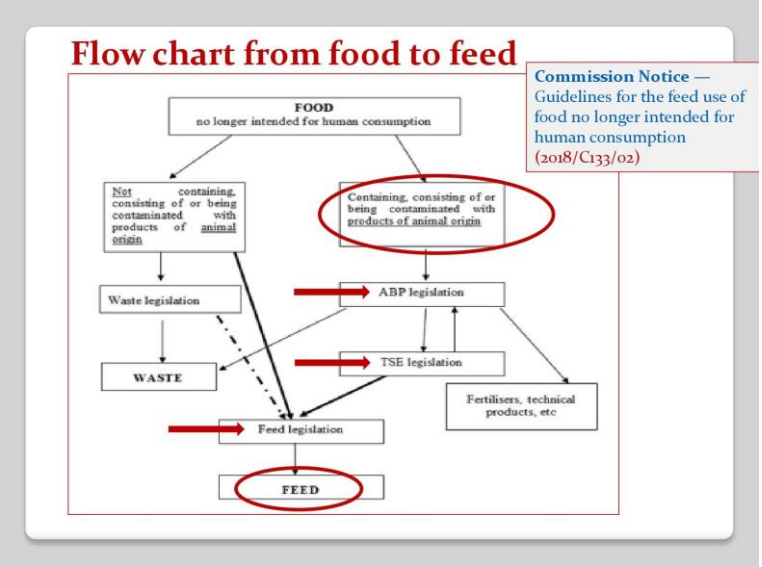
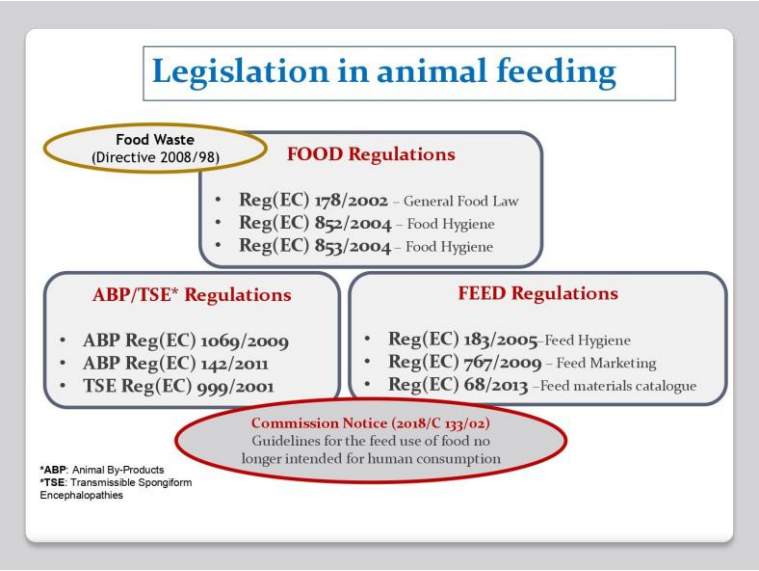


Figure 2. Food waste hierarchy obtained from WRAP (2018).
Food and drink material hierarchy
Most preferable option
Prevention
Waste
Prevention
Waste sent to anaerobic digestion; or
Waste composted
Recovery
Incineration of waste with energy recovery.
Disposal
Waste incinerated without energy recovery.
Waste sent to landfill.
Waste ingredient/product going to sewer.
Least preferable option
The use of former foodstuffs/by-products to produce animal feed is very high in the food use hierarchy


FOOD to FEED
Sustainability is important, but safety is a prerequisite!
Food producing ANIMALS
Feed ban
Animal FEED
FOOD of animal origin
Food waste
Animal by-products


Flow chart from food to feed
Commission Notice — Guidelines for the feed use of food no longer intended for human consumption (2018/C133/02)
FOOD no longer intended for human consumption
Not containing, consisting of or being contaminated with products of animal origin
Containing, consisting of or being contaminated with products of animal origin
Waste legislation
ABP legislation
WASTE
TSE legislation
Fertilisers, technical products, etc
Feed legislation
FEED


Legislation in animal feeding
Food Waste (Directive 2008/98)
FOOD Regulations
Reg(EC) 178/2002 – General Food Law
Reg(EC) 852/2004 – Food Hygiene
Reg(EC) 853/2004 – Food Hygiene
ABP/TSE* Regulations
ABP Reg(EC) 1069/2009
ABP Reg(EC) 142/2011
TSE Reg(EC) 999/2001
FEED Regulations
Reg(EC) 183/2005 –Feed Hygiene
Reg(EC) 767/2009 – Feed Marketing
Reg(EC) 68/2013 –Feed materials catalogue
Commission Notice (2018/C 133/02)
Guidelines for the feed use of food no longer intended for human consumption
*ABP: Animal By-Products
*TSE: Transmissible Spongiform Encephalopathies

R.142/2011 Annex X

Feed materials of animal origin

Materials of animal origin that satisfy the nutritional needs of animals and are used directly or for the preparation of compound feed *(R.142/2011, Annex I.3)*. Feed materials of animal are ONLY **category 3 materials** and produced in food plant (processed according to article 2(1)(m) of R.852/2004) or in ABP processing plant cat.3 and include:

- **processed animal proteins - PAP** (including blood-meal and fish-meal)
- rendered fat, fish oil, fat derivatives
- blood products
- gelatin, collagen, hydrolyzed proteins
- di-calcium phosphate, tri-calcium phosphate
- **former processed food** (milk, eggs, honey and their products)

Only DPs category 3

PAP definitions

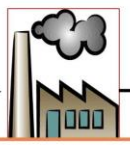
Processed animal protein -PAP (R.142/2011, Annex I.5)
animal protein derived entirely from **Category 3** material, which have been heat treated, including blood meal and fishmeal. *(PAP does not include blood products, milk, milk-based products, milk-derived products, colostrum, colostrum products, centrifuge or separator sludge, gelatine, hydrolysed proteins and dicalcium phosphate, eggs and egg-products, including eggshells, tricalcium phosphate and collagen)*

fishmeal (R.142/2011, Annex I.7) processed animal protein derived from aquatic animals except sea mammals
blood meal (R.142/2011, Annex I.6) processed animal protein derived from the **heat treatment of blood** or fractions of blood

Blood products are the derived products from blood such as dried/frozen/liquid plasma, dried whole blood, dried/frozen/liquid red cells or fractions thereof and mixtures *(R.142/2011, Annex I, point 4)*.

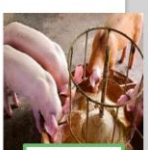
PAP from food to feed:
Flow chart and legislation requirements

Slaughterhouse
Butcher shop
(meat and bones)



ABP processing plant
(PAP production)

Feed plant
(compound feed)



Pig farm

ABP/TSE legislation requirements

Feed/TSE legislation requirements

ABP processing plant cat.3 (rendering plant)

R.142/2011 Annex IV

Conversion of organic substances (ABPs) in PAP and rendered fats

3

- Best available technology for the utilization of ABPs as feed
- Only raw materials category 3
- Processed products (PAP, rendered fats)
- Rendering plant needs approval **for specific category and animal species** (e.g. M3 from poultry) from the competent veterinary authorities

Flow chart for PAP production in a rendering plant

Raw ABP material
Breaker < 50 mm
Steriliztion
Dryer
Condensation
Waste water treatment
Press
Fat
Mill
Decanter/centrifuge
Meal, PAP
Fat

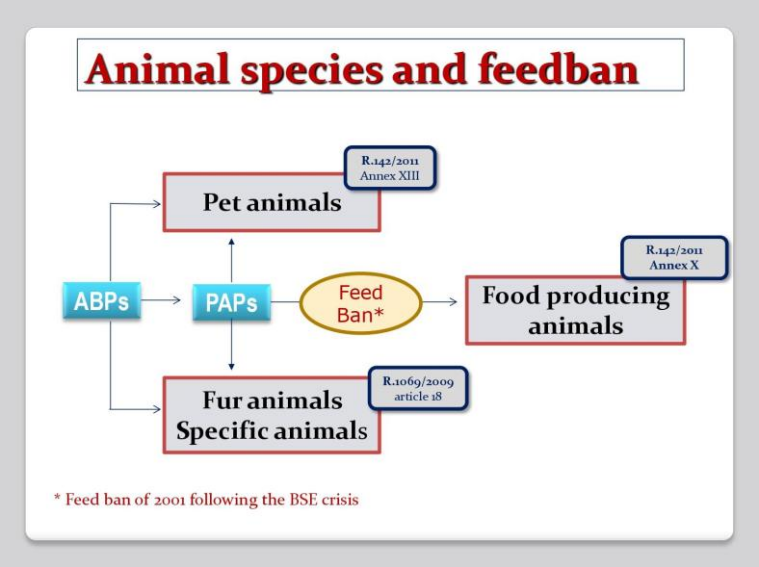
Critical parameters in PAP production

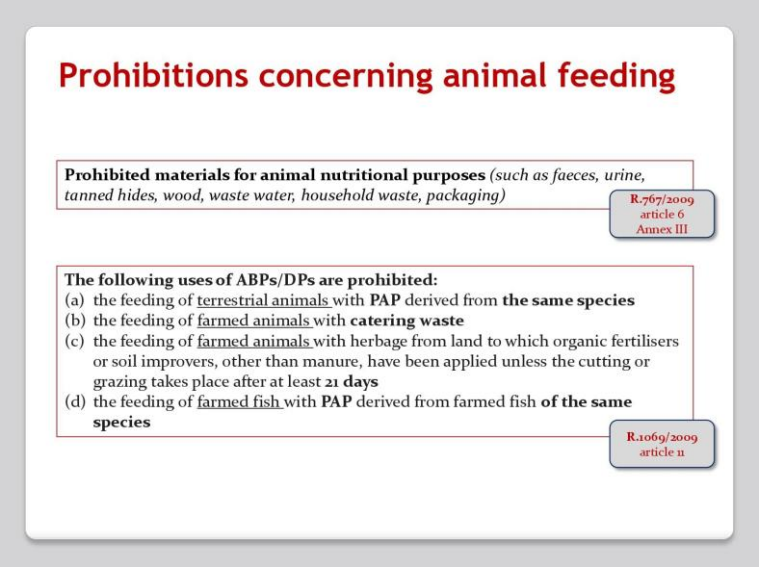
- Pulping of the incoming raw material

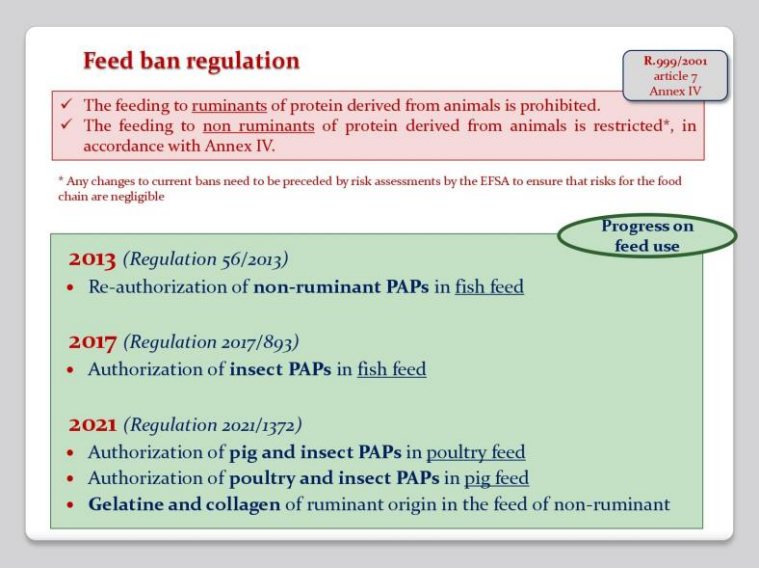
SOS → **Processing method 1** (pressure sterilization)

- Particles size < 50mm
- Temperature 133°C for 20'
- Pressure 3 bar

- **Rendering cooker**


Animal species and feedban
R.142/2011
Annex XIII
Pet animals
R.142/2011
Annex X
ABPs
PAPs
Feed
Ban*
Food producing
animals
R.1069/2009
article 18
Fur animals
Specific animals
* Feed ban of 2001 following the BSE crisis


Prohibitions concerning animal feeding
Prohibited materials for animal nutritional purposes (such as faeces, urine, tanned hides, wood, waste water, household waste, packaging)
R.767/2009
article 6
Annex III
The following uses of ABPs/DPs are prohibited:
(a) the feeding of terrestrial animals with PAP derived from the same species
(b) the feeding of farmed animals with catering waste
(c) the feeding of farmed animals with herbage from land to which organic fertilisers or soil improvers, other than manure, have been applied unless the cutting or grazing takes place after at least 21 days
(d) the feeding of farmed fish with PAP derived from farmed fish of the same species
R.1069/2009
article 11


Feed ban regulation
R.999/2001
article 7
Annex IV
✓ The feeding to ruminants of protein derived from animals is prohibited.
✓ The feeding to non ruminants of protein derived from animals is restricted*, in accordance with Annex IV.
* Any changes to current bans need to be preceded by risk assessments by the EFSA to ensure that risks for the food chain are negligible
Progress on feed use
2013 (Regulation 56/2013)
• Re-authorization of non-ruminant PAPs in fish feed
2017 (Regulation 2017/893)
• Authorization of insect PAPs in fish feed
2021 (Regulation 2021/1372)
• Authorization of pig and insect PAPs in poultry feed
• Authorization of poultry and insect PAPs in pig feed
• Gelatine and collagen of ruminant origin in the feed of non-ruminant

PAP from ruminants in animal feeding

Processed animal protein derived from ruminants (bovine, sheep and goats), including blood meal, **is banned** in the feed of farmed animals, due to BSE crisis.

R.142/2011, Annex X
R.999/2001, article 7

Processed animal protein derived from ruminants:
- must be produced in approved processing plants, with any of processing methods 1 to 5 or processing method 7
- intended to be used **for feeding pet animals and fur animals**

PAP from non-ruminants in animal feeding

PAP derived from	PAP as feed of the following animals
PAP from non-ruminants	Aquaculture (2013), pet and fur animals
Fishmeal	Aquaculture, only un-weaned ruminants, non-ruminants, pet and fur animals
PAP **only** from porcine	Aquaculture (2013), poultry (2021), pet and fur animals
PAP **only** from poultry	Aquaculture (2013), porcine (2021), pet and fur animals
PAP **only** from insects	Aquaculture (2017), poultry (2021), porcine (2021), pet and fur animals

R.142/2011, Annex X
R.999/2001, Annex IV

Processed animal protein derived from non-ruminants:
- must be produced in approved processing plants, with
  - processing **method 1** for food produced animals
  - any of processing **methods 1 to 5 or 7** for pet animals and fur animals

PAP from insects in animal feeding

Processed animal protein derived from farmed insects, may only be obtained from the following insect species:

R.142/2011
Annex X

- Black Soldier Fly (*Hermetia illucens*)
- Common Housefly (*Musca domestica*)
- Yellow Mealworm (*Tenebrio molitor*)
- Lesser Mealworm (*Alphitobius diaperinus*)
- House cricket (*Acheta domesticus*)
- Banded cricket (*Gryllodes sigillatus*)
- Field Cricket (*Gryllus assimilis*)
- Silkworm (*Bombyx mori*)

R.999/2001
Annex IV

Processed animal protein derived from farmed insects:
- must be produced in approved processing plants, with any of processing methods 1 to 5 or processing method 7
- intended to be used **for feeding aquaculture animals** (R.2017/893), **poultry and porcine animals** (R.1372/2021)

R.999/2001 article 7 Annex IV

Former food used in animal feeding

Former food	Requirements	Food producing animals				Pet and fur animals
		Ruminants	Pigs	Poultry	Aquaculture	
▪ Milk and products ▪ Eggs and products ▪ Honey ▪ Rendered fats (R<0.15%) ▪ Collagen/gelatin[1]	- Originated from EU - Processed under food hygiene legislation	[1]only from nR				
▪ Fish ▪ Fishery products	- Processed as fishmeal (PAP)[2]	[2]only for unweaned R in milk replacers			[2]no cannibalism	
▪ Meat of nR ▪ Meat products of nR	- Processed as PAP[3]		[3]only PAP from poultry & insects	[3]only PAP from pigs & insects		
▪ Meat of R ▪ Meat products of R						

(R) Ruminants
(nR) non-Ruminants
(PAP) processed animal protein

R.999/2001 article 7 Annex IV

Feed materials per animal species

	Product types	Farmed animals other than fur animals					Pet and fur animals
		Ruminants	Porcine animals	Poultry	Other non-ruminants	Aquaculture animals	
1	Ruminant processed animal proteins (PAP) including blood meal						
2	PAP from porcine animals			2021		2013	
3	Other non-ruminant mammalian PAP					2013	
4	PAP from poultry		2021			2013	
5	PAP from farmed insects		2021	2021		2017	
6	Fishmeal (PAP) (includes blood meal of aquatic animals)	In milk replacers for unweaned Ru-s only				No fishmeal of farmed species X to same species X	
7	Blood products from non-ruminants						
8	Blood products from ruminants						
9	Hydrolysed proteins from non-ruminants and/or ruminants hides and skins						
10	Hydrolysed proteins other than those only derived from non-ruminants and/or ruminants hides and skins						
11	Gelatine and collagen from ruminants		2021	2021	2021	2021	
12	Gelatine and collagen from non-ruminants						
13	Di and tricalcium phosphate of animal origin						
14	Egg, egg products, milk, milk products and colostrum						
15	Animal proteins other than the above-mentioned ones						
	Colour codes	Not authorized	Authorized			Authorized for certain types of animals	

*fishing bait is considered to fall under the category of feed for aquaculture, since one cannot guarantee that the fishing bait is only used for wild aquatic animals and not for kept aquatic animals.

Thank you for your attention!

http://www.minagric.gr/index.php/el/for-farmer-2/animal-production/zoikaypoproionta
E-mail: dpapanikolaou@minagric.gr

Thrasyvoulos Manios
Hellenic Mediteranean University Professor

LIFE -Food for Feed: An Innovative Process for Transforming Hotels Food Wastes into Animal Feed.
https://circulargreece.gr/wp-content/uploads/2023/10/04.-MANIOS.pdf

The F4F LIFE PROJECT

- Duration: 01/09/2016 – 28/02/2021
- Beneficiaries:

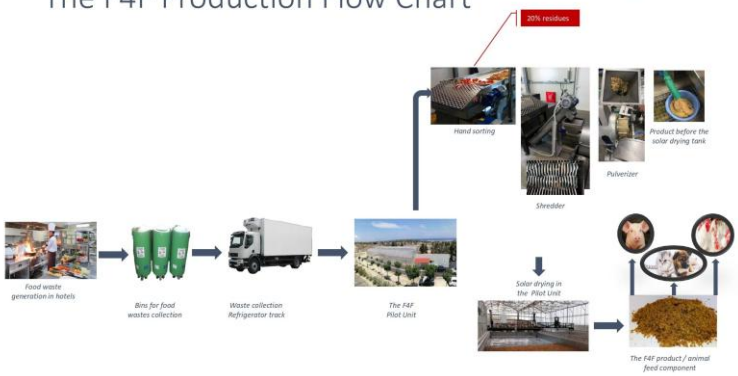
esdak | ΓΕΩΠΟΝΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ AGRICULTURAL UNIVERSITY OF ATHENS | Freie Universität Berlin | ΧΑΡΟΚΟΠΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ HAROKOPIO UNIVERSITY

- Location:

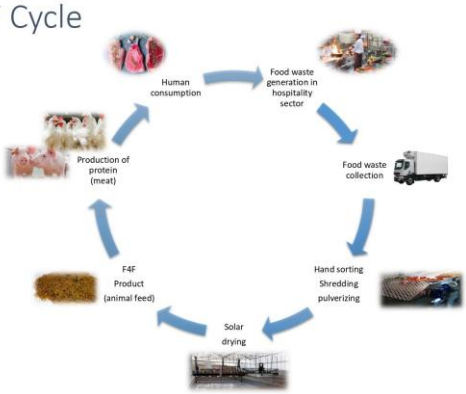
Heraklion, Crete, Greece

rethink food resources, losses, and waste 2023

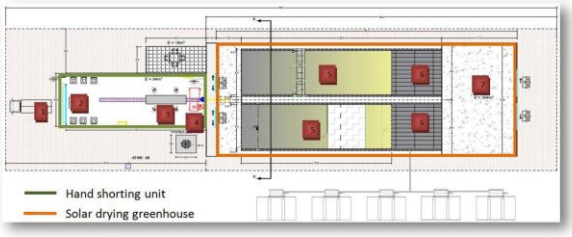
The F4F Production Flow Chart



The F4F Cycle



Plan View of the F4F Pilot Unit



1. Parking of refrigerator truck, brown bins uploaded
2. Bins entrance into the prefabricated building
3. Belt for hand shorting
4. Shredder and pump
5. Solar drying halls (covered with stainless still)
6. Place for bagging the end product
7. Temporary storage

Solar drying unit (30mx12.8m)=384m²
Prefabricated building (14mx6m)=84m²

rethink food resources, losses, and waste 2023

The F4F LIFE Project

➢Production of animal feed components from food waste

rethink food resources, losses, and waste 2023

Cooperative hospitality Units with the F4F

12 branch stores in Heraklion, Ammoudara, Herssonissos & Malia

rethink food resources, losses, and waste 2023

Refrigerator track for collection of food waste from hospitality units

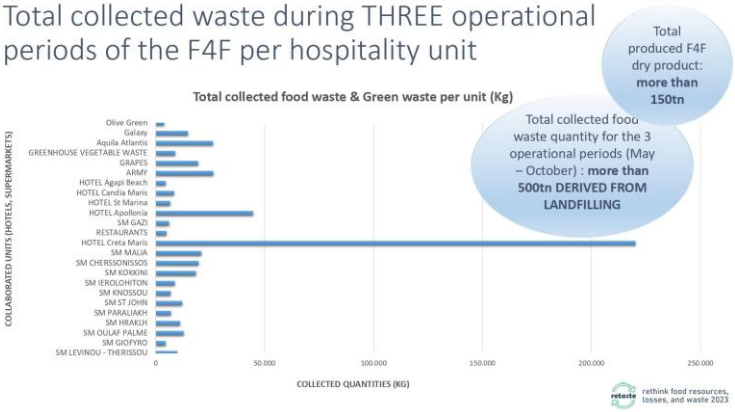
rethink food resources, losses, and waste 2023

During food waste collection from hospitality units

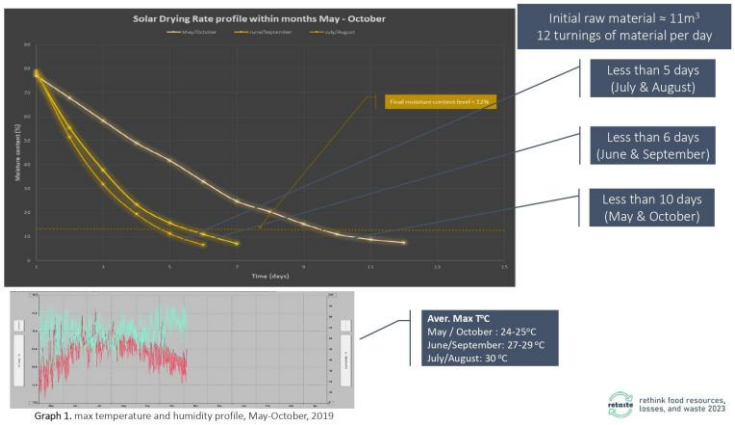
In the pretreatment unit …
Weighting - Hand sorting – Shredding - Pulverizing

In the Solar drying unit…

Total collected waste during THREE operational periods of the F4F per hospitality unit



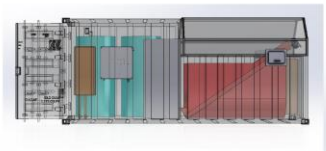
Total collected food waste (%) per month

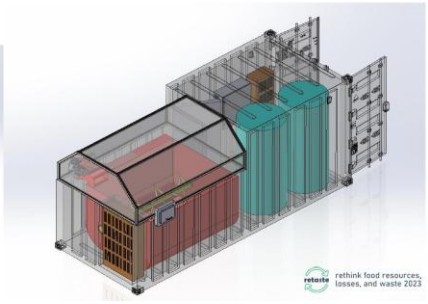


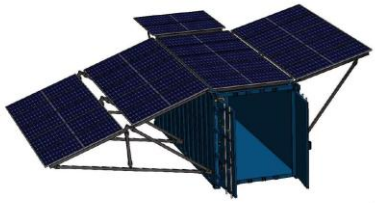
Graph 1. max temperature and humidity profile, May-October, 2019

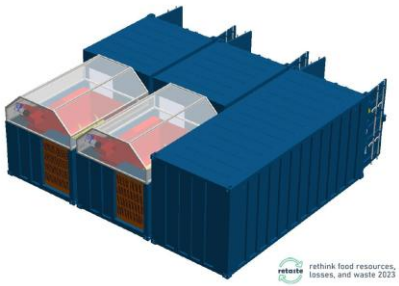
Total F4F product … as feed component…

The next step of the F4F ….
…is the on-site treatment….









rethink food resources, losses, and waste 2023

KEEP FOOD LOSSES
IN THE FOOD CHAIN !!!!

@LifeF4FCrete
@LifeF4FCrete
https://life-f4f.esdak.gr/

Acknowledgements
This research was co-funded by the EU LIFE+ project "Food for Feed: An Innovative Process for Transforming Hotels' Food Wastes into Animal Feed", with acronym LIFE-F4F (LIFE15 ENV/GR/000257) and by the Hellenic Green Fund.

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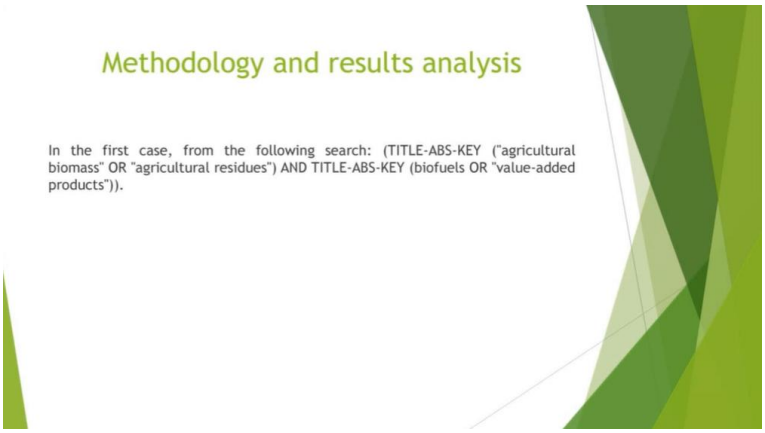
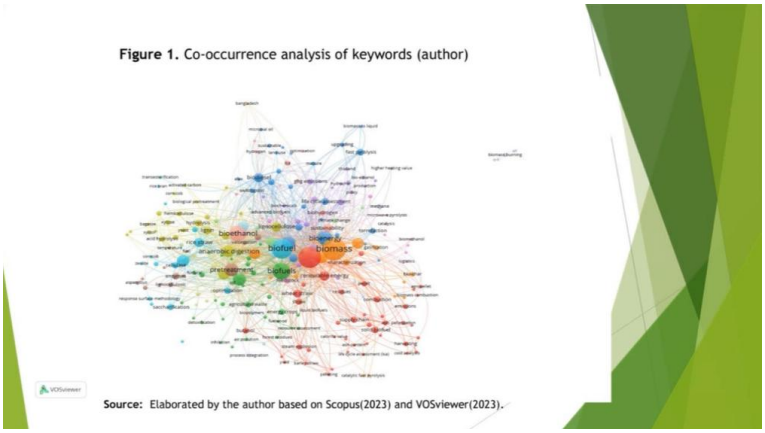
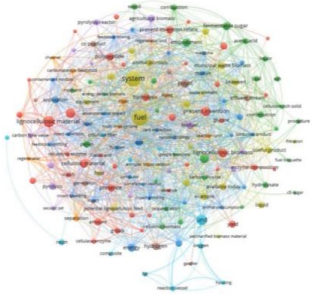
Advances in science and technology for the production of biofuelas and value-added products from the use of biomass and agricultural residues





In the second case, the patent analysis indicates that through the following search: (Title: ("agricultural biomass" OR "agricultural residues") OR (Abstract: ("agricultural biomass" OR "agricultural residues") OR Claims: ("agricultural biomass" OR "agricultural residues")))) AND (Title: (products OR materials) OR (Abstract: (products OR materials) OR Claims: (products OR materials)))).

Figure 2. Co-occurrence analysis



Source: Elaborated by the authors based on Lens (2023) and VOSviewer (2023).

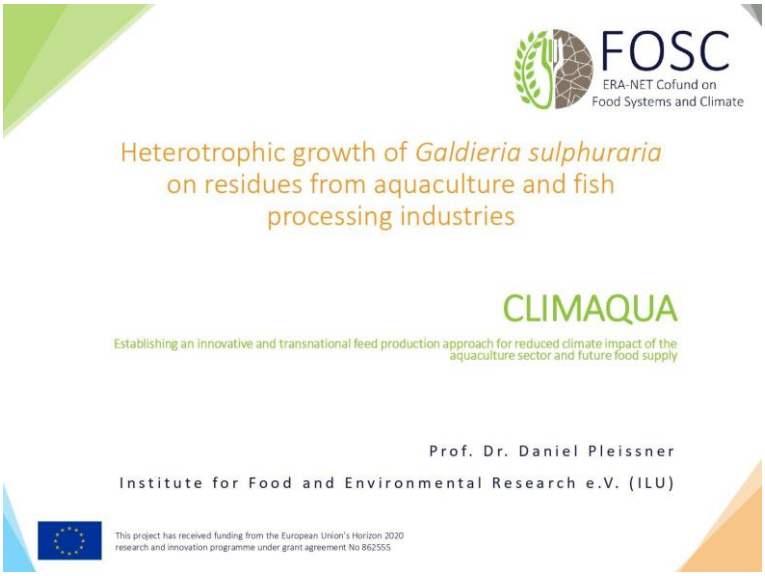
No.	Code	Description	Documents
1	C12P19/02	C12P 19/00: "Preparation of compounds containing saccharide radicals (ketoaldonic acids C12P 7/58)" ... C12P 19/02: "Monosaccharides".	44
2	C12P7/10	C12P 7/00: "Preparation of oxygen-containing organic compounds...". C12P 7/10: "Substrate containing cellulosic material...".	44
3	C12P19/14	"Produced by the action of a carbohydrase, e.g. by alpha-amylase...".	43
4	C12P7/06	"Ethanol, i.e. non-beverage...".	22
5	C12N9/42	C12N 9/00: "Enzymes, e.g. ligases (6.); Proenzymes; Compositions thereof (preparations containing enzymes for cleaning teeth A61K 8/66, A61Q 11/00; medicinal preparations containing enzymes or proenzymes A61K 38/43; enzyme containing detergent compositions C11D); Processes for preparing, activating, inhibiting, separating, or purifying enzymes ...". C12N 9/42: "Acting on beta-1, 4-glucosidic bonds, e.g. cellulase ...".	21

Conclusions

- There is an important dynamic in the generation of research and development for the advancement of biofuels and value-added products.
- However, it is important to continue working even more on the technological integration of biorefineries, especially those that process lignocellulosic material for the generation of second generation biofuels, such as bioethanol.
- Agricultural biomass and, in particular, agricultural residues represent a potential source for the generation of value-added products and for addressing energy problems, thus contributing to the advancement of sustainable development.

Daniel Pleissner
Institute for Food & Environmental Research e.V. Head of Science
Bad Belzig + Leuphana University Lüneburg Institute of Sustainable & Environmental Chemistry Adjunct Professor

Heterotrophic growth of Galdieria sulphuraria on residues from aquaculture and fish processing industries.
https://circulargreece.gr/wp-content/uploads/2023/10/06.-AFR-346.pdf



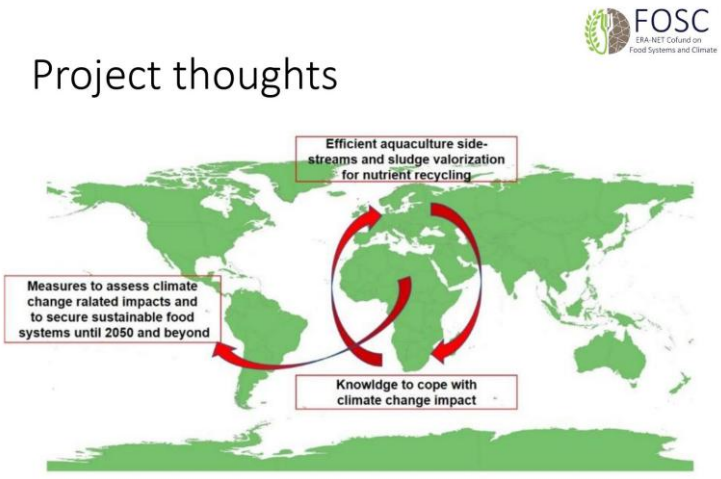


Fig. 1. Transnational Collaboration in CLIMAQUA.

FOSC
ERA-NET Cofund on Food Systems and Climate

Goals

Technological aspects lead to solutions with a low CO2 footprint	***Non-technological aspects leading to changes in supply chains and food system resilience***
1. Production of aquaculture feed that is efficient Feed utilization and a beneficial reduction in environmental pollution are ensured, 2. Utilization of aquaculture side streams (e.g. mud, fish carcasses) as raw materials for the production of *Galdieria sulphuraria* and finally to feed production, 3. Utilization of aquaculture plant wastewater rich in nitrogen and phosphorus as nutrient sources for *Galdieria biomass production sulphuraria* and finally for feed production, 4. Designing environmentally friendly feed production instead of using resources as well 5. Implement decentralized fish feed production, including on-site processing and minimal transportation.	6. Assessment of the socio-economic impacts and consequences of climate change on aquaculture in Africa and Europe, 7. Minimizing the interactions of climate change on food systems through climate-adapted production of feed and fish, 8. Development of resilient food systems taking into account changing food needs through needs-oriented aquaculture, 9. Decoupling agriculture from aquaculture by replacing agricultural feed with *Galdieria sulphuraria* and possibly residue-based feed and finally the reduction of greenhouse gas emissions from agriculture as well 10. Exchange and knowledge transfer to other regions worldwide.

FOSC
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Project thoughts

FOSC
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Activities

Wastewater from fish processing

Solids after hydrolysis of fish residues

Mud

Activities

Table 1. Composition of the substrates used.

Substrate	Protein (%)	Carbohydrates (%)	Fat (%)	Ash (%)
Solid after hydrolysis	65.5	-	11.6	2.1
Mud	29.2	19.9	9.1	21.8

Table 2. Composition of the wastewater (FAN = free amino nitrogen).

Nitrate (mg/L)	NH_3 / NH^{4+} (mg/L)	FAN (mg/L)
12.5	0.8	0.1

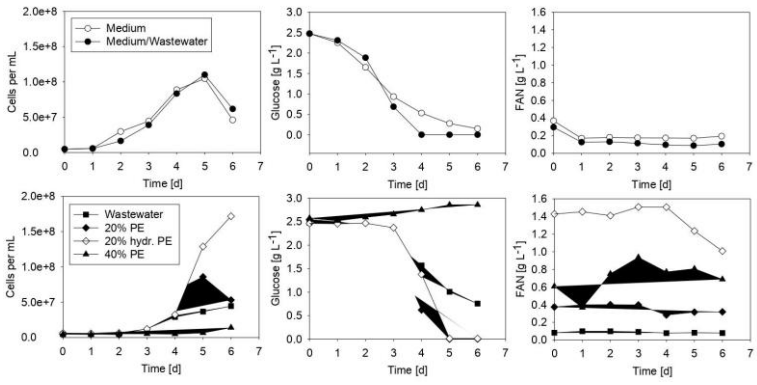
Activities

Bioresource Technology

Growth and phycocyanin synthesis in the heterotrophic microalga *Galdieria sulphuraria* on substrates made of food waste from restaurants and bakeries

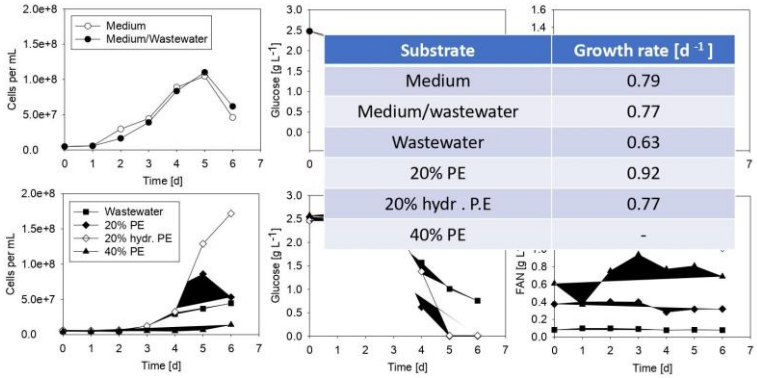
Activities

The cultivation of *Galdieria sulphuraria*



Activities

The cultivation of *Galdieria sulphuraria*



Substrate	Growth rate [d^{-1}]
Medium	0.79
Medium/wastewater	0.77
Wastewater	0.63
20% PE	0.92
20% hydr . P.E	0.77
40% PE	-

Bioreactor

Summary

- The utilization of by-products from the aquaculture sector must be kept in mind.

- And there are some interesting materials available for production of heterotrophic microalgae.

- The topic of feed production from by-products and that, so to speak constant recycling of nutrients must also be viewed critically.

- But is everything really more climate-friendly now?

Funded by the European Union

FOSC ERA-NET Cofund on Food Systems and Climate

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Bundesministerium für Ernährung und Landwirtschaft

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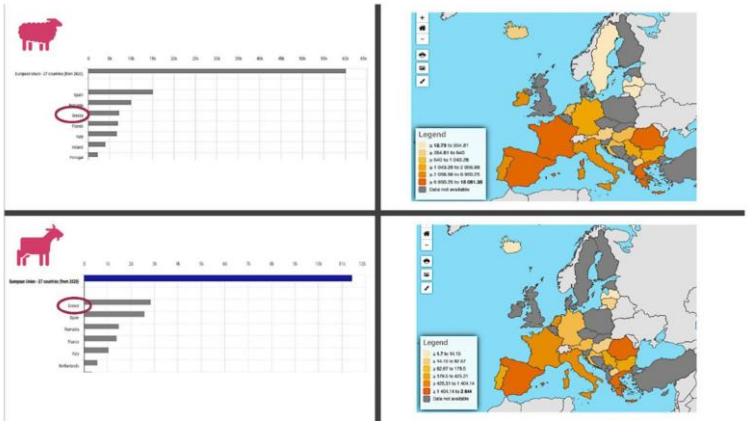
Smaragda Sotiraki
Veterinary Research Institute Hellenic Agricultural Organisation DEMETER

SMARTWASTE: Reusing wastes and by-products of agricultural industry to develop bioactive livestock feeds.
https://circulargreece.gr/wp-content/uploads/2023/10/08.-AFF-543.pdf

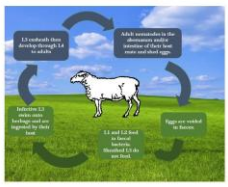
One of the most important agricultural activities is Sheep & Goat farming

- has a significant socio-economic contribution to the rural areas
- provides food to rural populations
- contributes significantly to the local ecosystems' maintenance
- is part of the cultural heritage of many region
- produces high quality traditional food products



Animal farming comes with challenges

Grazing ruminants = parasites

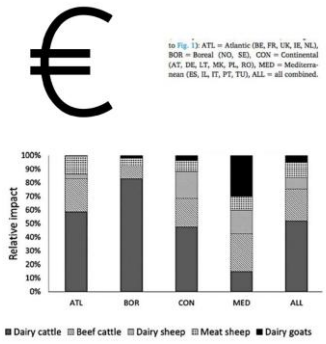


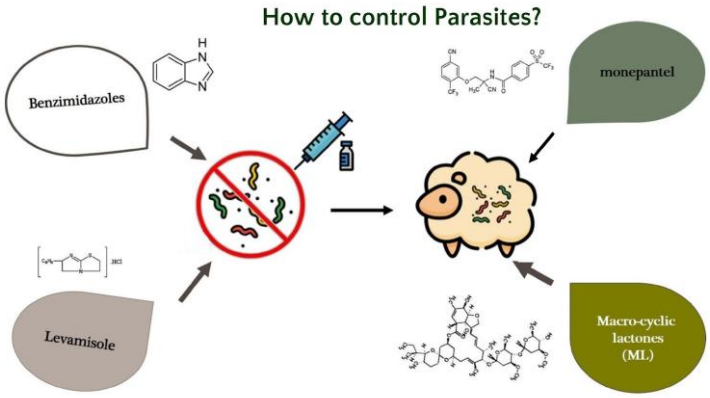
* Often occurring
* Widespread presence
* Affect health & welfare of grazing ruminants
  (anorexia, impaired digestion & nutrient absorption)
* Reduction of farmer's income
* Reduction in quantity and quality of products

parasite control matters

Evidence infection

- Budgets of all known national and European research projects on the topic in Europe over 10 year period
  - **€ 2.7 M / year**
- Annual investment / Annual cost:
  - **0.15%**





INCREASED LIMITS on the USE of AHs

NEED for ALTERNATIVE SOLUTIONS of CONTROL

- Worldwide development & diffusion of drug resistance
- Increasing number of multiresistant isolates in small ruminants
- **Exclusive reliance on AH is not a sustainable option**

Limits

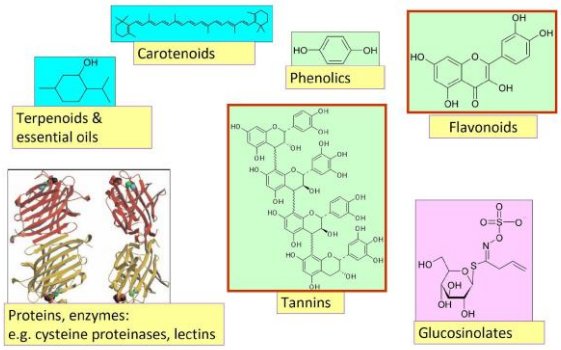
- Increased expectations to reduce chemicals in agriculture (organic products)
- Increased constraints in the regulation to use commercial AHs

Seek for alternative solutions

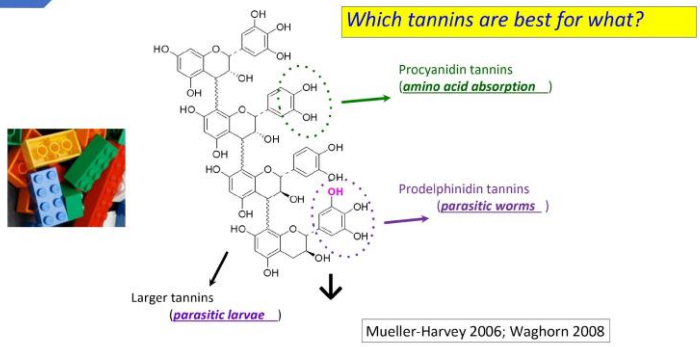
- Biological control, vaccine, genetic selection .....
- interaction host nutrition
- **Natural bioactive compounds of plants (plants secondary metabolites)**

11

What are Plant Secondary Metabolites (PSMs)?



Bioactive ingredients = tannins



Mueller-Harvey 2006; Waghorn 2008

The aim of our project was 3-fold:

1.to protect small ruminants' gut health & improving their productivity

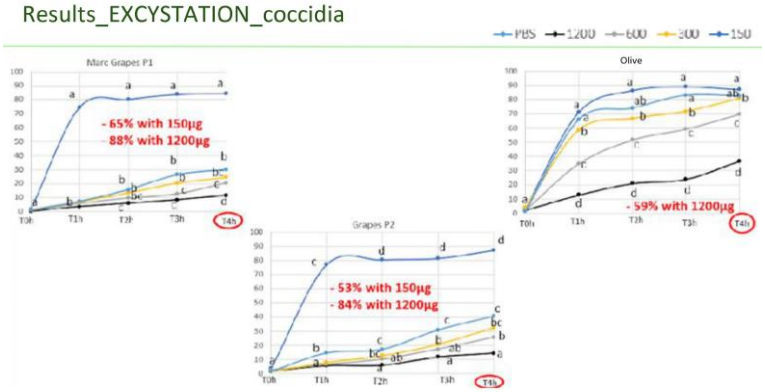
1.to adapt sustainable environmentally friendly, low input farming (reduce chemical drugs use)

1.to recycle agro-industrial biowaste & upgrading them to functional animal feed

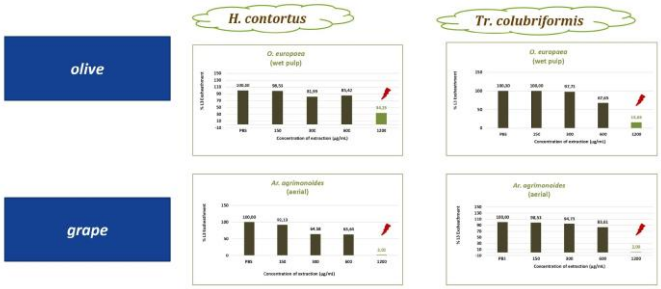

This will be achieved by producing our "SUPER FEED"
using locally produced agro-industrial waste/by-products containing bioactive compounds beneficial to the gut health


in vitro anthelmintic effect of extracts of plants' material.
Chemical components of the phenolics group within the extracts
In vitro studies

Results_EXCYSTATION_coccidia

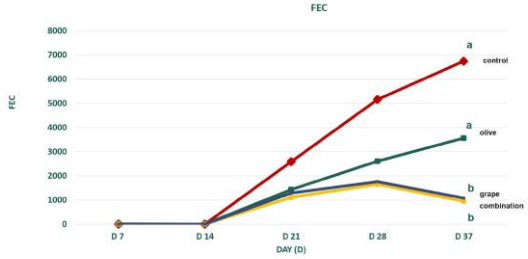


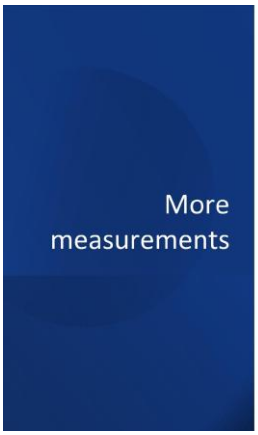
Results_EXSEATHMENT_GIN



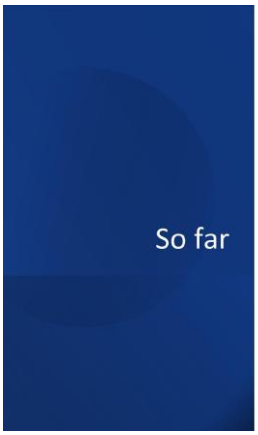
RESULTS

FAECAL EGG COUNTS _ gastrointestinal nematodes





- Chemical analyses
- Digestibility
- Refusals



- They do show an antiparasitic efficacy
- They are suitable to be added in animal ration
- They show hi nutritional value
- They are well accepted by the animals

- **1** How much depend on the Method of measurement !
- **2** There is a threshold requested but
- the concentration depends also on the quality of tannins
- **3** The effects can depend on the combination
- [C] x Time of distribution

HOW TO USE TANNINS IN THE DIFFERENT SYSTEMS OF SMALL RUMINANT PRODUCTION?

1 All year long as a feed complement ?

2 Repeated «cure» of tannin containing by-products/waste

4 At a strategic time in regard of the epidemiology of parasites

(e.g. Periparturient rise)

Παράρτημα Δ. Δελτία τύπου και λοιπό προωθητικό υλικό

ΠΡΙΝ

Circular Greece Δελτίο Τύπου

- https://circulargreece.gr/2nd-international-thematic-workshop-agrofood-waste-bioeconomy-28-9/
- https://circulargreece.gr/el/2%ce%bf-diethnes-thematiko-ergastirio-agrofood-waste-and-bioeconomy/

2023 RETASTE

- https://retaste.gr/life-ip-cei-gr-thematic-workshop-on-agro-waste/

EcoTec

- https://www.ecotec.gr/retaste-2023-prolipsi-kai-axiopoiisi-ton-apovliton-trofimon/

AgroTec

- https://www.agro-tec.gr/retaste-2023-prolipsi-kai-axiopoiisi-ton-apovliton-trofimon/

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