Innovation for Sustainability in Sheep and Goats

Innovación para la Sostenibilidad en ovinos y caprinos

Vitoria-Gasteiz, Spain, 3-5 October 2017

Vitoria-Gasteiz, España, 3-5 de Octubre de 2017

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Background and objectives of the Seminar

Sheep and goat sectors are facing an uncertain future due to a general lack of competitiveness stemming from poor technical and economic results, but also due to severe social, market and environmental challenges.

In order to overcome this situation, innovative solutions are needed at different levels (animal, flock, livestock population, farm, territory, value chain, etc.) to make the sheep and goat industries more sustainable and profitable when faced with emerging environmental, climatic, socio-economic, demographic, policy and market challenges. These innovations may improve production techniques, labour organisation, equipment and infrastructures, as well as collective programmes for animal yield recording, breeding schemes or health campaigns. Innovations can also strengthen social forms of organisation such as product quality schemes or the management of communal areas. Innovative feeding strategies coupled with precision flock management practices that target the reduction of production gaps and adjust to the environmental challenges, hold promise to tackle the above mentioned objectives.

The Animal Production Department of Neiker-Tecnalia (the Basque Institute for Agricultural Research and Development), the Mediterranean Agronomic Institute of Zaragoza - CIHEAM, and the H2020 Project iSAGE - Innovation for Sustainable Sheep and Goat Production in Europe - organise this joint Seminar of the FAO-CIHEAM Sub-Networks on Production Systems and Nutrition on Sheep and Goats in Vitoria-Gasteiz, Spain, from the 3rd to 5th of October 2017.

The objective of the Seminar is to encourage the participation and interaction among scientists and technicians working in the sheep and goat sectors with a view to introduce the conceptual framework of innovation development and adoption, as well as to analyse the innovations needed to adapt sheep and goat production systems and industry to the new demands of society. Success stories of innovations already adopted in the sheep and goat industry are presented, and the topic of precision farming in the sheep and goat sector will be introduced and discussed, not only as a vector of innovation but also as an opportunity to enhance the sustainability of the sector.

The Seminar will last two days, providing a forum for scientific and technical exchange and a one-day field trip. The scientific and technical exchanges are structured in four sessions, with keynote guest speakers and free contributions presented orally or as posters. The full articles of the keynote and free presentations will be edited and published in an special number of the Options Méditerranéennes, the journal of CIHEAM.
Joint Seminar of the FAO-CIHEAM Network on Sheep and Goats, Vitoria, Spain, 3-5 Oct 2017
Seminar conjunto de la Red FAO-CIHEAM de Ovinos y Caprinos, Vitoria, España, 3-5 Oct 2017

Organisers

With the collaboration of

Food and Agriculture Organization of the United Nations

Scientific Committee

R. Ruiz, Neiker-Tecnalia, Spain
E. Ugarte, Neiker-Tecnalia, Spain
G. Arsenos, AUTH, Greece
C. Thomas, EAAP, Italy
A. López-Francos, IAMZ-CIHEAM, Spain
M. Bengoumi, FAO-SNE, Tunisia
H. Ben Salem, IRESA, Tunisia
M. Rekik, ICARDA, Jordan
A. Araba, IAV Hassan II, Morocco
F. Bocquier, SupAgro Montpellier, France
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M. Chentouf, INRA, Morocco

J.P. Dubeuf, INRA, France
S. Giger-Reverdin, AgroParisTech, France
G. Luciano, Univ. Catania, Italy
N. Moujahed, INAT, Tunisia
M. Napoléone, INRA, France
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E. Molina-Alcaide, CSIC, Spain
S. Prache, INRA, France
A. de Vega, Univ. Zaragoza, Spain
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Organisation Committee

R. Ruiz, Neiker-Tecnalia, Spain
E. Ugarte, Neiker-Tecnalia, Spain
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A. López-Francos, IAMZ-CIHEAM, Spain

L. López Marco, IAMZ-CIHEAM, Spain
G. Arsenos, AUTH, Greece
C. Thomas, EAAP, Italy
M. Bengoumi, FAO-SNE, Tunisia
H. Ben Salem, INRAT, Tunisia

Sponsors
Información general y objetivos del seminario

Los sectores ovino y caprino se encuentran ante un futuro incierto por su falta general de competitividad, debido en parte a resultados técnicos y económicos insuficientes, pero también debido a importantes retos de tipo social, ambiental y de mercado.

Para hacer frente a esta situación, se requieren soluciones innovadoras a distintos niveles (animal, rebaño, cabaña ganadera, explotación, territorio, cadena de valor, etc.), para que los sectores ovino y caprino sean más sostenibles y rentables ante los desafíos emergentes; medioambientales, climáticos, socioeconómicos, demográficos, políticos y comerciales. Estas innovaciones pueden suponer mejoras en las técnicas de producción, organización de mano de obra, instalaciones e infraestructuras, y aplicarse a programas colectivos para el control de rendimientos, esquemas de mejora genética o a campañas sanitarias. También pueden centrarse en aspectos comerciales o de mercado, como el desarrollo de programas para la mejora de la calidad de productos, o reforzar formas sociales de organización tales como la gestión de pastos comunales. Las estrategias innovadoras de alimentación animal, junto con prácticas de ganadería de precisión, pueden reducir carencias en la producción y adaptarse a los desafíos medioambientales, ofreciendo unas soluciones prometedoras para los objetivos planteados.

El Departamento de Producción Animal de NEIKER-Tecnalia (Instituto Vasco de Investigación y Desarrollo Agrario), el IAMZ-CIHEAM (Instituto Agronómico Mediterráneo de Zaragoza/Centro Internacional de Altos Estudios Agronómicos Mediterráneos) y el Proyecto H2020 iSAGE (Innovación para la Producción Sostenible de Ovinos y Caprinos en Europa), organizan este seminario conjunto de las Subredes FAO-CIHEAM Sistemas de Producción y Nutrición de Ovinos y Caprinos, en Vitoria-Gasteiz, España, del 3 al 5 de octubre de 2017, bajo el título “Innovación para la sostenibilidad en ovinos y caprinos”.

El objetivo del seminario es de fomentar la participación e interacción entre científicos y técnicos trabajando en ovinos y caprinos con el propósito de introducir el marco conceptual del desarrollo y de la adopción de la innovación, y analizar las innovaciones necesarias para adaptar los sistemas de producción a las nuevas exigencias de la sociedad. Se presentarán casos de éxito de innovaciones ya adoptadas en la industria de ovinos y caprinos y se introducirá el tema de la ganadería de precisión, no solo como vector de innovación sino también como una oportunidad para contribuir a la mejora de la sostenibilidad del sector.

El seminario, de dos días de duración, ofrece un foro para el intercambio científico y técnico y una jornada de visita de campo. Los intercambios científicos y técnicos estarán estructurados en cuatro sesiones con ponencias invitadas y contribuciones libres que se presentarán como orales o en formato póster. Los artículos completos serán editados y publicados en un número especial de Options Méditerranéennes, la revista del CIHEAM.
Organizadores

Con la colaboración de

Comité Científico

R. Ruiz, Neiker-Tecnalia, España
E. Ugarte, Neiker-Tecnalia, España
G. Arsenos, AUTH, Grecia
C. Thomas, EAAP, Italia
A. López-Francos, IAMZ-CIHEAM, España
M. Bengoumi, FAO-SNE, Túnez
H. Ben Salem, IRESA, Túnez
M. Rekik, ICARDA, Jordania
A. Araba, IAV Hassan II, Marruecos
F. Bocquier, SupAgro Montpellier, Francia
F. Casabianca, INRA Francia
M. Chentouf, INRA, Marruecos

J.P. Dubeuf, INRA, Francia
S. Giger-Reverdin, AgroParisTech, Francia
G. Luciano, Univ. Catania, Italia
N. Moujahed, INAT, Túnez
M. Napoléone, INRA, Francia
F. Pacheco, DRAP-Norte, Portugal
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A. de Vega, Univ. Zaragoza, España
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Comité de Organización

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M. Bengoumi, FAO-SNE, Túnez
H. Ben Salem, INRAT, Túnez

Patrocinadores

Arabako Foru Aldundia
Diputación Foral de Alava

IDIAZABAL

Ayuntamiento de Vitoria-Gasteiz
Vitoria-Gasteizko Udala
PROGRAMME

3rd October

08:30 - 9:00  Registration

09:00 - 09:15  Presentation of the agenda and objectives of the Seminar

Session 1. Innovation's conceptual and practical framework. Application to the agro-food sector

Chair person: Cledwyn THOMAS (EEAP)

09:15 – 10:00  Keynote presentation: Leire BARAÑANO, Neiker-Tecnalia, Spain

10:00 – 10:45  S1 Oral presentations

The interest of devices of learning organizational to be resilient in a context of rapid change in agri-food systems. Between upstream and downstream, the example of a cheese cooperative. Martine NAPOLEONE, INRA-UMR SELMET SAD, France

Towards a pan-European typology of sheep and goat farms: A meta-analysis. Alexandros THEODORIDIS, Aristotle University of Thessaloniki, Greece

Environmental Implications of Different Production Systems in a Sardinian Dairy Sheep Farm. Antonello FRANCA, CNR-ISPAAM, Italy

Reference indices of the goat milk price. Yolanda MENA GUERRERO, Universidad de Sevilla, Spain

10:45 – 11:15  Opening ceremony

11:15 – 11:45  Coffee-break

11:45 – 12:15  Discussion

Session 2. Innovations to adapt sheep and goat feeding and production systems and industry to new societal demands

Chair persons: Hichem BEN SALEM (IRESA) and Roberto RUIZ (NEIKER)

12:15 – 13:00  Keynote presentation (Plenary): Anna NUDDA, Univ Sassari, Italy

13:00 – 14:00  Lunch

14:00 – 14:45  Keynote presentation (Plenary): Paula GASPAR, Univ. Extremadura, Spain
14:45 – 15:30 S2 Oral presentations (parallel sessions on Nutrition and Production Systems)

**Nutrition**

*Early weaning of kid goats does not compromise rumen microbial colonization and post-weaning digestive capacity.* Ignacio MARTÍN GARCÍA, CSIC-EEZ, Spain

*Effect of the proportion of dry beet pulp in the diet on lamb fattening performance, carcass characteristics and meat quality.* Mohammed BENBATI, INRA Maroc, Morocco

*Effect of tannins on indoles content and pastoral flavour of lamb meat.* Edi PIASENTIER, University of Udine, Italy

*Anti-inflammatory and analgesics in types of willow browsed by goats.* Hussein MUKLADA, ARO Natural Resources, Israel

**Production Systems**

*PESagri: A novel payments for ecosystem services framework for targeted agrienvironmental policy.* Alberto BERNUÉS, CITA, Spain

*Assessment of energy footprint of sheep meat in two different farming systems in Tunisia.* Ridha IBIDHI, INRAT, Tunisia

*The implementation of some regenerative practices to improve the sustainability of latxa dairy sheep system.* Nerea MANDALUNIZ, Neiker, Spain

*Adaptation of goats feeding system to the adverse economic conditions by changing the grazing management practices.* Theodoros MANOUSIDIS, Democritus University of Thrace, Greece

15:30 – 16:15 Viewing of posters (S1-S2)

16:15 – 17:00 S2 Oral presentations (parallel sessions on Nutrition and Production Systems)

**Nutrition**

*Feeding behaviour, intake, apparent digestibility and plasma metabolites of Latxa dairy ewes as affected by cold-pressed oilseed cakes and sainfoin.* Aser GARCÍA RODRÍGUEZ, Neiker, Spain

*Effect of grazing activity and supplementary feeding on energy utilization by goats.* Ahmed ASKAR, Desert Research Center, Egypt
Drinking high salt water from weaning to adulthood: Effect on body weight gain, body condition scores, metabolites profile, food and water intakes, ruminal fermentation, food digestibility, nitrogen balance and microbial synthesis in Barbarine male lambs. **Wiem MEHDI EL-GHARBI**, Faculty of Sciences of Bizerte, Tunisia

*The level of nutrition of suckling lambs modifies the colonic epimural bacterial community and feed efficiency traits during the fattening period.* **Javier DE FRUTOS VIDAL**, Instituto de Ganadería de Montaña (CSIC-Univ. León), Spain

**Production Systems**

*The respectful animal farming: condition of its sustainability.* **Elisabeth LECRIVAIN**, INRA, SAD - UR Ecodéveloppement, France

*Sheep dairy and meat products: from consumers’ perspective to industry innovations.* **Daniel MARTÍN-COLLADO**, INIA, Spain

*Innovation aspects of Serdaleh, a traditional Lebanese cheese produced from raw extensive goat’s milk.* **Christelle SALAMEH**, Holy Spirit University of Kaslik, Lebanon

*Goat value chain in Algeria, sustainable development proposals to cope with changes.* **Hossem SAHRAOUI**, University of Setif, Algeria

17:00 – 17:30 Discussion

18.00 – **Guided visit to Vitoria city**

**4th October**

**Session 3. Precision farming and other technical innovations for increasing efficiency in sheep and goats**

*Chair person: Dunixi GABIÑA*

09:00 – 9:45 Keynote presentation: **George STILWELL**, Univ Lisbon, Portugal

09:45 – 10:30 Keynote presentation: **François BOCQUIER**, Supagro Montpellier, France

10:30 – 11:00 S3 Oral presentations

*Innovations in the selection program of the UPRA-Grupo Pastores in Rasa aragonesa sheep breed.* **Leticia RIAGUAS RÚPÉREZ**, Oviaragón, Spain.

*Phenotyping intake rate in dairy goats, a useful repeatable trait which can be measured automatically.* **Sylvie GIGER-REVERDIN**, UMR INRA-AgroParisTech MoSAR, France
Eye and muzzle temperature measured using infrared thermography to assess sheep stress during shearing and foot-trimming. **Mariana ALMEIDA**, CECAV, Univ. Trás-os-Montes e Alto Douro, Portugal

11:00 – 11:30  Coffee-break

11:30 – 12:30  S3 Oral presentations

Remote sensing for real time estimate of aboveground biomass productivity in mountain pasture. **Bruno RONCHI**, University of Tuscia, Italy

Eskardillo: a platform based on individual animal data collection to improve decision making in dairy goat farms. **Alejandro BELANCHE GRACIA**, CSIC-EEZ, Spain

Feeding strategy of Lacaune dairy sheep: dairy ewes fed in group according to their milk yield. **Philippe HASSOUN**, INRA UMR SELMET, France

Clustering of lactation curves on French dairy goats. **Mathieu ARNAL**, INRA-GenPhySE, Idèle, France

The gaps and environmental challenges for small ruminant production in Turkey. **Yildirir MESUT**, General Directorate Agricultural Research and Policies, Ministry of Agriculture, Turkey

12:30 – 13:00  Discussion

**13:00 – 14:00  Lunch**

Session 4. Success stories of innovations in the sheep and goat industry, with special focus on increasing consumption and adding value to products

*Chair person: Eva UGARTE (NEIKER)*

14:00 – 14:45  Keynote presentation: **Raffaele ZANOLI**, Univ. Politecnica delle Marche, Italy

14:45 – 15:30  Keynote presentation: **Hichem BEN SALEM**, IRESA, Tunisia, and **Mohammed BENGOUMI**, FAO-SNE, Tunisia

15:30 – 16:15  Poster viewing (S3-S4)

16:15 – 17:30  S4 Oral presentations

Fluorescence spectroscopy coupled with factorial discriminant analysis technique to identify sheep milk from different feeding systems. **Moncef HAMMAMI**, ESA Mateur, Tunisia
**Ekiola:** manage feeding of a milk sheep flock based on the use of milk fatty acid composition to better care for animals and increase the health value of dairy farm-products. **Jean-Marc ARRANZ**, GIS-id64 / Chambre Départementale d’Agriculture, France

The commitment of sheep and goat production systems in the agro–ecological transition: a participative approach for pastoral systems. **Jean Paul DUBEUF**, INRA-LRDE, France

Sustainability of the dairy sheep farming: Examples from Greece and Spain. **Irene TZOURAMANI**, Agricultural Economics Research Institute – DEMETER, Greece

Validation of a microbial inhibition test based on Eclipse Farm coupled with e-Reader for antibiotics screening in sheep and goat milk and goat’s cheese whey. **Jennifer GIRALDO**, Univ. Politecnica de Valencia, Spain

Sensory & microbiological evaluation of Drâa goat cheese and study of its stability during storage. **Younes NOUTFIA**, INRA Maroc, Morocco

17:30 – 18:00 Discussion and closing session

20:30 – Social dinner

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**5th October**

**Field trip**

9:00 – 11:30 Experimental dairy Latxa flock at Neiker (including experiences from the LIFE projects that concluded in 2016 on rotation grazing and supplementing with rapeseed cake)

11:30 – 12:30 Ardiekin: Latxa and Carranzana dairy ram breeding centre

12:30 – 13:30 Lunch

13:30 – 17:00 Visit to mountain communal pastures
PROGRAMA

3 de octubre

08:30 - 9:00  Acreditación y entrega de documentación
09:00 - 09:15  Presentación del programa y objetivos del seminario

Sesión 1. Marco conceptual y práctico de la innovación. Aplicación al sector agroalimentario

Moderador: Cledwyn THOMAS (FEZ)

09:15 – 10:00  Conferencia invitada: Leire BARAÑANO, Neiker-Tecnalia, España
10:00 – 10:45  S1 Comunicaciones orales

*El interés de las herramientas de aprendizaje organizacional para ser resiliente en un contexto de cambios rápidos en los sistemas agroalimentarios. El ejemplo de una cooperativa de quesos.* Martine NAPOLEONE, INRA-UMR SELMET SAD, Francia

*Hacia una tipología paneuropea de explotaciones de ovinos y caprinos: Un metaanálisis.* Alexandros THEODORIDIS, Universidad Aristóteles de Salonica, Grecia

*Repercusiones ambientales de distintos sistemas de producción en una explotación de ovino de leche de Cerdeña.* Antonello FRANCA, CNR-ISPAAM, Italia

*Índices de referencia del precio de leche de cabra.* Yolanda MENA GUERRERO, Universidad de Sevilla, España

10:45 – 11:15  Inauguración oficial
11:15 – 11:45  Pausa café
11:45 – 12:15  Debate

Sesión 2. Innovaciones para adaptar industria y sistemas de alimentación y producción de ovino y caprino a las nuevas demandas de la sociedad

Moderadores: Hichem BEN SALEM (IRESA) y Roberto RUIZ (NEIKER)

12:15 – 13:00  Conferencia invitada (Plenaria): Anna NUDDA, Universidad de Sassari, Italia

13:00 – 14:00  Almuerzo

14:00 – 14:45  Conferencia invitada (Plenaria): Paula GASPAR, Universidad de Extremadura, España
14:45 – 15:30  S2 Comunicaciones orales (sesiones paralelas sobre sistemas de nutrición y producción)

Nutrición

El destete precoz de cabritos no compromete la colonización microbiana del rumen ni la capacidad digestiva posdestete. **Ignacio MARTÍN GARCÍA**, CSIC-EEZ, España

Efecto de la proporción de pulpa de remolacha deshidratada en la dieta de corderos sobre rendimiento en grasa, características de la canal y calidad de la carne. **Mohammed BENBATI**, INRA Maroc, Marruecos

Efecto de los taninos sobre el contenido en indoles y el sabor de los pastos en la carne de cordero. **Edi PIASENTIER**, Universidad de Udine, Italia

Antinflamatorios y analgésicos en los distintos tipos de sauce ramoneado por cabras. **Hussein MUKLADA**, ARO, Israel

Sistemas de producción

**PSA-agri**: Un marco novedoso de pagos por servicios ecosistémicos para políticas agroambientales específicas. **Alberto BERNUES**, CITA, España

Evaluación de la huella energética de carne de ovino en dos distintos sistemas de producción en Túnez. **Ridha IBIDHI**, INRAT, Túnez

Implementación de algunas prácticas regenerativas para mejorar la sostenibilidad del sistema de producción de oveja Latxa de leche. **Nerea MANDALUNIZ**, Neiker, España

Adaptación del sistema de alimentación caprina a condiciones económicas adversas cambiando las prácticas de gestión. **Theodoros MANOUSIDIS**, Universidad Demócrito de Tracia, Grecia

15:30 – 16:15  Visita a pósteres (S1-S2)

16:15 – 17:00  S2 Comunicaciones orales (sesiones paralelas sobre nutrición y sistemas de producción)

Nutrición

Comportamiento de alimentación, consumo, digestibilidad aparente y metabolitos plasmáticos de ovejas Latxas de leche que reciben tortas de oleaginosas prensadas en frío y esparceta. **Aser GARCÍA RODRÍGUEZ**, Neiker, España

Efecto de pastoreo y suplementación sobre el aprovechamiento energético de las cabras. **Ahmed ASKAR**, Desert Research Center, Egipto
Consumo de agua con alto contenido en sales desde del destete hasta la madurez: Efecto sobre ganancia de peso corporal, condición corporal, perfil de metabolitos, consumo de agua y pienso, fermentación en el rumen, digestibilidad de alimentos, balance de nitrógeno y síntesis microbiana en corderos de la raza Barbarina. **Wiem MEHDI EL-GHARBI**, Facultad de Ciencias de Bizerte, Túnez

*El nivel de nutrición de corderos lechales modifica la comunidad bacteriana epimural del colon y los caracteres de eficiencia alimenticia durante el período de engorde.*

**Javier DE FRUTOS VIDAL**, Instituto de Ganadería de Montaña (CSIC-Univ. León), España

**Sistemas de producción**

Ganadería respetuosa: la condición de su sostenibilidad. **Elisabeth LECRIVAIN**, INRA, SAD - UR, Francia

Productos lácteos y cárnico de ovino: de la perspectiva del consumidor a las innovaciones en la industria. **Daniel MARTÍN-COLLADO**, INIA, España

Aspectos de innovación del Serdaleh, un queso tradicional libanés producido a partir de leche cruda de cabra procedente de un sistema extensivo. **Christelle SALAMEH**, Universidad del Santo Espíritu de Kaslik, Líbano

Cadena de valor del caprino en Argelia, propuestas de desarrollo sostenible para abordar el cambio. **Hossem SAHRAOUI**, Universidad de Sétif, Argelia

17:00 – 17:30 Debate

18:00 **Visita guiada por Vitoria-Gasteiz**

**4 de octubre**

**Sesión 3. Ganadería de precisión y otras innovaciones técnicas para mejorar la eficiencia en ovinos y caprinos**

*Moderador: Dunixi GABIÑA*

09:00 – 9:45 Conferencia invitada: **George STILWELL**, Univ Lisboa, Portugal

09:45 – 10:30 Conferencia invitada: **François BOCQUIER**, Supagro Montpellier, Francia

10:30 – 11:00 S3 Comunicaciones orales

*Innovaciones en el programa de selección de Rasa aragonesa de UPRA-Grupo Pastores. Leticia RIAGUAS RUPÉREZ*, Oviaragón, España.
Fenotipado de la tasa de consumo en cabras de leche, un carácter útil y repetible de medición automática. **Sylvie GIGER-REVERDIN**, UMR INRA-AgroParisTech MoSAR, Francia

Medición de la temperatura del ojo y el hocico con termografía infrarroja para evaluar estrés en ovejas durante el esquilado y recorte de pezuñas. **Mariana ALMEIDA**, CECAV, Univ. Trás-os-Montes e Alto Douro, Portugal

11:00 – 11:30  
Pausa café

11:30 – 12:30  
S3 Comunicaciones orales

Teledetección para estimar en tiempo real la productividad de biomasa aérea en pastos de montaña. **Bruno RONCHI**, Universidad de la Tuscia, Italia

Eskardillo: una plataforma basada en la recogida de datos de animales individuales para mejorar la toma de decisiones en explotaciones de caprino de leche. **Alejandro BELANCHE GRACIA**, CSIC-EEZ, España

Estrategia alimentaria de ovejas de leche de la raza Lacaune: ovejas de leche alimentadas en grupo según su producción de leche. **Philippe HASSOUN**, INRA UMR SELMET, Francia

Agrupación de curvas de lactación en cabras lecheras francesas. **Mathieu ARNAL**, INRA-GenPhySE, Idele, Francia

Carencias y retos ambientales para la producción de pequeños rumiantes en Turquía. **Yildirir MESUT**, Dirección General de Investigación y Política Agraria, Ministerio de Agricultura, Turquía

12:30 – 13:00  
Debate

13:00 – 14:00  
Almuerzo

**Sesión 4. Casos de innovaciones exitosas en la industria ovina y caprina enfocadas a aumentar el consumo y el valor añadido de los productos**

**Moderadora:** **Eva UGARTE** (NEIKER)

14:00 – 14:45  
Conferencia invitada: **Raffaele ZANOLI**, Univ. Politecnica delle Marche, Italia

14:45 – 15:30  
Conferencia invitada: **Hichem BEN SALEM**, IRESA, Túnez, y **Mohammed BENGOUMI**, FAO-SNE, Túnez

15:30 – 16:15  
Visita a pósteres (S3-S4)
16:15 – 17:30 S4 Comunicaciones orales

Espectroscopía de fluorescencia en combinación con el análisis factorial discriminante para identificar leche de oveja procedente de distintos sistemas de alimentación. Moncef HAMMAMI, ESA Mateur, Túnez

Ekiola: gestión de la alimentación de un rebaño de ovino de leche basada en el uso de la composición de ácidos grasos en la leche para mejorar el cuidado de los animales y aumentar el valor para la salud de productos de explotaciones lecheras. Jean-Marc ARRANZ, GIS-id64 / Cámara Departamental de Agricultura, Francia

El compromiso de los sistemas de producción de ovino y caprino en la transición agroecológica: un enfoque participativo para los sistemas de pastoreo. Jean Paul DUBEUF, INRA-LRDE, Francia

Sostenibilidad de la ganadería ovina de leche: Ejemplos de Grecia y España. Irene TZOURAMANI, Instituto de Investigación de Economía Agraria – DEMETER, Grecia

Validación de una prueba de inhibición microbiana basada en Eclipse Farm acoplada con e-Reader para detectar la presencia de antibióticos en leche de cabra y de oveja y en suero de queso de cabra. Jennifer GIRALDO, Univ. Politecnica de Valencia, España

Evaluación sensorial y microbiológica de queso de cabra Drâa y el estudio de su estabilidad durante el almacenamiento. Younes NOUTFIA, INRA Maroc, Marruecos

17:30 – 18:00 Debate y sesión de cierre

20:30 Cena Social

5 de octubre

Visita técnica de campo

9:00 – 11:30 Rebaño experimental de ovino lechero de raza Latxa de Neiker (incluyendo las experiencias de los proyectos LIFE finalizados en 2016 sobre pastoreo rotacional y de suplementación con torta de colza)

11:30 – 12:30 Ardiekin: centro de sementales de ovino lechero de raza Latxa y Carranzana

12:30 – 13:30 Almuerzo

13:30 – 17:00 Visita a pastos comunales de montaña
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The interest of devices of learning organizational to be resilient in a context of rapid change in agri-food systems. Between upstream and downstream, the example of a cheese cooperative

Based on innovation and organizational learning concepts, we will illustrate the interest of implementing strategic management devices allowing actors to adapt in the process to constant changes within the agri-food systems. We mention as example changes in markets organisation, changing expectations of consumers, multiplication of short marketing chains, societal willingness questioning the ways of producing and transforming, ...while arises changes in the surrounding conditions of production (land access, climate change,...) that affect availability of resources... To adapt to – and take advantage of - these changes, stakeholders in the agri-food sectors, i.e. farmers and their cooperatives, may promote new tools within their organization allowing anticipations. These should deal with ability to analyse the running changes allowing new rules, norms and values within these organisations. Being resilient requires both flexibility to change and robustness relying on operating rules that fit the organization. We will take the example of the management of a dairy cooperative, whose adaptation to evolutions of the agri-food systems, needs to settle innovations, at several scales, mutually consistent. We will focus on the interest to set up devices and tools, such as the log book, allowing the actors to follow changes to analyze and think an evolution of their organization in coherence. These tools are related to the downstream part of the chain about diversity of marketing channels and products on one hand and, on the other hand, upstream the chain about managing a diversity of farming systems and accompanying specified technical and organizational changes fostering complementarities between these systems.
Sheep and goat farms should adapt under the new CAP reform and policy-makers should identify new measures to accommodate such adaptation strategies and specific needs of ruminant systems. However, given the high level of heterogeneity of livestock farms across counties in the EU, uniform policies, interventions and strategies common to all counties are likely not to be appropriate for the adaptation of the existing ruminant production systems in the EU under the new CAP. The use of a typology that describes the diverse production systems in EU can serve as an effective tool to propose better and targeted policy measures and strategies by revealing the features of homogenous groups of sheep and goat production systems. In the European context, a relatively large number of typification exercises is available in literature. However, these typologies vary significantly according to the factors considered for classification, which results in a complicated combination of types describing sheep and goat production systems. This paper contributes towards the generation of a single pan-European typology of sheep and goat farms. The typology developed and presented here is based on a meta-analysis of typologies appearing in relevant literature for six EU countries (Greece, UK, Spain, Italy, France and Finland) and Turkey. Initially, information was gathered from all the available literature including scientific papers, studies and reports on existing farm types published/carried out by Ministries, Institutions, payment organisations, etc and in total 45 typological studies were identified. These studies led to the specification of 13 types of sheep farms and 5 types of goat farms. This typology included ‘broad’ types described by their prevailing characteristics, which included the level of application of grazing, the level of intensification, their production aims, their environmental role and the technology used on farm. As expected, these types were not discrete and mutually exclusive to all countries, so in a second step they were refined using inputs and knowledge of industry partners that represent the sheep/goat sector across Europe. This process allowed for narrowing down the final typology to five types for sheep farms and five types for goat farms with farms of cross-cutting characteristics such as organic, PDO, PGI, pluriactivity etc. being included under these farm types when appropriate. This narrow typology constitutes a basis for the description of the multiple sheep and goat systems in the continent and may serve as an important tool in addressing common problems and challenges without adversely affecting the uniqueness of European production systems.

Acknowledgements: This work was undertaken as part of the iSAGE Project (http://www.isage.eu), with financial support from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 679302.
Sardinia (Italy) plays a relevant role on EU sheep milk production. As well as in others Mediterranean regions, contrasting dairy sheep farming systems coexist in Sardinia and an effective renovation process is needed in order to contrast the deep structural crisis. Eco-innovation of production processes and the valorisation of pasture-based livestock systems can be a key strategy to improve the farms competitiveness and to promote the typical Mediterranean dairy sheep products in a green way. For this purpose, research studies are needed in order to assess the environmental implications of Mediterranean sheep systems with a holistic and site-specific approach. The main objective of this study was to compare the environmental performances of two contrasting sheep milk production systems, by using a Life Cycle Assessment (LCA) approach. The LCA was carried out in a farm where, along ten years, a conversion from arable and irrigated crops to native and artificial pastures and a reduction of total mineral fertilizers supply occurred. The effects of the conversion on the environmental impacts were analyzed both using 1 kg of Fat and Protein Corrected Milk (FPCM) and 1 ha of surface as functional units. The LCA study highlighted that the change from a semi-intensive to a semi-extensive production system had a different effect on the environmental impacts depending on the utilized functional unit.
According to the current EU legislation, all supplies of raw milk that take place in Spain are made under contract. This contract must reflect, among other aspects, the price of milk, which can be fixed or variable. In case of being variable, it must be indicated on the basis of which it will vary that price. Conscious of the importance of the reference used, the INLAC (Spanish Interprofessional of Milk) has made available to the sector some price indices that serve as a reference for the contract. This indices has been developed by the authors of this paper, which guarantees its transparency and impartiality. By means of interviews with traders and experts and using econometric adjustment methods in which autoregressive techniques are involved, two indices are proposed, both referring to the price of the total Useful Dry Matter content (protein plus fat): Index nº 1, reflecting the variation of Market prices, and the Index nº 2 which incorporates those factors that have influence in the variation of the goat milk price.
Impact of group feeding management of Basco-Bearnais dairy ewes at the beginning of milking on milk production and the chemical composition of milk

Dairy herds of sheep are usually conducted in single groups with the same level of concentrates for all ewes. Physical or virtual feeding groups, supplemented through individual concentrate feeder allows adjusting concentrate levels to individual production. Until now, we do not know the effect of such management on milk production, milk composition and voluntary forage intake. Four groups of 44 Basco-Bearnaise ewes in early milking period were constituted and balanced according to their milk yield (MY): two with low (L) and two with high (H) milk yield. One L and H group was fed according to actual feeding management (C) and the two others according to their milk yield (E) for six weeks. Concentrate levels were decreased at mid experiment to fit the MY. There was no difference in forage DMI between EH and CH but DMI of CL was lower. Decreasing concentrates increased forage DMI in all groups with a substitution rate of 1.1 (CH) to 2 (EH). The adjustment of concentrates increased MY in EH by an average of 0.3 L/d/ewe. The milk fat content was modified for EH and EL groups, the urea level was higher for EH. Under these conditions, adjusting the concentrate to the MY has no great effect on milk production but increases the forage DMI. Substitution rate observed suggest that it could be possible to reduce the amount of concentrate when good forages are available. The economic interest will depend on the difference between the unit cost of concentrates and that of fodder.
“Geroko“, a simulator to measure changes in economic, environmental (ecosystemic services) and climatic performances of agropastoral farms in the Western Pyrenees

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Keywords: livestock systems, agropastoralism, eco-systemic services, simulations

Public policies, in response to societal demand, aim to reorient agriculture towards production models based on agro-ecology. How to give meaning to the principles of agro-ecology, to understand the effects of livestock on climate change and how to explain the trade-offs (economy-environment-climate) that farmers make in their strategic choices? The "Geroko" tool allows to understand the economic, technical, environmental and climatic components at the farm level. The table is based on the principle of variations between two states, it makes it possible to change animal productions and forage surfaces. Each type of animal is assigned needs and food offered, which vary according to animal productivity and part of different breeding: these needs make it possible to calculate the share of grazing, as well as the GHG emission indicators. Different types of forage areas are listed using the typology of Basco-Béarnaise meadows, which makes it possible to qualify them for a set of ecosystem services and the quality of products. The economic component is approached by calculating changes in margin on feed cost, levels of feed purchases and feeding self-sufficiency. The tool was tested at 44 farms: the simulations mainly focused on adapting the farms to the Ossau Iraty PDO specifications (suppression of silage) and on the animal production (productivity, size). From a set of farms subjected to heterogeneous pedo-climatic constraints, the effects of the intensification of fodder production or livestock production on the different services could be evaluated, showing the oppositions between these services, and the resulting trade-offs.
Revisiting particle kinetics in the rumen: comminution, digestion and passage functions as affected by diet type

Six Rasa Aragonesa wethers were fed lucerne hay either chopped at 5 cm (diet C) or ground (2 mm) and pelleted (diet P) in a cross-over design. Access to the diets was restricted to 4 hours, and fractional outflow rates from the rumen of liquid- (Co-EDTA) and solid-phase (Cr and Yb) markers, and digestion kinetics of different particle sizes (0.5-1 mm, 1-2 mm, 2-4 mm and 4-8 mm) were studied. Samples of rumen content were obtained at different times throughout the day to estimate rumen pools of different particle sizes. Feeding behaviour of the animals was also recorded. Dry matter intake was higher (P<0.001) in animals fed diet C than P (1733 vs. 1206 g/d) which also spent more time eating (218 vs. 94 min/day, or 182 vs. 55 min/kg dry matter intake DMI; P<0.001) and ruminating (283 vs. 182 min/kg DMI; P<0.05). Potential degradability of different particle sizes did not change across diet types whereas fractional degradation rate decreased (P < 0.01) as particle size increased. The mean particle size of rumen digesta was higher with diet C (P < 0.05) whereas dilution rate of Co-EDTA in the rumen was faster than those of Cr and Yb. The rate at which particles larger than 1.2 mm reduced due to chewing during eating was higher with diet P than C, but the effectiveness of rumination in reducing particle size of rumen digesta was higher with diet C. The higher intakes in animals fed diet P could be explained by variations in rumen volume, rates of digestion and a higher rate of outflow of small particles pulled out with the liquid phase.
**Title**  
Innovation and multi-actor cross-border cooperation in central Pyrenees to improve sustainability of local sheep breeds

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**Keywords**  
ovine, efficiency, genetics, indicators, reproduction

Sheep farming of local breeds in the Pyrenean region is of major significance from an economic, social and environmental viewpoint. However, this activity is in continuous recession. Common problems are found in both sides of the border, in France and in Spain: its scarce profitability and a lack of generational renewal, due in part to the lack of innovation linked to its particular geographic isolation. The PIRINNOVI project aims to establish a network for acquisition, exchange and transfer of field knowledge but also research methodologies in order to improve sheep farming sustainability by the way of management and reproductive genetics. Common indicators for sustainability are being designed to perform technical-economic, social and environmental studies in the Pyrenean area to get the most influencing factors and work on them. Regardless of the breed, increasing efficiency is a key factor to improve sustainability of sheep production. Thus, PIRINNOVI faces common reproductive problems like low fertility in artificial insemination, delayed puberty or low efficiency of selection schemes for prolificacy and maternal effects on growing lambs. Electronic automatization of lamb weight recording is being implemented to reduce workload and improve data accuracy. Next-generation sequencing (NGS) and other genomic technologies based on SNP arrays are being used to design a common paternity test for 17 French and Spanish breeds, to evaluate its real impact on the precision of genetic evaluation, and to detect new major genes linked to prolificacy. The opinion of farmers, technicians and other users of the Pyrenean territory on these innovations and their implications for the continuity of this activity will be also studied and taken into account for the future. EFA103/15 project, co-financed by FEDER within the POCTEFA framework.
The first results of the TRAMED research report how pastoralism, extensive livestock production - an activity that seems destined for oblivion, a memory of a recent past, shows instead interesting signs of resilience and important adaptive capacities. In several southern European countries, foreign workers, immigrant shepherds from other countries in the Mediterranean region, play an important role in this process by supplying skilled labor at a relatively low cost. Such migratory flows enable the pursuit, evolution and diversification of an activity increasingly recognized as essential to the preservation of the natural and cultural heritage of the region, but less and less practiced by Europeans. Involving and engaging this workforce in the adaptation and innovation processes of euro-mediterranean pastoralism in the face of the important socio-political and ecological changes affecting the region represents an opportunity not to be missed to contribute forming the shepherds and the breeders of tomorrow, without whom the Mediterranean risks losing some of its most valuable and increasingly rare guardians.
Interest is growing in promoting sustainable animal production systems because of their healthy relation to the natural environment. Ecological systems stand out, as they pay special attention to preserving natural resources, promoting biodiversity, guaranteeing animal well-being, and obtaining healthy products from raw materials and natural processes. The objective of this study is to evaluate proximity to the agroecological model of dairy sheep systems in Sardegna, Italy. Based on the methodology described by Mena et al. (2010) for goats milk systems, a questionnaire was designed for the farms, including 55 variables integrated into 9 indicators. Twenty two dairy sheep farms were surveyed, all farms with Sarda breed. The results show that farms are close to this agroecological model, necessitating some changes in aspects related to: i) use more sustainable products for the cultivation of forages and grains; ii) improve farm management and data collection and iii) increase the autonomy in products sales.
Sheep and goat milk are sources of bioactive compounds with health-promoting properties. The demand for sheep and goat milk has grown worldwide over the years, because of both the increased request for cheese and other traditional dairy products, and the success of sheep and goat milk as component of infant formulas, drinking milk and nutraceutical product. Animal feeding is one of the main factors affecting the quality of fat in sheep and goat milk and, therefore, in the derived dairy products. In particular, nutrition can readily alter milk fat concentration and fatty acid (FA) profile. This review compared the effects of sheep and goats feeding strategies on milk fat composition, with focus on FA with potential healthy properties, such as conjugated linoleic acid (CLA) and polyunsaturated fatty acids (PUFA) of the omega-3 family. The nutritional strategies to design the FA profile of sheep and goat dairy products based on grazing and use of vegetable oils and the different nutritional responses of the two species are reviewed and discussed.
### Title
Early weaning of kid goats does not compromise rumen microbial colonization and post-weaning digestive capacity

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### Keywords
weaning, rumen colonization, milk feeding

Milk feeding in intensive dairy farming represents a significant cost, which can potentially be reduced if the animal is weaned early. However, an abrupt transition from milk to solid feed may affect animal’s growth, appropriate rumen development and future digestive capacity. This experiment was conducted to assess the effect of an early weaning (EW) practice (5 weeks of life) on rumen microbial colonization and post weaning digestive ability against the normal weaning (NW) practice in dairy goats farming (7-8 weeks). Twelve new-born kid goats were used and randomly allocated to one of the experimental groups (n=6). They were provided mothers colostrum for 24 hours and then taken away and fed commercial milk replacer following the manufacturer guidelines. Good quality alfalfa hay and starter concentrate pellets were available from week one after birth. After weaning, animals were kept together until 6 months of life. Then rumen content samples were collected and a digestibility trial conducted. The weights of kid goats did not differ EW and NW until month six of life and both groups experienced a temporal decline in weight gain during the 7-10 days after weaning (more pronounced in EW). The fermentation pattern and microbial biomass were not different between groups, with the exception of fungi that were lower in EW kids. At month six of life neither the fermentation pattern nor the apparent digestibility differ between groups. Our results suggest that an early weaning strategy is possible and does not compromise the future digestive efficiency of the animal.
The objective of this work was to evaluate the effect of the incorporation of different levels of DBP in the diet on lamb fattening performance, carcass characteristics and meat quality. Thirty six Moroccan synthetic breed lambs "Dman*Boujaad" (20.2±1.82 kg initial body weight) were randomly assigned to three homogenous groups of twelve each. Lambs received a diet containing alfalfa hay (30%), sunflower meal (10%) and mixed concentrate with different proportions of dry pelleted beet pulp (DBP) and barley: 0% DBP and 60% barley (T0%), 30% DBP and 30% barley (T30%) and 60% DBP and 0% barley (T60%). The fattening trial was lasted for 68 days after 10-day of adaptation period and lambs were weighed at the beginning and at the end of the trial. At the end of the trial all the lambs were slaughtered, the carcass dressing percentage, ruminal pH, pH of meat at 0 and 24h postmortem, fat deposition (mesenteric and pelvic fat) and instrumental color (L, a, b) of Longissimus dorsi muscle were determined. The proportion DBP did not affect the carcass dressing percentage, pH of meat at 0 and 24h postmortem, fat deposition (mesenteric and pelvic fat), a and b (P>0.05), whereas it affected significantly the average daily gain, ruminal pH and L (P<0.05). The average daily gain of lambs of T30% (245.5 g/d) was higher than T0 (192.9 g/d) and T60% (199.4 g/d). Lambs of T0 had lower ruminal pH value (6.62) than those of T30% (6.84) and T60% (7.19). The parameter L was higher in T0 (32.7) and T60% (33.3) than T30% (30.5).
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<th>Effect of tannins on indoles content and pastoral flavor of lamb meat</th>
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<td>Authors</td>
<td>S. DEL BIANCO (1), S. FAVOTTO (1), A. SEPULCRI (1), B. PIANI (1), L. CAMPIDONICO (2), S. SALAMI (2), B. VALENTI (2), G. LUCIANO (3), F. FILOSO (1), E. PIASENTIER (3). (1)University of udine, Agricultural, Food, Environmental and Animal Sciences. via Sondrio, 2A, 33100, Udine, ITALY. (2)University of Catania, Agriculture, Food and Environment, via Valdisavoia, 5, 95123, Catania, ITALY. (3)University of Perugia, Agricultural, Food and Environmental Sciences. Borgo XX Giugno, 74, 06121, Perugia , ITALY</td>
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| Keywords           | cardus, tara, chestnut, mimosa, gambier |

Skatole and indole derive from the degradation of tryptophan in the digestive tract and are responsible for off-flavors in sheep’s meat and fat. Their formation and absorption can be controlled through feeding strategies. Particularly, dietary polyphenols reduce the biodegradation of tryptophan and are claimed to mitigate the pastoral flavor of sheep meat. The experiment aimed at evaluating the effect of the polyphenols nature. Fifty-three lambs of 70 days of age, were divided in six groups of 7-10 animals and fed with experimental diets for 75 days. The control group received a fodder formulated with barley, bran, dehydrated alfalfa and soybean meal. The remaining groups were fed with the control diet with the following integrations: i) 15% cardus, in partial substitution of dehydrated alfalfa; ii) 4% tara (hydrolysable tannins - gallic acid), iii) 4% chestnut (hydrolysable tannins - ellagic acid), iv) 4% mimosa (condensed tannins-profisetinidin) and, v) 4% gambier (condensed tannins- catechin). Perirenal fat was extracted in methanol and passed through a Sep-Pak C18 column. Skatole and indole content was quantified using HPLC system with a fluorimetric detector. A trained panel was asked to carry out the Quantitative Descriptive Analysis of sheep meat samples from Longissimus dorsi muscle as well as an olfactory evaluation of fat samples. Diets rich in hydrolysable tannins significantly reduced “pastoral” flavour in perirenal fat and at the same time demonstrated greater efficacy, compared to condensed tannins, to contain the accumulation of indole compounds.
Willows contain phenolic glucosides that act as anti-inflammatory compounds. In the previous study with 48 goats in two groups, we found that willow supplementation of grazing goats prevented the increase in milk somatic cell count (SCC) at the end of lactation. The aim of this study was to characterize and secondary compounds from different types of willows. Branches from ten types of willow (Salix Alba and Salix Acmophylla) were planted in 30 pots, in three replicates. Each pot received the same soil and amount of water from 1 August to 1 December. A sample of three healthy leaves were collected from each plant and kept at -80°C. For analysis, leaves were extracted with methanol 80%, filtered and injected into the HP-MS device. We found 37 compounds, which differed in mass, and retention time. Eighteen compounds from 37 have anti-inflammatory, antipyretic and analgesic activity (2’-o-acetylsalicin_0.5, 2’-o-acetylsalicin_p5.6, Caffeic acid, Gallic acid, helicin, Hyperin, isosalicin, lasiandrin_p0.6, lasiandrin_p6.9, luteolin, pAcetyl salicylic acid, pSalicylic acid_glu_2.4, pSalicylic acid_glu_4.4, Salicin, salicylic acid, Tremulacin_p6.7, Tremulacin_p7.2, triandrin ). This finding opens the possibility that eating willow could be used by animals for self-medication.
The hypothesis tested was that sainfoin hay (tanniferous forage) has an advantage over a typical fescue in dairy ewes with respect to intake, ruminal fermentation and ingestive behaviour when cold pressed oilseed cakes rich in crude fat are formulated in the concentrate. A lactation trial was carried out with 72 black faced Latxa dairy ewes at early lactation in a 2 x 3 factorial arrangement involving two forages (fescue and sainfoin hay) and 3 experimental concentrates. Concentrates were formulated to contain i) cold-pressed rapeseed cake (RPS), ii) cold-pressed sunflower cake or iii) palm oil as fat sources, containing equal amounts of crude protein, fat and energy. The experimental concentrates were offered in individual feeders in the milking parlour as two equal meals (450 g DM) during the morning and evening milking. Tall fescue hay or sainfoin hay was group fed ad libitum in a feed bunk. The experimental period lasted for 56 d. No interactions between concentrate and forage were observed. None of the measured traits was affected by the type of concentrate. However, feeding sainfoin increased forage eating time (356 vs. 279 min/d, P< 0.001), reduced rumination time (325 vs. 422 min/d, P<0.001), increased forage dry matter intake (1.84 vs. 0.99 kg/d, P<0.001), total diet apparent organic matter digestibility (613 vs. 580 g/kg, P=0.011) and IGF-1 plasma concentration (110.7 vs. 98.6 ng/ml, P=0.014). In conclusion, the utilization of sainfoin hay, supplemented with cold pressed oilseed cakes, showed better intake, ruminal fermentation and ingestive behavior in comparison to fescue hay.
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**Title**: Effect of grazing activity and supplementary feeding on energy utilization by goats

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**Keywords**: Grazing activity, Supplementary feeding, Energy utilization, Shami goats

Thirty non-productive female Shami goats were employed in a 60-day experiment to study the effect of grazing activity and supplementary feeding on energy expenditure (EE) and balance (EB). Goats were divided into three treatments, 10 per each. Animals were grazing a limited area of alfalfa with (GS) or without (G) a limited concentrate supplement, while animals in control treatment were in confinement (in-door, I) in which the same amount of supplement was given with Berseem hay depending on their recommended requirements. The concentrate supplement was given to cover approximately 50% of the metabolisable energy used for maintenance requirements (MEm). Total EE was estimated by a heart rate (HR) monitor for 48h after individual calibration by oxygen consumption with a face mask open-circuit respiratory system. The internal marker technique was used to estimate the individual intake and digestibility for 6 animals per each treatment in which bags was used for total fecal collection. Body weight was bi-weekly recorded for all animals. Animals in control group were consumed significantly less roughage (g/kg BW0.75) in comparison with those in grazing treatments (G and GS). Digestible energy was affected by grazing activity and supplementary feeding. Total EE was greater for grazing vs. in-door and reduced with supplementary feeding. As a result, the EB was positive and similar between animals in control (I) and GS groups, while a negative EB associated with body weight loss were observed when animals grazing without supplement. In conclusion, grazing activity has a significant effect on the EE and consequently the MEm and supplementary feeding is essential to maintain grazing animals without deterioration.
Forty adult Barbarine male lambs were used to evaluate the effect of prolonged drinking of saline well waters on digestive performance after a period of 4 months of administration. At the weaning day, animals were randomly allocated high salt water (10 g NaCl / 1l of water) or control water (potable fresh water, 0.5g/l). Animals were adapted for experimental conditions before starting the 105-day growth trial. At the end of the growth trial, animals were housed in metabolic cages for total faecal collection during 10 consecutive days. During the growth trial, water and food intakes were recorded daily for each individual animal. Each twice week, we recorded body live weight and body condition scores. Metabolites profiles were determinate monthly and ruminal fermentation was measured day before starting the metabolism trial. Drinking high salt water increased the MD digestibility (P<0.05). While growth performance and water and food intakes of the weaned lambs were different to drinking high-salt water. The response of the weaned lambs in digestibility coefficients of OM, CP and NAF, in urinary excretions of total purine derivatives, allantoin, xanthine plus hypoxanthine and uric acid as well as in urine outputs and nitrogen balances were similar for both groups independently the water quality used (P>0.05). Associating with adaptation to the salt, S-lambs decreased their serum triglyceride, cholesterol, glucose, total protein, acid uric and creatinine concentrations (P<0.001), as well as, the caudal body scores was lower too in S-lambs comparing to control groups. There was no high salt water effect on rumen condition except that S-lambs had high significantly lower (P<0.001) the osmolarity until 6h post-feeding and rumen pH at the time of rumen samples (oh). Utilization of such saline water could be used successfully and safely as good quality of water resources without compromising their feedlot performance.
The level of nutrition of suckling lambs modifies the colonic epimural bacterial community and feed efficiency traits during the fattening period

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Keywords: Feed efficiency, lambs, microbiota, immunity

Bacteria firmly attached to the gastrointestinal epithelium during early life show a significant impact on nutrient processing, immune-stimulation, health and feed efficiency traits during the entire life of lambs. Thus, the aim of the present study was to describe the changes in the colonic epimural bacterial community of fattening lambs promoted by different levels of nutrition during the suckling phase trying to shed some light on the underlying mechanisms behind different feed efficiency traits. Twenty four merino lambs (average LBW 4.83 ± 0.95 kg) were used, twelve of them (ad libitum, ADL) being kept permanently with the dams whereas the other group (restricted, RES) was separated periodically from the dams and milk restricted. After weaning all the animals were penned individually, offered the same complete pelleted diet at a restricted level (40g/kg LBW to ensure no differences of DMI) and slaughtered with a target body weight of 27 kg. During the fattening period, higher feed:gain ratios (3.05 vs. 3.69, p<0.001) were observed for the RES group. Additionally, increments of Prevotella sp. and Fusobacteria were detected in the colonic epimural bacterial community of RES, whereas Proteobacteria was decreased. However, the colonic gene expression of toll-like receptors and citokines (ΔCq), immunohistochemistry parameters (counts of lymphocytes T, B) and IgA levels (pg IgA/µg total protein) were not modified. In conclusion, the level of nutrition during the suckling phase promoted changes in feed efficiency traits and colonic epimural bacterial community that were not related to immunity response at this level.
This study was conducted to evaluate the ensiling characteristics of a fermented field and food industrial by-products mixture (FBM) (different percentages) and their replacement effect with clover hay in dairy goats ration. Digestibility, milk yield, milk composition and some blood parameters were also studied. Two fermented field and food industrial by-product mixtures (FBM) were composed of 54% potatoes vines PV, 20% dried beet pulp DBP, 19% rice straw RS and 7% molasses as (FBM1), and 60% potatoes vines PV, 18% dried beet pulp DBP, 17% rice straw RS and 5% molasses as (FBM2) mixtures, on a wet basis and ensiled for up to 6 weeks. The FBM - based silage contained on average 41.3 & 40.5% dry matter, 12.45 & 12.83% crude protein (CP), and 55.4 & 52.6% neutral detergent fiber (NDF), 44.7 & 40.8% acid detergent fiber (ADF), Ether extract 2.5 & 2.2% and ash content 9.5 & 10.3%, for (FBM1 & FBM2), respectively. Fifteen lactating Zaribe goats, live body weight 40.5 + 1.5 kg and age 3-4 years were divided randomly into three similar groups (5 goats each), were used and 3 rations were studied. The first group (G1) received conventional ration, consists of concentrate feed mixture (CFM) and clover hay (CH) as control group (G1). Meanwhile, second and third groups received CFM and replacement (CH) with (FBM1) or (FBM2) as tested (G2 & G3) groups, respectively. Results should that there were no significant differences between two fermented by-products mixtures (FBM1 and FBM2) concerning NH3-N acetic acid and propionic acid. On the meantime, the total dry matter intake (TDMI) value for G3 was significantly (P<0.05) higher as compared with control group (G1). The highest (P<0.05) digestibility of DM, CP, NDF and ADF were recorded with (G3). No significant differences between all tested groups concerning digestibility of EE. The main results reported that goats fed (R3), recorded highest (P<0.05) milk yield value as compare with control group (G1), but there were no significant effect between (G2) and (G3) groups. Meanwhile, the lowest value of milk yield was recorded with (G1) group. Also, there were no significant differences between tested groups among the blood parameters. The feeding cost / head /day was decreased by 29.5 and 23.6% with G2 and G3 groups, respectively as compared with control group, leading to an improvement of economical efficiency by 29.5 and 24.3%, with G2 and G3 rations, respectively than with control group. In conclusion, replacement clover hay with fermented by-products mixtures (FBM1 or FBM2), in goats rations decreased feeding cost and better utilization with available by-products feed mixture which will be reflected in the improvement of livestock holder income.
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Title: Eléments de mesure rapide de digestibilité chez les medics pour une amélioration génétique de la valeur alimentaire des populations.

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Keywords: Composition morphologique, digestibilité, luzernes, sélection, variabilité génétique

La mise au point d’outils d’évaluation rapide de la digestibilité d’un grand nombre d’échantillons par des coupes histologiques permet d’envisager la mesure de la digestibilité et envisagé une sélection. Une importante variabilité génétique, entre populations a été mise en évidence, et l’hérédité de ce caractère est principalement évidente. Des photos des coupes des structures histologiques de la tige montrent que les variations génétiques de la digestibilité sont liées à la proportion de xylème (tissu lignifié) et à la proportion des tissus non lignifiés (parenchyme médullaire et parenchyme cortical). Ce qui a prouvé que l’espèce pérenne est moins digestible que les espèces annuelles. La digestibilité des tiges est inférieur à celui des feuilles. Alors il existe une relation étroite entre la morphologie de la plante (rapport feuille tiges), le taux des tissus lignifiées et non lignifiées et de là de la composition chimique de la plante (teneur en cellulose et surtout la lignine). Le sommet des tiges est plus digestible que la base. Le rapport des tissus non lignifiés sur les tissus lignifiés fois le nombre des faisceaux montre que le résultat est plus élevé chez M.muricoleptis que chez M .ciliaris, respectivement 187,5 et 77.Ce qui concorde avec les observations effectuées sur les photos.
Résumé Nous nous intéressons dans cette étude à déterminer les teneurs en sucres totaux et de vérifier la qualité nutritionnelle de trois populations locales Algérienne de sorgho (Hamra, Beida et Soudane). Les résultats d’analyses montrent que ces populations contiennent respectivement des taux de sucres totaux qui varient entre 11-14,5 et 17%. Aussi, la composition chimique semble intéressante du point de vu teneur en : (protéines brute, cellulose brute, calcium et phosphore) mais elle est déséquilibré en azote totale et élevé en cellulose brute notamment chez la population Soudane avec un taux de 37,46% et une production de matière verte atteignant les 14,4Kg favorisé par le nombre de talles et la hauteur moyenne des tiges. Par ailleurs, la population Hamra donne un très bon résultat concernant la digestibilité par rapport aux deux autres populations avec un rapport moelle/écorce ~1. Dans cet article nous avons procédé en premier lieu à l’extration de la sève et le dosage des sucres totaux de trois populations locales Oasiennes pour évaluer leur potentialité agroalimentaire en matière de teneur en sucre totaux. En deuxième lieu une étude de la composition chimique (protéines brutes, cellulose brute, teneur en phosphore et calcium) des sous produits issus de leur pressage et estimer leur teneur en unité fourragère. Mots clés: populations sorgho, sucres totaux, sous produits, valeur nutritionnelle.
The nature of the dietary carbohydrate fraction may affect fermentative conditions and performance, depending on rumen environment. Three mixtures (1:1 maize:barley, MB, and maize:sugarbeet pulp at either 1:1, MP, or 3:1, 3MP) were incubated in an in vitro semi-continuous culture system, using inoculum from lambs receiving a concentrate (CI) or a forage (FI) diet (three 24h series for each inoculum). Medium pH was poorly buffered from 0 to 6h, and allowed to rise around 6.5 from 8h onwards. With CI, minimum incubation pH was reached after 6h, being higher (P<0.05) with MP than with MB and 3MP from then (6.06, 5.97 and 5.95 at 6h, respectively) to 20h (6.78, 6.67 and 6.67). Gas production was highest for MB at 2h and from 6 to 16h, and lowest with 3MP from 2 to 8h, and with MP from 20h onwards (P<0.05), whereas no differences (P>0.05) were recorded neither between MB and 3MP at 20 and 24h, nor between MP and 3MP from 10 to 16h. With FI, pH was lower with MB than with 3MP at 6h (6.33 vs. 6.39, P<0.05), and maintained lowest onwards (P<0.05) with MB. The volume of gas from 3MP was lowest (P<0.05) up to 4h, and lower with 3MP than with MB from 6h onwards (P<0.05), whereas differences between MB and MP were only recorded after 24h. In both concentrate and forage environments, MP maintains a more stable pH pattern while fermentation was not noticeably depressed compared to higher starch proportions mixtures (MB and 3MP).
The nutritional interests of halophytic plants in South-East of Algeria

Under pasture systems, plants are a basic and potential source for grazing livestock to satisfy their nutritional requirements. The nutrition of grazing animals is a result of interaction between soil, plants and animals. In the arid zones, a particular vegetation growth and well adapted to extreme conditions characterized by a low rainfall and high temperatures. Continuous regression of pastureland in those areas has been observed in recent decades. This is due to the combined action of man (overgrazing, clearing ...) and the climate change. All these factors contributed to a decline in the forage heritage of these regions. In South-East of Biskra, the vegetation cover is degraded, consisting mainly by grasses in association with a halophytic species such as Atriplex spp, Tamarix spp, Salsola spp, Suaeda spp. Depressions are the preferred sites of these plants that are very adapted to these harsh conditions. The low forage production in those arid areas has motivated the use the shrub and tree fodders as feed resources for ruminants in order to provide their nutritive requirement. They have always played a role in feeding livestock and they are a good source of crude protein and minerals for the ruminants. The objective of this study is to evaluate the nutritive value of the shrub Atriplex halimus and the tree Tamarix africana in relation to the edaphic characteristics of the soil on which this vegetation type grows.
The objective of this work is to contribute to the solution of a major problem that concerns the lack of feed availability in ruminant livestock farming in arid regions, by controlling feed through the exploitation of "indigenous" resources available. Wastes of dates constitute a feed resource that is traditionally valued in the diet of small ruminants in particular in the oases. The present work aims to determine the effect of incorporation of date waste on the intake and milk quality produced by goats. 24 indigenous goats (mean of age = 5±0.91 years and average weight = 27±0.29 kg) were used in this work. They were divided into 3 groups differ by the level of waste of date. This essay aims the effect of waste of date on dairy production, the physico-chemical quality. The intake was higher in group 2 (1167.10 ± 42.8 g DM / d) than in the other two groups (1028.9 ± 68.9 and 856.04 ± 58.9 g MS / d, respectively for group 3 and 1). The average daily milk production was similar (P<0.05) in the three groups, it is slightly higher in group 1 (271 ± 62.8 ml / d). The fat and total nitrogen contents were not affected by the type of ration.
Use of field pea and triticale in dairy sheep diet: Effects on milk composition and fatty acid profile

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With the aim to find protein and energy sources used as alternatives of concentrate feed containing soybean meal and corn bought generally for expensive prices and are genetically modified organisms, the effects of legume and cereal grain based concentrates were evaluated on sheep milk production. Twenty ewes received individually 1.8 kg/day oat hay and 500 g/day of control concentrate (SC) containing soybean meal and corn or the same amount of isoprotein and isoenergetic experimental concentrate (FT) containing field pea and triticale, during the suckling period. The ewes ingested similar quantity of oat hay regardless the nature of the concentrate feed (1582.45 (±16.76); P>0.05). Differences were instead observed in milk yield (720 and 541 ml/day for control and experimental concentrates, respectively; (P>0.05). The experimental concentrate led to higher lactose content 4.02% compared to the control concentrate (3.85%) (P<0.05). The concentrate feed did not have effect on fat, protein and urea content (P>0.05), with average values about 7.75% (±0.10), 5.56% (±0.07) and 43.21 mg/dl (±1.21) respectively for fat, protein and urea content. Experimental concentrate decreased the milk concentration of saturated fatty acid as well as short and medium chain fatty acids (P<0.05), whereas, it resulted in an increase of linoleic fatty acid and total mono-unsaturated fatty acids concentrations (P<0.01). Field pea and triticale could replace soybean meal and corn in diets of dairy ewes that may enhance farm sustainability, as they do not adversely affect milk yield and composition, but modifications in milk fatty acid composition have to be taken into consideration.
Title: Effect of increasing level of maize silage in the diet on lambs fattening performance and carcass characteristics

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Keywords: Maize silage, lambs, fattening performance, carcass

The aim of this study was to determine the effect of increasing levels of Maize silage in fattening diets for lambs their production performance and carcass characteristics. Thirty six Moroccan crossbred lambs of “Dman*Boujaad” (21.9±0.74 kg initial live weight (LW)) were divided into four homogenous groups of nine each. Diets consisted of a control containing no silage (EM0%), diets with 15 (EM15%), 30 (EM30%) and 45% (EM45%) maize silage (DM basis) in the ration. During the fattening trial, which lasted for 75 days, the feed intake was determined and lambs were weighed at the beginning and at the end of the trial and fortnightly. At the end of the experiment seven lambs per group were slaughtered to determine carcass dressing percentage and fat deposition (mesenteric and pelvic fat). The level of maize silage in the diet affected significantly the fattening performance, feed conversion ratio and feeding cost (P<0.05). The average daily gain of lambs was 217.9, 172.3, 160.2 and 168.2 g/d respectively, for EM0%, EM15%, EM30% and EM45%. The feed conversion ratio (kg DMI/kg LW) was 5.72, 6.29, 7.45 and 6.17 respectively, for EM0%, EM15%, EM30% and EM45%. The feeding cost (Moroccan dirham (Mdh)/ kg LW) was 17.53, 18.61, 21.30 and 17.02 respectively, for EM0%, EM15%, EM30% and EM45%. The carcass dressing percentage and fat deposition were not affected by the inclusion of maize silage (P> 0.05). The study showed that the 45% maize silage can be included in the fattening diets of Moroccan crossbred lambs without negatively affecting feeding cost and carcass characteristics.
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<td>Keywords</td>
<td>The aim of this work was to study the chemical composition and the antibacterial activity of essential oils of <em>Rosmarinus officinalis</em>, <em>Thymus vulgaris</em>, <em>Myrtus communis</em>, and <em>Artemisia herba-alba</em> from the Northeastern Tunisia (Zaghouan). Leaves and twigs from these species were collected in spring and EOs were extracted by hydrodistillation and then analyzed using GC/MS. The antimicrobial activity was conducted by diffusion in agar against four strains: <em>Staphylococcus aureus</em> ATCC29213; <em>Staphylococcus aureus</em> 6816; <em>Listeria monocytogene</em> ATCC19195 and <em>Escherichia coli</em> ATCC35218. Results showed that the essential oils of <em>Rosmarinus officinalis</em> is characterized by the presence of 1,8-cineol (39.0%) and bornel (9.9%) as principal chemical components. The essential oils of <em>Thymus vulgaris</em> were composed mainly of thymol (60.0%). The essential oils of <em>Myrtus communis</em> were composed mainly of α-pinene, 20.4% limonene and 11.5% linalol. <em>Artemisia herba-alba</em> EOs are mainly composed of thujone (42%) and camphor (17.5%). <em>Rosmarinus officinalis</em> EOs have not showed any activity at 1/100 dilution. Whereas, at this level, <em>Myrtus communis</em> has an anti-bacterial activity only against <em>Escherichia coli</em>. For <em>Artemisia herba-alba</em> the cited concentration was sufficient to inhibit the growth of all stains, except <em>Listeria monocytogene</em>. <em>T. vulgaris</em> EOs showed the highest anti-bacterial effect against all the tested bacteria. This bioactivity is due mainly to the richness of these EOs in thymol, known for its effectiveness against the microbial agents. It was concluded that the studied species have an important antibacterial activity that can be tested to modulate the ruminant fermentation in order to improve the efficiency of digestion and reduce the production of greenhouse gases.</td>
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In order to evaluate the effect of Pistacia lentiscus essential oils (EOs) on in vitro rumen fermentation in sheep, leaves and twigs were collected from the Eastern Region of Tunisia (Zaghouan) in spring. The EOs were extracted by hydrodistillation and analyzed using GC/MS. Increasing doses of EOs (0; 5; 10; 20; 40; 80; 120 µL/0.5g DM of substrate) were tested with a ration composed of ray-grass hay and concentrate (50:50 on DM basis) in inoculum according to the technique of Menke and Steingass (1988). Rumen liquor was sampled from 3 adult sheep (Barbarine, averaged age and weight 18 months and 38 kg, respectively) receiving a ration composed of 70% of oat hay and 30% of commercial concentrate. For each dose of EOs, 3 syringes were reserved to determine true organic matter degradability (TOMD) and 2 syringes were designated to analyses ammonia-N (NH3-N). Short chain fatty acid (SC-FA) concentration and partitioning factor (PF) were calculated. Results showed that Pistacia lentiscus EOs were mainly composed of Hydrocarbon monoterpene (73%), associated to 16.7% of α-pinene; 15.9% of sabinene; 12% of cis-ocimène and 11.6% of ϒ-terpinene. After 24 h of fermentation, gas production (GP) decreased significantly (P<0.0001) from 20 to 120 µL doses (i.e. 70.6, 82.9, 51.5 and 46.1 ml, respectively for 20, 40, 80 and 120 µL). The same trend (P<0.001) was observed for calculated SC-FA concentrations. Ammonia-N concentration increased significantly (P<0.0001) at 20 µL and reached 151.7 mg/L, and then decreased to 97.2 mg/L at 120 µL of EO. Concerning TOMD, a trend of decrease (P<0.0001) was noted when adding EOs and the lowest value was observed at 5 µL of EOs. Partitioning factor values were equivalent for 0, 5 and 10 µL of EO (Averaged: 7.24), but the observed values increased significantly (P<0.001) for 20µL, 40µL and 80 µL (Averaged: 8.77) and for 120 µL (9.87). It was concluded that Pistacia lentiscus EOs could be envisaged as a potential additive to manipulate rumen fermentation in the optic of improving feed feeding efficiency in ruminant.
**Effect of green forage and oily components in lamb ration on fattening results, slaughter value and meat quality**

**Authors**

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**Keywords**
Lamb, fattening, slaughter value, meat quality

Experiment was carried out twice on 48 rams fatten up to of 35 kg body weight. Animals were grouped and fed four diets composed of concentrate (3% of body weight) and grass or red clover forage ad libitum. Control group received standard concentrate (CJ) based on cereal components (>50%) and rapeseed and soybean meal (totally >40%) as well as grass forage. Experimental group 1 received concentrate containing 35% of oily components (OL; 15% rapeseed cake, 15% DDGS, 5% linseed seeds) as well as grass forage whereas experimental group 2 received CJ concentrate and red clover forage. Experimental group 3 was fed OL concentrate and red clover forage. Experimental factors did not affect the fattening results: daily gains as well as diet and particular nutrients utilization per unit of body gains. Type of forage had also no effect on chemical composition and cholesterol as well as oxysterols in meat. Partial replacement of cereals and reapeseed meal by oily components increased meat fat content and decreased protein to fat ratio. The tendency to decrease MUFA and as well as increase of LCFA and PUFA n6/n3 content was observed though there were no statistical changes in fatty acids profile.
Methane production in fattened lambs depends on forage type and oily components in diets

Experiment was carried out twice on 48 rams fatten up to of 35 kg body weight. Animals were grouped and fed four diets composed of concentrate (3% of body weight) and grass or red clover forage ad libitum. Control group received standard concentrate (CJ) based on cereal components (>50%) and rapeseed and soybean meal (totally >40%) as well as grass forage. Experimental group 1 received concentrate containing 35% of oily components (OL; 15% rapeseed cake, 15% DDGS, 5% linseed seeds) as well as grass forage whereas experimental group 2 received CJ concentrate and red clover forage. Experimental group 3 was fed OL concentrate and red clover forage. After slaughtering rumen fluid samples were collected and following parameters were determined: pH, volatile fatty acids, ammonia concentration as well as bacteria, protozoa and methanogen counts. Methane concentration was analysed at the final stage of fattening (4 groups x 2 lambs x 2 repetitions) in respiration chambers using infrared equipment (Servomex 4000 Series, UK). Changes in counts of microorganisms involved in methanogenesis, including reduced number of protozoa, were observed in the rumen of lambs fed diet with oily components. Such changes resulted in propionate increase and mitigation in methane concentration. Also type of forage affected methane concentration. The lowest methane value, lower by 26% than in control group, was observed in experimental 3 group receiving red clover and OL concentrate (15.6 CH4/d).
In the last years, there has been an increasing interest in the use of alternative feeds, such as agroindustrial by-products, in ruminants feeding. The aim of the present work was to study the effects of including variable amounts of different by-products (tomato fruits, citrus pulp, brewer’s grains and brewer’s yeast), previously processed and dried in solar convection ovens, in the concentrate of dairy goats on in vitro ruminal fermentation. Six concentrates were formulated and mixed with alfalfa hay in 1:1 proportion before being fermented in vitro using batch cultures of mixed rumen microorganisms from goats. The kinetics of gas production was evaluated in 72-h incubations and the fermentation variables were determined after 24 h incubation. Gas production data were adjusted to the following the exponential model $y = A \left[1 - e^{-c \cdot t}\right]$. There were no differences among diets ($P > 0.05$) either on pH or molar proportions of individual volatile fatty acids (VFA), but total VFA production was greater ($P<0.05$) and the amount of CH$_4$ was lower ($P<0.05$) in five of the diets including by-products compared with the control diet. The inclusion of by-products resulted in greater ($P<0.05$) values of gas production and gas production rates in four of the diets. The results of this study indicate that by-products from tomato, juice and beer industry could be included in ruminant’s diets, promoting better ruminal fermentation patterns and reducing the environmental impact of animal production. The potential of agro-industrial by-products to substitute conventional ingredients in small ruminants diets should be further investigated.
Influence of particle size of crude olive cake on in vitro rumen fermentation and gas production kinetics

By-products of olive oil industry can be used in ruminants feeding, but their nutritive value can be affected by their processing method. The aim of this research was to estimate the nutritive value of four samples of crude olive cake (COC) obtained from the same trommel at different stages of the screening process. Particle sizes were greater than 3 (COC3), 2 (COC2) and 1 mm (COC1) or smaller than 1 mm (COC0). Alfalfa hay (AH) and barley straw (BS) were included in the study for comparative purposes. Gas production kinetics was determined in 144-h in vitro incubations with sheep rumen fluid, and fermentation parameters and in vitro dry matter digestibility (IVDMD) were analysed after 24 h. COC3 and COC0 samples had lower contents of neutral detergent fibre (NDF; 415 and 391 g/kg DM), but greater contents of crude protein (96.6 and 114 g/kg DM), and ether extract (220 and 242 g/kg DM), than COC2 and COC3 (627 and 624; 42.4 and 48.7; 102 and 124 g/kg DM, respectively). The IVDMD values of COC (39.4 to 58.7%) were lower than that for AH (67.5%), but similar or greater than that for BS (42.4%). Samples COC3 and COC0 had greater (P<0.05) potential gas production (103 and 66.2 ml/g DM, respectively) and total volatile fatty acid production than COC2 and COC1, but values were lower than those for AH and BS. The results indicate that decreasing the particle size to <1 mm increased the fermentation potential of COC, but its nutritive value was still slightly lower than that of straw. The similar quality observed for COC3 and COC0 samples was attributed to the high sugar content of COC3.
The aim of this study was to assess the nutritive value for ruminants of five samples of crude olive cake (COC) and two commercial olive fruits extracts (Prolivols® and Hytaolive®). Alfalfa hay (AH) and barley straw (BS) were also evaluated for comparative purposes. Gas production kinetics was determined in 144-h in vitro incubations with sheep rumen fluid, whereas fermentation parameters and in vitro dry matter digestibility (IVDMD) were analysed after 24 h incubation. Crude protein, neutral detergent fibre (NDF), acid detergent fibre (ADF) and ether extract (EE) contents of COC ranged from 65.2 to 105, 374 to 448, 269 to 316 and 145 to 267 g/kg dry matter (DM), respectively. The high amount of N bound to the ADF in the COC samples (25 to 45% of total N) indicated low N availability, and the lignin/NDF ratios were high (0.272 to 0.401). The IVDMD values of COC (47.9 to 60.8%) were lower than that for AH (67.5%), but greater than that for BS (42.4%). Potential gas production values of COC samples (60.3 to 103 ml/g DM) were lower (P<0.05) than those for olive fruits extracts, AH and BS (values > 170 ml/g DM). There were no differences (P>0.05) among COC samples in total volatile fatty acid (VFA) production, and values were similar to those of BS, but lower (P<0.05) than those for the two commercial extracts and AH. The COC could be used in ruminant diets replacing low-quality feeds such as BS, but due to its high EE content it could be also used in dairy animals to increase the content of insaturated fatty acids in milk.
In Northern Morocco, goat population is the most dominant. His feeding is based on forest rangelands and characterized by strong seasonal variability responsible of the low productivity. Feed improvement is necessary. Cactus cladodes represent an available feed resource that can take their place in goat feeding calendar. In order to introduce them, it is necessary to characterize their chemical composition. In this context, this work aims to determine the chemical composition of cactus cladodes according to age and collection period. Twelve samples of young and old cactus were collected in three places in Tangier in two period (April and May). In the laboratory, measurement parameters of cladodes were determined and samples were dried in oven at 60°C and subsequently ground and sieved to 1 mm diameter. The studied composition parameters were dry matter, ash, total nitrogen, fat and fibers. The chemical composition of these samples was determined by the methods of AOAC (1997). From results, measurement parameters was not affected by collection period. However, the age factor had a very highly significant effect on all measuring parameters. Old cladodes were the longest, the largest, the thickest, and the heaviest. Also, collection period did not affect chemical composition. But, The age affected significantly ash, nitrogen and crude fiber. Old cladodes had more ash (+27.4%) and crude fiber (+27%) and less nitrogen (+118%). In conclusion, young cactus cladodes are more interesting and the constant of cactus composition during period make easy their introduction in ruminant feed calendar.
Nutrition is a main constraint for goat production in the Sudan due to rangeland deterioration and seasonal variations in feeds quantity and quality associated with seasonal rainfall. Browses are important feeds, especially in the dry seasons with limited information on ME and degradation characteristics to apply modern concepts of ruminant nutrition. Consequently, the proximate analysis, in vitro gas production, fermentation kinetics and predicted ME were studied in different parts of some browses in the Gezira State, Sudan. Proximate analysis varied among parts and browses and CP was highest in B. aegyptica leaves and CF was highest in A. albida leaves. There were high variations in corrected in vitro gas production and fermentation characteristics among browses parts. Degradation p and b were highest in B. aegyptica fruits, a was highest in A. senegal pods and c was highest in A. nilotica early growing leaves. Predicted ME generally varied among parts, browses and equations and was least from proximate analysis. Menke (1988) 1st equation generally increased predicted ME with time and the 2nd equation estimates were generally higher than the 1st one at different times. Metabolizable energy predicted by the 4th equation (Makkar, 1995) generally varied significantly (P < 0.01) among parts.
Meat production is mainly traditional and nutrition is a main constraint in the Sudan. Sugar beet is introduced into the Gezira State with no information on feeding it to goats. Consequently, this study was launched to study effects of dried sugar beet (DSB) based concentrates level on Tagger kids performance and carcass characteristics. Twelve males at 6 month old were housed in individual pens and allocated at random to three diets. They were weighed weekly for 8 weeks with a two weeks preliminary period. They were fed groundnut haulm (GNH) ad lib. in two equal meals and refusals were weighed. They were fed different levels of concentrates (0 (control), 150g and 300g) in two equal parts before GNH meals. They were slaughtered and carcasses characteristics and wholesale cuts were studied. Data was statistically analyzed using ANOVA (SPSS). Body weight and weekly weight gain generally increased with concentrates level, but not significantly (P>.05). Slaughter weight, hot carcass weight, EBW, dressing percentage, muscle, fat, muscle: bone and muscle: fat increased and bone decreased with concentrates level, but not significantly (P>.05). Concentrates level had no significant (P>.05) effect on whole sale cuts percentages.
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**Title**

Effect of the energy level and of linseed in the diet on the production and composition of milk in Saanen goats during early lactation.

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**Keywords**

Goat feeding, diet energy, linseed, milk composition, milk fatty acids

Fifty four Saanen goats (58 +/- 2.4 kg body weight) in early lactation (20 +/- 2 days in lactation) were randomly allocated to 3 homogeneous groups. All diets were based on pre-wilted grass silage, fodder beet and maize (Control). To increase the energy level, maize silage and lupines were introduced in the diet (Energy). Linseed was added to the Energy diet fed to the third group (Linseed). The energy concentration, concentrates proportion and sugar and starch content were respectively 0.82, 0.94 and 0.98 UFL/kg DM, 17, 34 and 34 % and 19.4, 24.5 and 26.5 % of the DM for the control, energy and linseed diets. Intake, milk production and milk composition were measured during 5 days after an adaptation period of 3 weeks. A production of fresh cheese was made at the end of the experiment. The Energy diet failed to significantly improve DM intake, milk production and milk composition. On the other hand, the Linseed diet increased (P<0.05) the fat corrected milk and fat production, the fat content and fat to protein ratio in milk. Linseed improved the fatty acids composition. C18:3n-3 concentration was increased (P<0.001). C16:0 and n-6 on n-3 ratio were decreased (P<0.05 and P<0.001 respectively). The diets had no effect on the milk to cheese efficiency and on the cheese quality.
Diet supplementation with a high dose of stearic acid to alleviate fish oil-induced milk fat depression in lactating ewes

Despite the benefits of using marine lipid supplements in dairy ewe diets to modulate milk fatty acid (FA) composition, this strategy causes milk fat depression (MFD), which precludes its use under farm conditions. One theory trying to explain this type of MFD attributes the depression to an impaired capacity of the mammary gland to achieve an adequate melting point for milk fat secretion. This alteration of fluidity has been linked to a shortage of available ruminal 18:0 caused by the consumption of marine lipids. However, in a previous study, we were not able to prevent the effects of fish oil supplementation through concomitant dietary addition of stearic acid (2% DM). Yet, before ruling out a mechanism based on milk fat fluidity, we decided to try with a higher dose of 18:0. Thus, this assay was conducted with 12 lactating ewes divided in 3 treatments that lasted for 4 weeks: a total mixed ration without lipid supplementation (control) or supplemented with 20 g/kg DM of fish oil alone (FO) or in combination with 40 (FOSA4) g/kg DM of 18:0. As expected, FO supplementation modified milk FA composition towards a healthier profile for consumers but, at the same time, reduced milk fat concentration. This MFD was not alleviated by the addition of 4% 18:0 (FOSA4). Animal performance results are discussed in relation to milk FA composition, particularly to the concentration of metabolites responsible for changes in the melting point and fluidity of fat.
Production performance and milk fatty acid profile as affected by cold-pressed oilseed cakes and sainfoin in Latxa dairy ewes

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Keywords
Latxa, sunflower, rapeseed

Sainfoin, given as hay, can have an advantage in dairy ewes with respect to production performance when cold pressed oilseed cakes are formulated in the concentrate. A lactation trial utilized 72 blackfaced Latxa dairy ewes at early lactation in a $2 \times 3$ factorial arrangement involving two forages (fescue and sainfoin hay) and 3 experimental concentrates containing either cold-pressed rapeseed (RPS), cold-pressed sunflower (SUN) or palm (CTR). Concentrates were offered in the milking parlour in two meals (450 g DM). Forage was group fed ad libitum. Milk yield was individually recorded twice daily. Every week, an individual milk sample was analysed for fat and protein. On d 54, a composited milk sample per animal was recollected for fatty acid composition analysis. No interactions between concentrate and forage were observed on milk productive performance. Non significant differences were found among concentrates in terms of milk yields. Feeding sainfoin increased milk yield (2378 vs. 1998 g/d, $P=0.001$), 6.5% FCM (2111 vs. 1806 g/d, $P<0.001$), fat yield (140 vs. 117 g/d, $P<0.001$) and protein yield (102 vs. 86 g/d, $P<0.001$). Feeding SUN increased the PUFA:SFA ratio compared with CTR (0.16 vs. 0.06, $P<0.001$) and RPS (0.16 vs. 0.09, $P<0.001$), and RPS compared with CTR (0.09 vs. 0.06, $P<0.001$). Feeding sainfoin hay increased the PUFA:SFA ratio compared with fescue hay (0.12 vs. 0.09, $P<0.001$). In conclusion cold pressed oilseed cakes do not affect milk yields but can improve milk fatty acid profile to a healthier one depending on the forage fed.
Once that sainfoin hay has an advantage over typical fescue hay in dairy ewes with respect to ruminal fermentation, the objective was to assess the effect on the quality and sensory properties of the final products when cold-pressed oilseed cake (RPS) is formulated in the concentrate. A trial used 72 black faced Latxa dairy ewes at early lactation in a 2 x 3 factorial arrangement involving two forages (fescue-FES, and sainfoin hay-SAIN) and three experimental concentrates containing RPS, cold-pressed sunflower cake (SUN) or palm oil (CTR). Concentrates were isonitrogenous and isoenergetics and were offered in individual feeders in the milking parlour as two equal meals (450 g DM) during the morning and evening milking. FES or SAN was group fed ad libitum in a feed bunk. On d 15 of the experimental period, a milk sample (7 L) was collected from each treatment for sensorial evaluation by a non-trained sensory panel. A 10-point scale was used, being the lowest and 10 the highest score for the evaluation. No interactions between concentrate and forage were observed for any of the traits, being ranked with 6.5 on average. Non differences were found among CTR, SUN and RPS, or among FES and SAN either in terms of acceptability, appearance, odour, texture or flavour, being ranked with 6.0 on average, whereas curd appearance was best qualified when the forage used was SAIN (6.9 vs. 6.4, P=0.011). In conclusion SAIN did not affect negatively the sensorial traits of curd, and only appearance was improved.
Forty Moroccan local kids (14.6±1.38 kg initial body weight) were used to evaluate effects of the concentrate protein level in the diet on the growth performance and carcass characteristics. The trial was carried out into two phases. In the first phase, which lasted 1 month, kids were randomly divided into two groups of 10 males and 10 females per each and received a diet containing alfalfa hay and concentrate supplement with two different percentages of crude protein (17.5%; T1 and 16%; T2), while in the 2nd phase, which lasted 2 months, each group formed in the phase 1 was also divided into two subgroups of 5 males and 5 females per each and received a diet containing alfalfa hay and concentrate supplement with two different percentages of crude protein (14.5%; T3 and 13%; T4). The kids were weighed at the beginning and at the end of the trial, and fortnightly. At the end of the experiment kids were slaughtered, and the carcass dressing percentage, fatness (1-5 scale) and conformation (SEUROP system) were measured. The level of crude protein of the supplement concentrate did not affect either kids growth performance (during the 1st and 2nd phase) or carcass characteristics (P> 0.05). Average daily gain during the 1st period was 111 and 91 g/d for T1 and T2, respectively, whereas during the 2nd period it was 113, 92, 85 and 98 g/d for T1T3, T1T4, T2T3 and T2T4, respectively. The warm dressing percentage was 53.57, 52.67, 52.81 and 52.98 % for T1T3, T1T4, T2T3 and T2T4, respectively. On the other hand, the sex affected growth performance (during the 1st and 2nd phases) and carcass characteristics (P<0.05). Average daily gain during the 1st period and 2nd period was 124 and 78 g/d, 114 and 79 g/d for males and females, respectively. The warm dressing percentage, the conformation and fatness were 54.58 and 51.03, 3.33 and 2.87, 3 and 2.58 for males and females, respectively.
Title: Effect of cake of argan on the dairy performance of goats of breed alpine

The cake of argan constitutes a strategic protein resource due to its composition on proteins (23% to 47% dry matter), which makes it possible to fill the deficit characterizing the animal feeding of the national herd. This study aimed to evaluate the effect of the incorporation of the cake of the argan tree in animal feeding on the performances of production and the nutritional quality of the goat milk. Results showed a significant increase of goats milk production for the first six weeks of lactation in the group fed the cake of argan (CA) compared to the group fed with traditional diet (TD). Milk fat content showed a significant difference between the two groups. The difference was not significant for lactose and protein contents. Average daily gain (ADG) of kids during lactating phase showed a significant difference of (CA) compared to (TD).
In this study, the viability of using oil from Laminaceae seeds as source for making ewe cheeses enriched in omega-3 has been evaluated. Two concentrations (1.5 and 2.5%; v/v) of seed oil emulsions stabilized with calcium caseinate were assayed in pressed sheep’s milk cheeses, and physicochemical, microbiological and organoleptic parameters were evaluated during 32 ripening-days. Sheep’s milk coagulation parameters during cheese elaboration were not affected by the incorporation of seed oil emulsion. The fortification with the emulsion had a positive impact on the cheese yield, its composition and the omega-3 level. Moreover, lactic acid bacteria were not inhibited. In the sensory analysis, the semi-trained judges did not appreciate differences between the control and the enriched cheeses.
The aim of the study was to evaluate the physicochemical quality of ewe milk under the cactus silage, compared to the local regime. Feeding trials were conducted on farm of local breed called Sardi, one fed with cactus silage (SD) and the other with a local diet (CD). The results of milk samples analyzed for density, freezing point and protein levels were not affected by treatments, except fat content which shows more fluctuations for both treatments ($P<0.05$). As for conductivity, solid non-fat and ash milk parameters, the means were respectively 2.72, 9.20 and 0.69% for SD diet, whereas they were 3.08, 9.08 and 0.69% for CD diet. These parameters showed high to very high significant change ($p<0.001$), along lactation weeks. Except for P concentrations, which were highest in milk of SD compared with that of CD group ($P<0.05$), the mineral composition of both milks (Na, K, Ca and Mg) was similar statistically. Except for Zn, the average contents of trace elements Cu, Mn and Fe during lactation weeks was very significantly different. The mean of Fe content was higher in milk of SD compared with that of CD; nevertheless the other compounds (Mn, Zn, and Fe) have nearly kept the same concentration for both groups. It is concluded that, in term of quality, cactus silage (SD) could replace a local diet and could be used as a cost-effective feed in dry areas.
Given the importance of livestock production in Morocco as much as the main component of agricultural production, we have found it very useful to study the livestock food deficit which remains one of the major problems hindering the development of this sector. However, the option that remains to be mobilized to cope with this deficit consists in the valorization of the agricultural and industrial by-products that can join the ordinary rations. It is in this context that this present study is carried out, the ultimate objective of which is the assessment of the effect of the incorporation of argan by-products (meal and pulp) on the production and quality of milk of ewes and the performance of lambs in the lactation phase. Feeding trials were carried out on two batches of Sardi ewes, one with Argan by-products (AC) and one with traditional (AT) feed. The results showed a significant increase of milk production for the first 13 weeks of lactation in (AC) herd compared to (TA). The peak of lactation is reached at the 3rd week for both batches. The protein content and milk lactose showed no significant difference between the two batches. Moreover, the difference was significant for the fat content.
Differences in rumen fermentation profile (including methane emissions) underlie variations in feed efficiency and residual feed intake (Jami et al., 2014). Therefore, understanding the relationship between feed intake and rumen fermentation is key to understanding the biological basis for animal differences in productivity, health and efficiency. The objective of this experiment was to examine the effect of differing levels of intake on rumen fermentation profile, nutrient digestibility, methane emissions, and feeding behaviour in sheep. Six Aberdale cross Texel ewes (90.2 ± 1.89 kg BW) fitted with rumen fistula were used in a duplicated 3×3 Latin Square with three 21-d experimental periods. Treatments comprised dried grass nuts fed to meet one (1M), 1.5 times (1.5M), or two times (2M) maintenance energy requirements (NRC, 2007). During each of the three experimental periods, sheep were weighed at d 1, 7, 14, and 17 to calculate average daily gain and feed efficiency. Feed offered and refusals were recorded daily to measure feed intake. From d 15 to 17 of each period, sheep were housed in individual metabolic crates, where total faecal and urine production were recorded daily to measure nutrient digestibility. From d 18 to 20, ewes were housed in individual methane chambers to determine gas production. On d 16 of each period, a video camera recorded feeding behaviour. On d 17 of each period, a total of 5 mL of blood were taken from jugular venipuncture immediately before feeding and 4 h later for haematology analysis. Also, 50 mL of ruminal content were collected from the ruminal cannula immediately before feeding, and 2 and 4 h after feeding to measure pH, volatile fatty acid (VFA) and ammonia concentration, and protozoa count. Data were analysed using the MIXED procedure of SAS (University Edition 2.3, SAS Institute, Inc., Cary, NC). The model included as fixed effects the square of the Latin Square arrangement, period, animal nested within square, treatment and, when necessary, hour after feeding, and the interaction treatment × hour. The average daily gain was greater (P = 0.01) in 2M than 1M ewes (0.49 vs -0.09 ± 0.079 kg BW/d). The 1M ewes had a lower (P < 0.01) VFA concentration than 1.5M and 2M (69.9 vs 101.8 and 111.4 ± 6.99 mM), and a greater (P = 0.04) acetic-to-propionic ratio than 1.5M (2.40 vs 1.97 ± 0.108). The ammonia concentration was greater (P = 0.01) in 1.5M than in 2M ewes (14.14 vs 8.89 ± 1.024 mM). Dry and organic matter digestibility per unit of metabolic weight were greater (P < 0.05) in 1M than 1.5M and 2M ewes (2.61 vs 2.47 and 2.43 ± 0.029 %/BW^0.75; 2.68 vs 2.55 and 2.50 ± 0.027 %/BW^0.75, respectively). Emissions of methane per unit of DM intake were greater (P < 0.05) in 1M than 1.5M and 2M ewes (18.33 vs 15.08 and 13.53 ± 0.772 g/d x kg DMI). No differences (P > 0.05) were found in protozoa count, feeding behaviour or haematology. Results show that increased levels of intake have a measureable impact on diet fermentation and digestibility, reducing the acetate-to-propionate ratio, ammonia production, digestibility rate and methane emissions. These changes could be attributed to the different nutrient fermentation pattern and the higher flow rate from the rumen to the lower digestive tract. Acknowledgements The authors acknowledge the financial support provided by the Welsh Government and Higher Education Funding Council for Wales through the Sêr Cymru National Research Network for Low Carbon, Energy and Environment.
The aim of this study was to evaluate the effect of dietary pomegranate pulp (PP) on the productive performance and intramuscular fatty acid (FA) composition in lambs. Seventeen Comisana lambs were individually stalled, divided into two groups and fed for 44 days: a barley-corn based concentrate diet (CON-8 lambs) or a concentrate diet containing 20% of PP to partially replace barley and corn (POM-9 lambs). The dietary treatment did not affect the growth performance of lambs. The inclusion of PP in the diet produced an overall improvement of the fatty acid composition of longissimus muscle. In particular, percentages of t-11 18:1 (0.73 vs 1.38, P < 0.001), c-9 t-11 18:2 (0.35 vs 0.94, P < 0.001), c-9 c-12 c-15 18:3 (0.37 vs 0.51, P < 0.001) and c-9 c-12 18:2 (5.37 vs 7.09, P = 0.035) were higher in the meat of POM group in comparison with CON lambs. All the mentioned FAs are involved in the ruminal metabolism of lipids, suggesting an effect of the bioactive compounds contained in PP on the FA biohydrogenation. In addition, c-9 t-11 c-13 C18:3 (punicic acid), the peculiar FA of pomegranate seeds, was detected only in the muscle of POM lambs, representing 0.48% of the total fatty acids. The percentage of MUFA and PUFA were significantly higher in meat from POM group compared to CON. In conclusion, a diet containing 20% of PP increased the proportion of healthy fatty acids arising from ruminal the biohydrogenation without compromising animal growth.
Variation in fatty acids profile of transhumant small ruminants milk related to the floristic composition of rangelands in Greece


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Mountainous grasslands, extensive production, grazing, dairy product quality

Greece represents a Mediterranean setting of particular importance in terms of biodiversity. A significant part of the country’s Usable Agricultural Areas is characterized as High Nature Value farmland (53%), especially in the mountainous areas of the country, which are the most abundant. Agro-pastoralism has played a crucial role in the formation and maintenance of unique landscapes with significant biodiversity in these areas, with transhumant sheep and goat flocks being the main grazers of mountainous rangelands. These flocks remain in the highlands for at least four months (May/June – early/late October) and graze in rangelands with considerable ecological and floristic diversity. Recent experimental data have revealed that properly grazed areas are characterized by increased floristic diversity and moderate grazing provides important ecosystem services. However, up to now the available knowledge regarding the effects of grazed species composition on milk quality is limited. This study contributes to fill in this gap by presenting the results of a combined study of rangeland floristic composition and milk quality of transhumant flocks. Plots of 9 - 16 m² in selected rangelands in Northern and Central Greece were fenced in order to be protected from grazing. Measurements of the vegetation cover and forage production were taken in summer 2013 and 2014 and the species composition and richness were calculated during the first days of grazing by transhumant flocks. At the same period milk samples were taken from the refrigeration tanks where milk is collected before transportation to industries and dairies. In total three samplings were performed in 2013 (2 in the lowlands and 1 in the highlands) and two samplings were undertaken in 2014 (1 in the lowlands and 1 in the highlands) in 26 farms. Samples were analyzed for the profile of fatty acids, which were divided in six categories (SFA, MUFA, PUFA, CLA, omega-3 and omega-6). The results of the statistical analysis demonstrate that there is a significant correlation between the level of floristic diversity and the concentration of specific fatty acids, some of which are particularly beneficiary for human health. Differences are found not only between winter and summer rangelands but also among areas used by transhumant flocks at the same time of the year.
Goat colostrums samples were analyzed for estimation of chemical composition (fat, Dry matter, ash and proteins) and fatty acids contents in Tunisian goat milk by using gas chromatography. Analysis of goat colostrums samples revealed the highest percentage of saturated fatty acids SFA (70.1%) Within saturated fatty acid the major contribution was given by palmitic (C16:0) 22.57% followed by myristic (C14:0) 16.19%, capric (C10:0) 12.8% and stearic (C18:0) 10.48% respectively. The concentration of short chain fatty acids (SCFAs, C4 to C10) was found to be 29.61% varying from 5.32 to 12.8 g/100g of FAME. Whereas the concentration of medium chain fatty acids (MCFAs, C12 to C15) was 21.97% varying from 0.53 to 16.19 g/100 g of FAME and Long chain FA (LFA, C16 to C24) was 37.66% varying from 0.27 to 22.57 g/100g of FAME. Colostrum from goat was rich in Unsaturated Fatty Acids USFA, the highest amount was for oleic (C18:1) 15.66%.
The aim of this experiment was to study the effects of the dose and the administration form of rosemary (Rosmarinus officinalis L.) essential oils (REO) on lambs’ carcass characteristics and meat quality. Thirty two Barbrine lambs were allotted to 4 homogeneous groups and fed oat-hay ad libitum with 500 g of concentrate. Rosemary essential oils (REO) were orally administrated in a dose of 0.3 and 0.6 ml/day to lambs of O-R1 and O-R2 groups, respectively. Rosemary essential oils were mixed to the concentrate in an equivalent dose of 0.3 ml/day for the Mix-R1 group, while the control group (C) did not receive REO. The administration of REO affected hot carcass weight (HCW) and, consequently, commercial dressing percentage (CDP; P < 0.05) being higher for Mix-R1 group (48 %). The administration of REO incorporation slightly ameliorated testicles weight (111 vs. 105 g for REO and C group, respectively). The administration of 0.3 ml/day of rosemary essential oils may have an important interest on carcass parameters and reproduction parameters.
**Title**  
Effects of EPA and DHA on in vitro ruminal biohydrogenation of 18-carbon fatty acids in sheep

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**Keywords**  
Lipid metabolism, PUFA, trans fatty acid, ewe

Marine lipid supplements have been used to inhibit the ruminal saturation of trans-11 18:1, with the final goal of enhancing cis-9 trans-11 conjugated linoleic acid (CLA) concentration in milk and meat. This response would be largely explained by the effects of n-3 very long chain polyunsaturated fatty acids (PUFA) on the last biohydrogenation (BH) step. In this regard, docosahexaenoic acid (DHA, 22:6n-3) has been suggested to be a stronger inhibitor of trans-18:1 hydrogenation than eicosapentaenoic acid (EPA, 20:5n-3) in cows, but information about changes in individual 18:1 isomers is very limited, and no reports are available in sheep. This in vitro study was therefore conducted to compare the impact of EPA and DHA on the BH of 18-carbon fatty acids in ovine, using batch cultures of rumen microorganisms and cannulated ewes as inocula donors. The two PUFA were added at a dose of 2% incubated DM and effects were examined after 24 h of incubation. The DHA treatment led to the greatest concentration of trans-18:1 in digesta, but this was mainly accounted for by accumulation of metabolites from alternative BH pathways (e.g., trans-9, -10, -12 and -15 18:1), while the inhibition of trans-11 18:1 saturation was comparable with both PUFA. The saturation of cis-18:1 was constrained too, particularly by DHA, whereas EPA seemed to have specific effects on 18:3n-3 metabolism. Changes in oxo-FA concentrations suggested that ruminal hydration (an alternative metabolic pathway to BH) was also affected by PUFA treatments.
Rennet curd cheese is sensitive process based on milk coagulation and formation of rennet-induced gel. This study compared the effect of dietary protein sources with vegetable origin (sunflower meal (SFM) vs. dried distillers’ grains with solubles (DDGS)) in ewe’s diets on milk clotting time (MCT, s), rennet coagulation ability (score 1 – 3) at 6 (RCA6) and 12 h (RCA12), and index of milk clotting time (IMCT, %). Simultaneously, it’s examined the relationship between suggested parameters and effect of lactating day (27, 35, 42, 49, 56, 63 and 70-d). It’s studied earlier lactation period (4 - 10 weeks) in 18 ewes (n= 9), 126 individual milk samples of regional breed Synthetic Bulgarian Dairy Population (SBDP). Animals were allocated into two dietary treatments (n= 9 per diet) formulated to contain equal amounts of fiber, energy, protein digestible in small intestines (PDI) and calcium : phosphorus ratio (Ca:P). The rates of rennet induced ewe milk coagulation (s) were measured as time from rennet addition to onset of rennet-induced gel. Rennet coagulation ability was measured subjectively based on scale of coagulum (shape, homogeneity, firmness, porosity) and serum (limpidity, turbidity) characteristics (score 1 – 3). Obtained results suggests significant effect (p< 0.05) of feeding supplement (DDGS vs. SFM) on RCA12 and tendency at RCA6 (p= 0.04). The influence on MCT and IMCT also showed such tendency (p= 0.57). Deduced Pearson’s correlation coefficients between evaluated parameters values and diet supplements at different lactation stage (d). In conclusion, the obtained results revealed that investigated parameters (RCA6, RCA12, MCT, IMCT) were influenced by dietary protein source (SFM vs. DDGSw). Firmer coagulum (RCA6, RCA12), but longer MCT were observed at milk, collected from ewes fed SFM-vs. DDGSw- based diet.
The objectives of this study were to determine the effects of feeding rapeseed and sunflower by-products as protein supplements on fatty acid (FA) composition (%), profile (ratios and indices), etc. of meat in lambs fed cereal-based diets. Simultaneously, it's examined the relationship between ingested FA and meat FA in slaughtered lambs. Samples were obtained from male fattening lambs (n=10, Bulgarian Synthetic Dairy Population, 146-d aged, FBW=36.95±0.91 kg) involved at two iso-caloric, iso-nitrogenous and equal in Ca:P ratio dietary treatments: 1./ control (CD) – with sunflower meal (SFM), and 2./ experimental (ED) – with rapeseed meal (RSM). Fat tissue extracted from meat was analyzed for FA profile. Animals fed RSM had significantly higher (p<0.01) performance (FBW=38.80 vs. 35.1 kg) and meat yield (5.26 vs. 4.67 kg). Diets contained 27 % (DM basis) RSM increased C18:3 (p<0.01) and C18:3/CLA (p<0.05), and decreased (p<0.01) C18:2/C18:3 ratio compared with control group. Deduced relationships shows good parity and high correlation (R>0.55). In conclusion, animals fed RSM-based diet, as a method to modifying meat FA profile, decreased the amount of SFA and PUFA, and increased MUFA, UFA and DFA of meat.
Small ruminants in a High Nature Cultural Value agroforestry system. Case studies in sheep research

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Keywords: Dehesa, extensive farming, agroforestry systems, PDO, cooperativism

Sheep and goat systems in south west Spain are “suffering” the same as any other extensive ruminant systems the Mediterranean area. Specifically, sheep farms have been endangered in recent years due to various pressures derived from changes in the consumption patterns and public policy changes. These systems are extremely fragile, as well as having a key role in providing environmental services. In this paper two case studies are presented. The first one is dealing with dairy herds of Merino ewes producing under a PDO scheme. In this case we analyse the farmers’ perception of their relationship with the PDO “Torta del Casar”, one of the most well-known Cheese PDOs in Spain, focusing on the technical and economic benefits that they obtain from their membership. The second case is related to sheep for meat systems. A sample of 101 sheep farms belonging to a second degree cooperative has been analysed. From this case we can conclude that the integration of farms into cooperatives can improve farm structure and ensure their persistence, due to the provision of additional services to the farmer, the generation of added value and increased price stability. Both cases are examples of successful strategies to improve the level of competitiveness of the productive system and the viability of the farms.
Multifunctional farms and policy makers need to connect agricultural management with the delivery of ecosystem services (ES) to improve policy outcomes and satisfy social demands. Despite the increasing understanding of the complex causal relationships between agricultural practices, biophysical processes and ES delivery, the application the ES framework to agrienvironmental policy remains very limited. In this context, we developed a reliable and flexible framework of Payments for Ecosystem Services (PES) for the implementation of agrienvironmental measures at the farm level. The PES framework i) focuses on agricultural activity as the main driver of many ES such as biodiversity and landscape conservation; ii) links objectively the real practices at the farm with the provision of the main ES; iii) uses expert knowledge that allows evaluating and comparing the multiple effects of farming practices on ES; iv) represents the role of all the stakeholders involved (farmers, researchers, society, policy makers); and v) constitutes a generic and versatile framework that can be implemented in diverse agroecological and policy settings. The paper describes the structure and operation of the PES system that is implemented in excel. We use the case of sheep and mixed sheep-crop systems in the Euro-Mediterranean basin to illustrate the results of the PES application with diverse environmental objectives; for example, a policy targeting the real preferences of society for ES provision by Spanish sheep systems (i.e. wildfire prevention 53.2% of total importance, provision of quality products linked to the territory 20.2%, conservation of biodiversity 18.4%, and conservation of agricultural landscape 8.2%).
Energy is a major input for sheep production due to the intensification and mechanization of production technologies. Energy efficiency is one of the key indicators for developing more sustainable agricultural practices. However, analyses of energy uses in different sheep production systems are scarce. In this context, this study had been set out to measure energy footprint (EF) of sheep meat production in two farming systems in Tunisia; the integrated cereal cropping-sheep farming system (prevailing in Northern Tunisia, mainly in regions of Beja, Jendouba) and the agro-pastoral farming system (prevailing in southern Tunisia mainly Tataouine and Kebili) where farmers rely on the purchase of livestock feedstuffs. This study further considers differences in the two production systems to explore the causes of variation of EF in sheep meat production. A total of 80 sheep farms, were investigated, using data on direct (fuel and electricity) and indirect (structures, machinery, feed, fertilizers, pesticides, and seeds) energy inputs. EF was expressed as mega joule (MJ) per unit of live weight of the animal (LW). Results show that the average EF of all evaluated farms was 1.58 MJ/kg of LW. Farms in the North had the highest EF (average 2.18 MJ/kg of LW) for which energy use is distributed as following: 65% feed production, 15% water pumping for watering and irrigation, 8% animal housing and lighting and 12% for transport. While the lowest EF was obtained in farms located in the south averaging 0.98 MJ/kg of LW for which the energy use during feed production, water pumping for watering and irrigation, animal housing and lighting and transport were 15, 25, 9 and 51%, respectively. It is concluded that sheep meat production in the agro-pastoral farming system in Southern Tunisia is less energy demanding than in the mixed cereal cropping-sheep farming system in the North of the country. This can be explained by the fact that feed production has the largest share of the total energy used by Northern’s farms. This means that efforts should be made to increase the energy efficiency of feed production and to feed use efficiency by animals.
Land use and grazing management practices have changed during the last decades as a result of the productive intensification. Some of the consequences of these changes are directly related to environmental impacts, such as carbon footprint. The assessment of the effect of different management practices is critical to improving the sustainability of these systems. Dairy sheep production in the Basque Country has been traditionally based on a pasture-based farming system. The main objective of the current work was to determine the effect of some regenerative practices in dairy sheep production variables and carbon footprint. The essays to determine the effect on production variables were carried out with the experimental flock of Neiker during 2014 and 2015, with two grazing regimes: regenerative (R) and free (F). Data and samples were taken fortnightly during spring. On the other hand, carbon footprint was estimated with data collected monthly before (2013) and after (2014) the regenerative practices were implemented in the flock. According to the results, there were no differences in daily dairy production but the R regime resulted in 12-15% greater amounts of herbage being harvested for conservation. Moreover, the regenerative practices implemented (7% increase of grazing time, remove the use of chemical fertilizations, 4% reduction of concentrates for feeding and the increase of the amount of herbage) reduced 10% the carbon footprint. As conclusion, the regenerative practices implemented in the study seemed to be linked with an increase of conserved herbage and a reduction of carbon footprint, without compromising livestock productive parameters.
The sustainability of the intensive sheep and goats systems in the Mediterranean region seems to be restricted due to the current economic crisis, which has worsened the problems of significant high cost of purchased feeds and their high dependency on capital. An alternative trend to overcome these issues is the extensification of farming systems in which an essential part of feeding requirements are covered by grazing in order to reduce feeding costs. Indeed, grazing provides livestock farmers with the necessary flexibility to adjust their livelihoods according to the external circumstances. Thus, he can modify the grazing system, the daily grazing duration and the supplementation management according to the availability of necessary resources in order to achieve an acceptable level of flock productivity. The purpose of the present study was to investigate the shepherd grazing management practices and the characteristics of the flock's movement in a communal rangeland. For this purpose, the case of a herded goat farm was investigated for three seasons (spring, summer and autumn) throughout two consecutive years during the economic crisis when the cost of feedstuffs was increased and the selling price of milk was decreased. Collars with GPS devices were placed on adult female goats' neck for four consecutive days during each test period. The GPS data as well the vegetation map of the study area were analysed using GIS tools. According to the results grazing spatial patterns per season were differentiated as the shepherd took into account the cost rate of supplementation, the forage availability per season and criteria to prevent overgrazing.
Today the fate reserved for many livestock animals no longer leaves indifferent. The lack of transparency on the conditions of farming and slaughter leads many citizens to reject all forms of livestock farming and their productive goals. The objective of this paper is to highlight, within farms, practices respectful to animals, necessary for the social acceptability and the sustainability of the farming. For this, we have identified the nature of the links between animals and humans in sheep farms, and we report how farmers assume the slaughter of their animals. The results come from a series of observations and video recordings of the interactive behaviors between ewes, shepherding dogs and shepherds in shepherding situations, as well as individual interviews with shepherds and farmers. On the question of the slaughter of the animals we organized groups of discussion between farmers. The results relate two aspects. The first concerns working collaboration between livestock farmers and their animals in farms. We have thus characterized the work of shepherding dogs with the shepherds: these dogs are not only objects of work and do not only respond to orders like robots but are actors of the work of shepherding. We show that through interactive behaviors, work between shepherds and dogs is a shared work, based on relationships of intelligence, negotiation, reciprocal affectivity and recognition. We have also identified relational values that lead farmers to spend time with their sheep to observe them, to be close and to communicate with them, as well as moral values of consideration, recognition and empathy. These relationships are experienced by the farmers as the essential wealth of their work as shepherds and farmers. The second aspect concerns the respect of animals by farmers up to slaughter. As shared labor relations amplify the links between shepherds and farmers to their animals, farmers explain that they can only assume the productive ends of livestock farming by providing their animals with conditions worthy of slaughter. This is why farmers want the animals they care for to be respected to the end: in particular, they want to reduce the duration of displacement before death and be assured of the efficiency of their stunning at the time of slaughter. The place of the animal in the livestock farming, given and explained thus by shepherds and farmers, leads to re-think livestock farming as an end: to be with animals as much as a means: to produce.
Sheep dairy and meat products: from consumers' perspective to industry innovations

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Keywords: Sheep products, consumers, focus groups, marketing

Sheep production has a long history in Spain which is reflected in a large variety of native breeds, production systems and products. Nowadays (2015), sheep and goat represents 8% of the final livestock production and it holds the second largest sheep population of EU-28 (2015). However, despite its importance, it has suffered 15 years of negative evolution of sheep numbers and sheep meat consumption, which has drastically dropped from 2.7kg per capita (2006) to 1.7kg (in 2014). Conversely, cheese production has increased slowly but steadily during the last decade, with a sharper increase since 2012. These trends respond mainly to changes in consumption habits and consumers preferences which are highly influenced by urban way of life. In this context, four consumers’ focus groups (part of iSAGE EU project), of 10 participants each, were conducted in Madrid aiming to explore urban consumers’ awareness, attitudes and preferences towards meat and dairy sheep products. Focus groups session showed that despite their high consumption of cheese, participants had an important lack of knowledge on cheese products, sometimes not even knowing whether they are purchasing cow, sheep or goat cheese. Participants also gave increasing importance to environmental, and animal welfare issues, however it was globally acknowledged that price continue to be the main driver of sheep products consumption. These and other aspects will be analyzed in depth in the presentation and discussed in term of its implications for the design of sheep products marketing campaigns and inclusion of new goals in breeding programmes.
Traditional dairy products have always been an important component of Lebanese diet; their production is fundamentally rooted in culinary heritage. Nevertheless, the future of these artisanal products is uncertain and needs considerable scientific efforts to save them from extinction, due to changes in lifestyle, consumer preferences and market challenges. Serdaleh is a traditional lactic goat cheese originated in South East Lebanese mountains. It is highly recommended for its unique taste and manufacturing technique using jars macerated in olive oil. Unfortunately, little information is available about this traditional product and its distinctive ripening method, which represents an obstacle for the protection of such authentic and original products. In order to preserve this endangered traditional product and increase its competitiveness, our study aims to characterize Serdaleh cheese and to optimize its manufacturing process by using innovative ripening methods. Pottery ripening jars were substituted by plastic barrels, and the effects of this alternative method on the physichochemical and microbiological characteristics of Serdaleh were evaluated. However, the real challenge was to maintain Serdaleh distinctive flavor and peculiarities, while optimizing its manufacturing process and improving its sanitary quality. Our findings represent an opportunity for the Lebanese dairy sector, to adapt artisanal goat cheese production to the new demands of consumers, and ensure its sustainability, specificity and authenticity.
Goat farming in Algeria is undergoing profound changes; it is shifting from pastoral low input to economic livestock farming in order to adapt to a new context, characterized by a high demand of goat’s meat and milk. Our study tries to highlight the evolutionary dynamics of this breeding and the adaptation strategies of the supply chain actors in order to identify dysfunctions and to propose alternatives to ensure sustainable development. Our study shows that the changing socioeconomic context of the country (urbanization, improvement of purchasing power, standardization and emergence of new food habits) has boosted the demand of primary (milk and meat) and processed (cheese) goat products, for their real and supposed dietetic and organoleptic qualities. This high demand has led to an increase in products prices, and chain stakeholders to try to seize this opportunity. Breeding systems are changing toward a more market oriented systems, and new dairy farmers or fatteners are organizing their production systems to own more profit. There is also a starting of a development process of a goat cheese industry in a few regions. However, the sector still suffering from a multitude of natural, technical, organizational and economic constraints affecting one or several chain segments. To accompany these changes, our study propounds innovative propositions; the use of new approaches to utilize food resources, produce new knowledge on local goat genetics, and reorganizing the sector, with the emphasis on making more organized and coherent the relationship among the stakeholders of the value chain.
A random regression model was applied to estimate co-variance components and genetic parameters for average daily gains (ADG1 from birth to 30 days, ADG2 from 30 to 90 days, ADG3 from 120 to 150 days, and ADG4 from 150 to 180 days). The data comprised 13,095 records belonging to 945 local kids (progenies of 22 sires and 285 dams) born between 1998 and 2014. The data were first assessed by analysis of variance using the SPSS Program, in order to identify the fixed effects to be included in the model. Year*month, sex*type of birth, dam’s class weight were classified as fixed effects and dam’s age at kidding as covariate. Random effects included in model were direct additive genetic effect, maternal additive genetic effect, direct permanent environmental effect, maternal permanent environmental effect and residual effect. Direct and maternal heritability estimates of ADG ranged from 0.1 to 0.39 and 0.09 to 0.24, respectively, in which ADG1 had the lowest direct and highest maternal heritability estimates among the other age groups. Estimated co-variance components increased with age for direct effects. A significant maternal effect was found in the pre-weaning stage that decreased in the post-weaning stage. Unlike in breeds raised in favorable conditions, the estimated maternal component of variance was larger than the direct variance in the pre-weaning period, indicating the importance of maternal ability in this breed. Estimates of genetic correlations among the traits studied were low to moderate with values ranging from -0.26 to 0.78, whereas the magnitude of the phenotypic correlation ranged from 0.14 to 0.94. Heritability estimates indicate that selection for maternal and direct components of ADG is possible in this breed. However, direct components need to be evaluated after weaning for a more efficient selection.
The effect of different feeding and water aspects on some cheese enzymes activity produced from Shami goat milk (Lysozyme (Lz), lactoperoxidase (LP), Alkaline phosphatase (ALP), Protease (Pro), $\beta$-Galatosidase ($\beta$-Gal) and $\beta$-Glucosidase ($\beta$-Glu)) fed salt tolerance plants and drinking saline water was determined. Samples were collected during 1st of March to 25th of May 2013 from Shami goat herd kept at Ras Sudr Research Station, Desert Research Center, Ministry of Agriculture. Fifty goats were divided equally into five groups. These goats were fed different five feeding and water systems. Group 1 (control) fed barseem hay and drink fresh water (G1). Group 2 fed barseem hay and drink saline water of 6000 ppm (G2). Group 3 fed alfalfa and drink fresh water (G3). Group 4 fed on alfalfa and drink saline water of 6000 ppm (G4). Group 5, fed on alfalfa ad libitum and drink fresh water (G5). Plus, bulk milk sample was collected from unknown feeding and water system around the research station. Goats in this system were fed shrubs and different desert plants and drinking unknown water (UFS). The nutrition requirements of the first four groups were covered by concentrate fed mixture. Four goats from each group were random selected to collect milk samples in the station. Samples were collecting individually at the 1st week of kidding after colostrums and each week up to 4 weeks, then once a month (w8 and w12 (weaning)). Cheese was made and pickling for 4 weeks. The result of total aerobic bacterial count slightly increased than fresh cheese in all groups up to 3rd week, then decreased at 4th week 6±2ºC. The Lz, ALP activity in cheese during pickling period was not significant (P>0.05) differences among all studied groups during pickling period. The LP, $\beta$-Gal and $\beta$-Glu activity show significant (P<0.05) differences among all studied groups during pickling period. The Pro activity was slightly increased until the 2nd week and then rapidly increased until the end of pickling period. The groups fed alfalfa were higher in the $\beta$-Glu activity than that fed on barseem hay. Sensory evaluation was done on cheese after 1st week of pickling at 6±2ºC. The total score points indicated that cheeses made in G2, G4 and UFS were higher than G1 and G3. It concluded that was not effect for different feeding and water groups on activity of studied enzymes. So, using of salt tolerance plants and saline water could not affect the quality of cheese made from Shami goat milk at Sinai, Egypt.
Performance monitoring in suckling sheep as in all other animals, is the basic tool for genetic improvement of livestock; via the selecting bodies, but its use by the farmer can be very beneficial. The traits related to ewe's productivity of local populations in the Setif region were studied on 105 lambs. The ADG10-30 allows estimating the genetic potential of ewes and rams on the criterion of the dairy value, from 2 weighing on the Lambs (averaged 10 D and 30 D). While the reproductive efficiency (RE) schematize better reproductive performance of sheep and is also the product of several other variables that are fertility, fecundity, and the weaning rate. Our study is to investigate the production performance of ewes (dairy production) during the month post lambing, and that by monitoring weight and lamb growth during this period, but also to determine the reproductive efficiency and mortality of the young.
This study was conducted to evaluate the effectiveness of hormonal protocols with different doses of eCG and cloprostenol in induction and synchronization of oestrus in North Moroccan goats. Thirty two adult goats were divided into four groups adjusted for age and live weight. Animals were treated for 11 days with an intravaginal sponge impregnated with 20 mg FGA. Two days before sponge removal, all groups received an intramuscular injection of 300 UI (T1 and T2) or 500UI (T3 and T4) of eCG plus 50 µg of cloprostenol for the T2 and T4 groups. Four fertile bucks were used to detect oestrus 12h after sponge removal and blood samples were collected every 2h from 20 to 60h following sponge removal to determine plasma LH concentrations. Oestrus and LH pic responses were similar in all groups (T1, 100%; T2, 87.5%; T3, 100%; T4, 100%). There were no statistically significant differences (P>0.05) between the groups for the onset of oestrus (26.8 ± 9.4 h, 35.6 ± 8.7 h, 21.5 ± 13h and 23.2 ± 12.7 h respectively for T1, T2, T3 and T4 groups) and preovulatory LH surge after sponge removal (36 ± 13.1 h, 37.4 ± 10.4 h, 27.2 ± 13.4h and 28 ± 9.9 h respectively for T1, T2, T3 and T4 groups). The onset of oestrus and preovulatory LH surge were significantly shorter in groups received 500UI eCG, compared to groups received 300UI (30.6±10 h vs. 22.3±12.5h and 36.7± 11.5h vs. 27.6± 11.4h respectively; p<0.05). Dose of cloprostenol did not affect the induction and synchronization of oestrus and preovulatory LH surge (P>0.05). In conclusion, in hormonal protocols of oestrus and ovulation induction in North Moroccan goats, the utilization of 500UI eCG shortened the onset of oestrus in North Moroccan goats during anoestrus season.
This study aims at establishing phenotypic and genetic characteristics of the local goat population and its biological diversity as well as its adaptive abilities. It is proposed to evaluate the genetic and productive behaviour of local goat in a breeding pattern. Phenotypic characterization of local population, based on profiling of phenotypes and the general stature of goats was carried out at 19 herds involving 784 females and 45 males. Typing done confirms the wide diversity within local population and illustrates its ability to adaptation. The frequencies of various phenotypic patterns vary widely with communities and systems. The local population is a genetic group with traditional irregular trend of homozygosity due to the practice of consanguineous mating and lack of exchange of bucks.
Performances of Barbarine ewes grazing on wheat stubble under conventional and conservation agricultural conditions in a Tunisian semi-arid area

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Keywords: Ewes, stubble, grazing, conservation agriculture, performances

The aim of this work was to study the effect of agricultural practices (Conventional and conservation agriculture: Conv.A and CA respectively) on live weight variation and body condition scoring (BCS) of Barbarine ewes in Tunisian semi-arid conditions. The trial was carried out in the experimental station of INRAT (Region of Zaghouan) in two plots of bread wheat stubble, cultivated respectively according to Conv. A and CA conditions. Each one was divided into 3 electrically fenced subplots and each subplot had an area of 1665 m² for a stocking rate of 30 ewes/ha. Thirty Barbarine breed ewes (Initial average weight 38±1.86 kg) were divided into 6 homogeneous groups of 5 ewes each (3 groups for each agricultural system: Conv.A and CA). Animals grazed during a period of 45 days. Live Weight (LW), Daily Live Weight Gain (DLWG) were determined 4 times after the start of the experiment (every 10 days) and Body Condition Scoring (BCS) was determined at the beginning of the experiment and 40 days after. Results showed that Live Weight increased significantly from the first weighing time until the end of the experiment both in Conv. A and CA (P<0.05, +3.94 and 3.85 kg respectively). In the second period, DLWG decreased significantly in CA plot (P<0.05, -40.1 g/d), affecting the body weight which decreased but not significantly. Then, the live weight increased in the third period and it was maintained until the end of the experiment with a positive DLWG registered on ewes. The same trends of variation in LW were found in Conv.A and CA. For all the weighing times, no differences in LW and DLWG values between agricultural practices were noted. Results relative to Body Condition Scoring variation showed that no significant differences were observed in lumbar region score between the two investigated agricultural practices in the 2 measurement periods. The variation of tail region score according to agricultural practices at the start and the end of experiment showed that both in Conv. A and CA, the tail region score increased significantly (P<0.01; P<0.0001, respectively for Conv. A and CA). Statistically, the two investigated agricultural practices (Conv.A and CA) didn’t affect the tail region score whatever the measurement time. It was concluded that in these experimental conditions, no differences were found in performances between the two agricultural practices.
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<tr>
<td>Title</td>
<td>Adaptation of sheep breeding systems to changes in the Algerian steppe context: Case of the region of M’Sila.</td>
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| Keywords | Changes, adaptation, sheep breeding, Algerian steppe, M’Sila |

The Algerian steppe (area of 20 million hectares, rainfall between 100 and 400 mm/year) knew many socio-economic and environmental changes, of which the most observables:  
(i) The depletion of naturals pastures, as a result to the degradation of the steppe rangelands  
(ii) An accelerated demographic growth, which is reflected in an increase in household needs and the necessity to find a satisfactory income for the family,  
(iii) Economic instability, especially imported livestock feed. In this study, we are interested in the analysis of the different mechanisms of flexibility of sheep breeding in M’Sila region; One of the main wilayas (departments) of the algerian steppe. We conducted interviews with thirty sheep breeders representing the different breeding systems in the area. After analyzing the results of the undertaken interviews, we can note a wide range of practices innovating and adopting by the breeders. These practices are reactions to the various changes in the socio-economic and environmental context, both national and local. Diversification of sources of income, readjustment of tribal rangelands distribution rules, adaptation of animal feeding to the deficit of natural fodder through supplementation with concentrated feed; these practices were the main ones adopted by the breeders.
Vers 2000, des travaux ont signalé une mutation silencieuse de l'élevage pastoral au Maghreb. Afin de saisir ces dynamiques, nous avons mené plusieurs études en zones steppiques des trois pays. Des facteurs de perturbations génériques se sont révélés à la fin du 20ème siècle : forte croissance démographique, périodes de sécheresses sévères, accaparement des terres de parcours pour développer les cultures, transformation des habitats, politique publique agricole mettant plus l'accent sur l'agriculture que sur l'élevage, évolutions socioculturelles (e.g. scolarisation, poids en diminution des Arch pour la régulation des accès aux ressources, etc.). Dès les années 1990, les éco-pastoralistes ont souligné l'augmentation des surfaces cultivées, la diminution des surfaces de parcours et la baisse de leur productivité. Il s'avère néanmoins que les cheptels ont une nette tendance à augmenter pour tenter de couvrir les besoins des trois pays. Les parcours naturels ne permettent de couvrir que 40 à 50 % des besoins des animaux (en Tunisie Central < à 20%). Les chaumes, les "céréales sinistrés" les repousses de céréales en automne etc., sont pâturés. Mais il se révèle nécessaire d'apporter des concentrés, environ 30 à 45 % des besoins des animaux. L'obtention en concentré (e.g. orge, son de blé, etc.) est devenu un facteur majeur de vulnérabilité. Notre questionnement porte sur les potentialités à valoriser les ressources fourragères, par des usages ajustés des parcours et le recours à de nouvelles ressources. L'objectif est de diminuer la part des concentrés qui augmente l'incertitude dans les élevages et les coûts de production.
This study covers traditional healing practices for sheep and goats collected in the Tena Valley and Biescas Area (Spanish Pyrenees). 30 informants were interviewed, being registered 60 different plant taxa which belong to 35 botanical families, 7 herbal remedies, 1 fungus, 9 elements of animal origin, 9 of mineral origin, 1 of chemical origin and 7 handling practices or other remedies. In total, 130 practices for medicinal, reproductive or production uses in small ruminants were collected. These traditional practices are very useful for organic farming as alternatives to synthesized medicinal products and as non-conventional feeds, and contributes to maintain the traditional knowledge, which has been passed on one generation to the next and is falling into disuse in recent times. Our elders may not have so much scientific-based knowledge, but they had wide experience in sustainability.
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Title | Effect of the presence of neomycin in goat's milk on the making process and characteristics of Tronchón cheese
---|---
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Keywords | Neomycin, goat milk, cheese

The presence of antibiotic residues in dairy products can be a problem for public health, and also for the dairy industry leading to technical as well as product quality alterations, especially in fermented products such as cheese. Among the antibiotics for dairy livestock, there is neomycin, belonging to the aminoglycoside group, with bactericidal activity, mostly against aerobic gram-negative bacteria. Information on the effect of the presence of neomycin in milk on the characteristics of cheese is very limited. Therefore, the objective of this study was to analyze the effect of the presence of neomycin in goat’s milk on the manufacture and the characteristics of semi-hard Tronchón cheese. To this end, elaborations of cheese were made, in duplicate, from raw goat’s milk without antibiotics and with the addition of neomycin at a concentration of 2500 µg/kg equivalent to the Maximum Residue Limit (MRL). Possible changes in the characteristics (pH, composition, proteolysis, lipolysis, texture and color), and the presence of the antibiotic in the cheeses, ripening for different periods (1, 30 and 60 days), were studied. Based on the results obtained, it was observed that the presence of neomycin was lower in the fresh cheese (day 1: 5590±14 µg/kg) than in the matured cheese (day 30: 6420±707 µg/kg; 60 days: 7415±120 µg/kg). The presence of neomycin caused some changes in texture and color, also affecting the proteolysis and lipolysis of cheeses with a low concentration of fatty acids and free amino acids. The ripening affected all parameters studied for cheeses.
The local goat population is traditionally raised in pastoral mode and the kids’ meat is the main herd product. The dairy performances of this population affect the productivity by the bias of the kids’ growth. The data was carried out from a periodic dairy survey of 8 herds in the region providing more than 300 lactations complete information. Individual milk performances such as, daily average production, total milk per lactation, milking period was estimated by Gamma function and analyzed by a GLM Model. The results illustrate the importance of the adaptation of this population as well as its wide variability. The local goat presents a similar morphology that characterizes breeds and populations of the hot regions. Milk performances of the local goat were weak like those of races and nursing populations of the hard regions. However, it exists within the local population, goats of high production marked by their phenotypes and their related herds. Factors controlling forage availability such as the year, the month, the region,…, affect the animal performances. Also, the environment affects the animal genotype expression by fixing of a high limit of production. Especially for the best ones, the complete genotype expression is not allowed under the arid conditions. During the difficult periods and the critical physiological stages, the phenotype manifests the environment potentialities and doesn't permit the genetic difference.
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<th>Title</th>
<th>Innovation in small ruminants’ dairy products in Lebanon: an alternative drying technique for kishk, a traditional fermented milk</th>
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| Keywords | Kishk, lebanese, traditional, sun drying, innovative |

The Lebanese dairy sector is a viable and competitive sector. However, local dietary habits and consumer expectations of dairy products are changing, with a strong demand for innovative products with better hygienic and nutritional qualities. This development raises concerns about product standardization and uniformity of tastes, leading to loss of traditional products and impoverishment in terms of typical flavors. Consequently, it is essential to valorize traditional dairy products and improve their hygienic and nutritional quality, in order to increase their competitiveness in the Lebanese market and preserve this culinary heritage. Kishk is a traditional Lebanese fermented product, prepared from yogurt and bulgur allowed to ferment together, shaped into balls and sun-dried. However, the sun drying of kishk requires a large amount of manual labor for homogenous drying. It also includes a high risk of microbial and physical contamination, and affects the final quality of kishk powder and reduces its shelf-life. Therefore, our study proposes an innovative drying technique (hot air drying), and evaluates its effects on the nutritional, physicochemical and sensory properties of Lebanese kishk. Our results are promising and show that hot air drying technique can be a great alternative to improve the safety of kishk powder while preserving its nutritional and sensory quality.
Innovations in the selection program of the UPRA-Grupo Pastores in Rasa aragonesa sheep breed

The Cooperative Oviaragon-Grupo Pastores carries out since 1994 a selection program for prolificacy in Rasa Aragonesa sheep, with 216,232 ewes at present. Sires of higher estimated breeding values are produced within the scheme by MOET, increasing the performance of this technology through the measurement of plasmatic Anti-Müllerian Hormone (AMH) in ewe embryo donors, an endocrine marker of the ovarian activity. Within this program a natural genetic prolific variant was found in 2007 (FecXR allele, BMP15 gene). Its effect on prolificacy leads to an increase of 0.35 lambs/lambing ewe when compared with non-carrier ewes, with an additive effect over the standard hormonal treatments used in farms. Recently, new variants in MTNR1A gene associated to reproductive seasonality have been detected in Rasa aragonesa breed. Non-linked SNPs in promoter and exon 2 regions have been detected decreasing the length of non-cycling period (considering anoestrus those periods with three or more consecutive weekly-sampled progesterone concentrations lower than 0.5 ng/ml) as much as 30 and 53 days, respectively, from January to August. In the same way, the allele located in exon 2 was also associated to an increase of 15% of oestrus cycling months (based on oestrus records). Due to their productive interest, a controlled program for the outreach of FecXR allele and MTNR1A alleles has been developed. Finally, a polygenic selection program for maternal capacity is being carried out. The selection program goes on with a combined polygenic selection for prolificacy, maternal capacity and dissemination of FecXR and MTNR1A alleles.
In intensive systems, high producing animals are fed with a high proportion of acidogenic ingredients in the diet to meet their requirements, but might suffer from acidosis with an occurrence differing from one animal to another. Feeding behaviour is a key factor to explain these inter-individual differences. Phenotyping feeding behaviour is thus of interest for quantifying some of the variation in digestive efficiency, and therefore in feed efficiency. Feeding behaviour was assessed at three periods (1st lactation, 2nd gestation + lactation, 2nd lactation) on thirty-five contemporary goats. The evolution of feed intake during 15 hours after the afternoon allowance was measured in individual crates every 2 min for 3-4 days. Two phenotypes were automatically measured: Q90 (quantity of feed consumed by 90 min post afternoon allowance), P90 (Q90/Total quantity of feed consumed after the afternoon allowance). Intra-period individual repeatabilities were very high. The value for one period was highly correlated with that of a preceding one for the P90 criteria, but only tended to be correlated for the Q90 criteria. Given this repeatability, it is possible to characterise the feeding behaviour of all the goats during their first lactation and, for example, in the following lactations, to restrict feed allowance of those with the highest P90 or Q90 in order to decrease the occurrence of acidosis in the herd, and then increase their efficiency. These results on the variability of intake rate show that simple criteria could be found to phenotype goats on intake rate in precision livestock farming systems.
Infrared thermography (IRT) has a wide range of applications in farm animal welfare, including measurement of body temperature as a distress indicator. The aim of this study was to investigate the IRT potential to measure eye (IRTeye) and muzzle (IRTmuz) temperature to detect stress in sheep during shearing and foot-trimming procedures. Both temperatures were measured on 89 non-lactating and non-pregnant ewes of two breeds (55 Churra da Terra Quente – CTQ and 34 Ile-de-France – IF). The IRT was collected before, during and after each procedure. A FLIR infrared camera was used and IRT images were analysed using Flir Tools+ software to determine IRTeye and IRTmuz. All statistical analyses were performed using the JMP software. Data was analysed considering breed and time of IRT collection as factors. The IRTeye and IRTmuz were analysed separately. Least significant difference Student’s t-test was used to compare means. The IRTeye was higher than IRTmuz (37.26 vs. 31.60 °C, P<0.01, respectively) for both breeds and procedures. The IF ewes show higher temperatures than CTQ for foot-trimming and shearing (37.49 vs. 37.11 °C, P<0.05; 37.54 vs. 37.13 °C, P<0.05, respectively). Time of IRT collection presents different values, the lowest (P<0.05) being observed during both procedures and the highest before. The IRTmuz did not allow to identify differences between breeds or time of IRT collection. In conclusion, IRT allows the obtainment of eye and muzzle temperature being a viable indicator of distress in sheep during shearing and foot trimming, which can be a valuable tool in welfare assessment.
Remote sensing for real time estimate of aboveground biomass productivity in mountain pasture

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Keywords
Remote sensing, NDVI, Precision grazing

Precision grazing may increase the farm business productivity, through improved pasture and animal management. One of the main issue is to estimate the real productivity of the pasture, in order to program the correct grazing load at each moment of the year. The aim of the study was to verify if the data acquired by the new European satellite system named “Sentinel 2” could be used for estimation of aboveground biomass in a mountain pasture. During 2016 growing season, in a Central Italy mountain pasture (M. Tilia, Rieti), we built nine grazing exclusion fences (12 m x 12 m), including the Sentinel 2 acquisition grid (10 m x 10 m pixel). Inside each plot, we cut grass (5 m-2) once a month for three months. The grass was weighed and analyzed for chemical and physical parameters. At the dates matching with cuts, free-of-charge red and infrared bands were acquired from Sentinel 2 data hub, in order to calculate NDVI (Normalized Difference Vegetation Index). In a GIS environment, we extract NDVI values for each plot. To explore how NDVI relate to biomass, linear regression analyses were performed. NDVI, varying from 0.41 to 0.83, showed strong linear relationships with green biomass (R²=0.6356). A lower relationship was observed between NDVI and dried biomass (R²=0.4678). No significant correlation was found with the other parameters. The model, after being further refined, can be used to spatialise data over vast grazing areas, with high temporal frequency (5-10 days), helping in a more precise planning of livestock grazing.
Dairy goat sector is experiencing the intensification process observed in dairy cattle consisting on maximizing productivity, efficiency and profitability. To achieve this ambitious goal Cabrandalucía Federation has implemented a new concept of farming based on the use of the ‘Eskardillo’, a smart phone-based platform which relies on three principles: i) systematic individual data recording (milking control, productivity, genetic value, morphology, phylogeny, prolificacy), ii) big data processing and interpretation and iii) interactive feedback to the farmer to optimize decision making. In this case study six farms belonging to the Murciano-Granadina goat breeding association (Capigran), which implemented the Eskardillo in 2014, were monitored from 2012 to 2016 in terms of genetic value and productivity of individual animals to determine the effectiveness of this platform. This study demonstrated that Eskardillo allowed maximizing the genetic progress by implementing a well-defined selection program. As a result, in 2016 this platform increased 4.5 times the genetic progress in terms of milk production (from +1.3 to +5.9 kg milk/animal, lactation and year) leading to an acceleration in the milk production from 508 to 527 kg milk/lactation. Furthermore, Eskardillo implied a holistic and data-driven management, which helped to optimize the first kidding age, dry period length and culling strategy to minimize “invisible loses” derived from unproductive periods. It could also provide additional benefits derived from implementing precision feeding practices or sustainability parameters integration. Thus, a more detailed study is required to fully evaluate the impact of Eskardillo platform on farm profitability over the years to come.
In France, Lacaune dairy sheep in the Roquefort area are fed in groups with a wide range of milk yields (MY). In order to adapt concentrate levels to MY, a 100-day experiment was conducted during the early milking period (50 days in milk) with three batches of 54 multiparous ewes constituted according to their MY (L/d): high (h: 3.2), medium (m: 2.7) and low (l: 2.2). Each batch was separated into two groups of 27 ewes, a control group (C) and an experimental group (E), fed either with the same level of concentrate (Ch, Cm and Cl) or with concentrates adjusted to the MY (Eh, Em and El), respectively. All ewes were fed a forage mixture ad libitum. The average daily individual forage dry matter intake was not different (P>0.05) between groups Eh, Ch, Em and Cm (2.3 ± 0.17 kg DM), but that of Cl (2.0 ± 0.17 kg DM) was lower (P<0.05) than El (2.2 ± 0.17 kg DM). Body weight gain was higher (P<0.01) for Eh (59.2 g/d) than for Ch (33.9 g/d), but not for the other groups (P>0.05). Body condition score was not affected (P>0.05) by concentrate level in any of the groups. There was no effect (P>0.05) on MY and milk composition. However, the urea level in the milk was lower (P<0.001) for El than Cl. There was no effect on metabolism parameters between batches E and C. In our conditions, adjusting concentrates to the MY neither saved concentrate nor changed total milk yield.
In the context of climate change and input reduction, the availability of animals with persistent lactation is of interest to livestock farmers. Indeed, for the same total quantity of milk produced during lactation, a persistent goat will have its energy demand distributed all along the lactation, which could decrease disease problems and increase rough forages consumption. The objective of this study was to achieve a typology of lactation curves and to analyze the influence of environmental factors (rank of lactation, breeding area, breed, age at kidding, month of kidding, dry-period length, stage of gestation, herd effect from milk yield genetic evaluation and estimated breeding values (EBV) for milk yield and somatic cell scores (SCS)), on these curves. The data used consists of 2,245,628 monthly test-day records of milk (324,547 lactations) on 213,000 Saanen and Alpine French goats, from the French official milk-recording program. A principal component analysis (PCA) was performed on test-day records with R package fdapace. Three principal components were found: one relating to the level of milk production, another to the persistency and a third to the shape in middle lactation. Data clustering was performed on PCA lactation scores and 5 clusters were found. The first principal component was mainly explained by herd effect, milk yield EBV, rank of lactation and region. The second one was mainly explained by month of kidding, breed, age at kidding, dry period length, gestation stage, SCS EBV, and rank of lactation. The third one was mainly driven by the month of lactation.
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**Title**: The gaps and environmental challenges for small ruminant production in Turkey

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**Keywords**: Sustainability

Small ruminant breeders contribute to animal production by using the great environmental resources in different production systems. The small ruminant breeds and production environments are two basic components for sustainable livestock production. In terms of sustainability, interactions of both components should be considered as well as production level. This study covers sheep and goat breeds which reared in their original production environment in Turkey. Comparison made for their production systems, level of production and sustainability. Compared to the improved and crossbreds lower meat and milk production were observed in local breeds. These production levels could be preferable under the certain circumstances. In the scope of the economic production, adaptability to the environment of the breeds of sheep and goat, product quality, market demand and infrastructure of rural areas has been considered important factors. Therefore not only the yield level but also the sustainability of the production is important factor for breeders’ decision.
Abstract
In the last three decades, Saudi Arabian government had supported the animal production throughout many agricultural policies. The sheep production is among the supported sectors in which received more attention to improve production environment, upgrading of traditional procedures and subsidize the higher feed prices. These policies were reflected in different impacts on red meat production and improved food securities. The total number of sheep has been estimated in accordance with the General Authority for Statistics in 2015 about 17.53 million head, farming systems represent about 51.6%, while landless farms based on free grazing represent about 48.4%. The eastern region ranks fourth in terms of number of sheep, estimated at 2.18 million head, of which 1.47 million head in landless farms based on free grazing. There are three main varieties of sheep meat in Eastern Region which are Noiemy, Najdi and Harry. Noiemy represent about 81.1% followed by Najdi with 7.3%, and 4% is Harry. The research aims to study how to encourage farmers with medium size sheep farms (200-400 head) to turning from traditional to high-improved commercial production. Feasibility study for Noiemy medium-sized farms has carried out to the number of 300 heads, and it has achieved a good level of profitability in light of the feed prices, its subsidies, meat prices and energy prices for 2016, Net revenue is estimated around 29.3% of the total cost.
The objective is to study the evolution of body reserves of ewes before the struggle and during gestation and their effects on the mode and the birth weight of lambs. The study was conducted at the experimental farm of the Institute of Breeding Technique Ain M'Lila (eastern Algeria) on 82 ewes Ouled Djellal, multipara, aged four years and weighing an average of 52 ± 7 kg followed for 180 days. The ewes have received a compound feed of oat hay, barley straw and 500 g of concentrate (800 g in the struggle) per ewe and per day with access to grazing of fallow. The results show important variations in body condition of the ewes between physiological stages \( (p < 0.001) \). The leanest ewes (therefore not sufficiently fueled) showed less important loss of body condition score (BCS), and have had more single births than others. Furthermore, loss of body condition in the second half of pregnancy is linked so highly significant \( (P < 0.001) \) in litter size at birth. Weight of lambs at birth is affected by the mode of birth \( (r^2 = 0.47; p < 0.05) \) and weight of ewes at farrowing \( (r^2 = 0.41; p < 0.05) \). Single lambs have a slight superiority in birth weight \( (0.87 \text{ kg}) \) compared to twins by the effect of compensatory growth.
Improving milk production by using digestible fiber rich by-products would increase production efficiency and reduce environmental impact of sheep production. We hypothesized that prenatal and early life exposure to either starch from corn grain or highly digestible fiber from beet pulps and soyhulls would affect sheep response to the same feeds in mid-lactation. Two groups of 12 Sarda ewes each were exposed during the last two months of the prenatal life to two different isoproteic diets (one per group) and then fed the same diet during their growing phases and their first pregnancy. The diets were one glucogenic, being rich in starch from corn grains (S; 21% of starch and sugars, DM basis), the other hypogenic, being rich in digestible fiber from soyhulls and beet pulps (F; 7% of starch plus sugars, DM basis). In early lactation (until 54 DIM) all the 24 ewes received the same glucogenic S diet to support the lactation peak. From 55 to 160 days in milk (DIM) the ewes with S and F background, homogeneous per yield and BCS, where split to S or F total mixed rations (with 24%, S, and 13%, F, of starch plus sugars, DM basis), creating 4 groups of 6 ewes each: SS, SF, FS and FF based on the dietary sequence applied between prenatal life and parturition and between mid-lactation to the end of the experiment. Milk yield and composition were measured each 10 days and BCS every two weeks. Fat and protein corrected milk yield (FPCMY) was compared by using the PROC MIXED procedure of SAS for repeated measurements. At 55 DIM, FPCMY was (mean±SE) 1.592±0.096 kg/d per ewe, and BCS was 2.85±0.15. The F diet provided during early life and until parturition numerically favored higher FPCMY and persistency on ewes fed S compared to those fed F during their mid-lactation (1.2680.198 vs 1.012±0.180 kg/d for FS and FF, respectively; P=0.3). At the opposite, the S background numerically favored FPCMY and a higher persistency on ewes fed the F diet compared to those fed the S diet during their mid lactation (1.483±0.180 vs 1.143±0.198 kg/d for SF vs. SS, respectively; P=0.3). On ewes with S background the use of F in mid-lactation was significantly associated to higher FPCMY compared to S ewes after 110 DIM (P=0.05). FPCMY at 160 DIM was 1.24±0.196 vs. 0.729±0.214 kg/d (P=0.05) for SF vs. SS ewes, and 0.946±0.214 vs. 0.593±0.196 for FS and FF ewes (P>0.20). BCS at 160 DIM was 2.98±0.10 and not different among groups. The positive effects of the exposure to glucogenic diets in early life suggest investigating the hormonal and metabolic mechanisms underlying these results. Acknowledgements the project was funded by the Italian Ministry of University and Research within the Future in research Program 2013.
Ixodid ticks transmit various infectious agents that cause disease in humans and livestock worldwide. A cross-sectional survey on the presence of protozoan pathogens in ticks was carried out to assess the impact of tick-borne protozoa on domestic animals in Palestine. Ticks were collected from herds with sheep, goats and dogs in different geographic districts and their species were determined using morphological keys. The presence of piroplasms and Hepatozoon spp. was determined by PCR amplification of a 460–540 bp fragment of the 18S rRNA gene followed by RFLP or DNA sequencing. A PCR-RFLP method based on the 18S rRNA was used in order to detect and to identify Hepatozoon, Babesia and Theileria spp. A total of 516 ticks were collected from animals in six Palestinian localities. Five tick species were found: Rhipicephalus sanguineus sensu lato, Rhipicephalus turanicus, Rhipicephalus bursa, Haemaphysalis parva and Haemaphysalis adleri. PCR-based analyses of the ticks revealed Theileria ovis (5.4%) mainly in sheep, Hepatozoon canis (4.3%) in dogs, Babesia ovis (0.6%) in goats, and Babesia vogeli (0.4%) in dogs. Theileria ovis was significantly associated with ticks from sheep and with R. turanicus ticks (p < 0.01). H. canis was detected only in R. sanguineus s.l. and was significantly associated with ticks from dogs (p < 0.01). To our knowledge, this is the first report describing the presence of these pathogens in ticks collected from Palestine. Communicating these findings with health and veterinary professionals will increase their awareness, and contribute to improved diagnosis and treatment of tick-borne diseases.
The Taadmit ovine breed currently in the process of extinction has practically disappeared from its original cradle (Taadmit region of Djelfa). It is the fruit of the crossbreeding between the breed Ouled-Djellal (Algerian sheep population) and the breed Merinos, crossing made during colonial period (Trouette, 1933). In recent years, the total number of this breed has been limited to a few thousand heads (2,200 heads according to Fantazi, 2015). Its wool performance was its main strengths, however its low reproductive performance against the Ouled-Djellal breed, a late seasonal resumption of sexual activity (Benyounes 2013) and a prolonged anœstrus were the almost certain cause of the disinterestedness of Breeders. Our study is carried out on the herd of the National Agricultural Research Institute (INRAA) experimental station of H'MADNA, the only homogeneous herd currently available at the national level (Fantazi, 2015). Our objective is to evaluate the reproductive performance of the experimental herd: * By the analysis of the control and results to lambing during the last two past campaigns. * By monitoring the conduct of the wrestling, during the 2016 campaign and lambing (in progress). * As well as by the implementation of a protocol of hormonal control for a heat induction in off-season.
Our study aims to investigate factors affecting body reserve mobilization and their impact on ewe reproduction and lamb growth performances, raised in low input production systems. We monitored eight measurements of body condition score (BCS) of 194 ewes during reproduction, lambing, lactating periods, and lambs growth till weaning. Ewes' BCS increased significantly (P<0.05) during reproduction period from (2.31 ± 0.918 to 2.90 ± 0.925), followed by a significant decrease since gestation to lambing (1.81 ± 0.797), followed by a non significant (P<0.05) rise at one month of lactation (1.95 ± 0.880), and maintaining till weaning (1.90 ± 0.851). Ewes BCS trends very significantly with age and parity to the benefit of 2-4 years old and multiparous ewes which have less competition between physiological functions and energetic growth needs, experiencing less changes of body reserves the most critical moments of the production cycle. Litter size also affected significantly body condition (BC) during lactating period, less change occurred for ewes having singles. BCS at the flushing period (2.90± 0.925) has a high significant effect on fertility (P <0.01). The best performance was observed for ewes with BCS ranging between 2 and 2.75, however lower BCS (< 2) affected fertility and prolificacy. Lambs birth weight was affected (P<0.001) by BCS during pregnancy (1.75±0.501). BCS of ewes during lactating period had a positive correlation (P<0.001) with lambs weights till weaning. Understanding factors of BC variability of the ewes allows better managing sheep flocks raised under low input production systems.
Ouled Djellal ram is the heritage and one of the potential genetic resources of Algeria. Phenotypic parameters for semen characteristics and their relationships with scrotal circumference in Ouled Djellal rams were estimated in this experiment. The experiment was carried out using six rams aged between 2 and 4 years. Animals were kept in a building during the breeding season (autumn) and no-breeding season (spring) and fed with a constant ration of wheat and hay with free access to water. The means (±SE) of semen volume (ml/ejaculate), pH, mass motility, individual motility, sperm concentration (10⁹ cells/ml), total sperm number (10⁹ cells/ejaculate) and scrotal circumference, were 0.94±0.03, 6.75±0.03, 2.91 ± 0.16, 2.97± 0.17, 3.21 ± 0.18, 3.17 ± 0.25 and 34.39 ±0.38 respectively. Rams of Ouled-Djellal breed in southeast Algeria don’t have seasonal variations of sexual activity in relation to annual photoperiod variation (P>0.05), except pH, mass motility and scrotal circumference have a significant effect by Season of collection. All the parameters, except scrotal circumference were affected by age. Selection for increased scrotal circumference should have favorable correlated response in semen characteristics. However, the existence of differences among rams (P<0.05) in semen quality and quantity makes it necessary to perform a semen evaluation on individual basis in order to select the best males before they are used for breeding. The results are consistent with the required standards that could be used for artificial insemination fresh (15 °C) to preserve their genetic purity.
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**Title**

Investigation into the key drivers of ewe colostrum production

**Authors**

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**Keywords**

Ewe, colostrum, immunoglobulin, lamb

The majority of lamb mortality which occurs during the first 24 hours post-partum is preventable through providing the lamb with sufficient quantities of high quality colostrum. Data from seven late gestation nutrition experiments carried out at University College Dublin Lyons Research farm between 2002 and 2014 were collated into a single data set comprising of 415 twin bearing ewes. Analysis was carried out to investigate the factors associated with ewe colostrum production (at 1, 10 and 18 hours post partum), namely body reserve mobilisation, ewe breed type, ewe age, gestation length and lamb birth weight. Multivariate regression analysis indicated that colostrum volume during the first 18 hours post-partum was influenced by lamb birth weight (P = 0.01), ewe age (P = 0.01), breed type (P = 0.01) and gestation length (P = 0.06). Ewe live weight change (P = 0.05) during late pregnancy had a significant influence on the volume of colostrum produced but ewe BCS change during this period did not affect colostrum production (P = 0.25). Further multivariate regression analysis indicated that IgG yield was influenced by ewe breed type (P = 0.01), lamb birth weight (P = 0.02), gestation length (P = 0.05) and BCS change (P = 0.04). Leicester cross ewes produced less colostrum per kg lamb birth weight at 1 hour post-partum compared to all other ewe breed types (Belclare, Suffolk & Terminal type ewes; P = 0.01) and less than Suffolk ewes at 10 hours post-partum (P = 0.01). This analysis highlights the important factors associated with ewe colostrum volume and IgG yield outside of nutrition.
The production of the sheep and goat farming is heavily dependent on grazing for feed needs of animals in Turkey. This requires the yield of fodder be increased to the level of meeting the animal’s needs. For this reason, rangelands are improved and put into service for farmers by government. It is aimed to provide a sustainable fodder yield on these rangelands. The effects of the improving works on farmers and rangelands should be researched. The research is conducted in 11 villages where the most improving works are carried out and implemented. The farmers who farm sheep and goat in villages are the population of the study and the sampling volume is determined according to these numbers. The sampling volume is fixed by 89, according to the Stratified Sampling Method. The data obtained are analyzed by Chi-square and Benferroni correction test and evaluated with regard to the analyses results. According to the study results, the relationship between the producers view about finding rangelands improving works successful and their age, level of education, land size and forage crops production is found statistically significant (p<0.05). In respect to sustainability, according to the analyze results; the relationship between the demand for the sustainable rangeland use and the variables of rangelands improving works, producing forage crops and the lowness of feed cost is found statistically significant (p<0.05). At the results of the analyze and evaluations, it is found that rangelands improving works carried out in the study field are not successful and sustainable using of rangelands will not be realized in respect socio-economic factors.
### Title

Grazing behaviour of goats in Rif Mountains of Morocco by using new techniques

### Authors

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### Keywords

Grazing, Behaviour, Rif Mountain, Goat, Pasture

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Precision livestock tools have potential to increase productivity and efficiency of grazing systems. In Rif Mountains of Morocco goats are exclusively conducted in extensive farming systems which forest pastures provide the most important feed sources for goats. Grazing is associated with daily activities significantly different from those of animals in confinement, such as grazing behaviour and distance covered. The assessment of grazing intensity is important for making adequate management decisions on rangelands. Management is based in the comprehension of individual behaviour of goat facing different characteristics of their direct environment. This study was conducted in a forest rangeland of the Moroccan Rif Mountains (Derdara) exclusively used by goat’s herds to assess their spatio-temporal movement and activities during three seasons (Winter, spring and summer). Eight goats were fitted by GPS collars and Icetag3D™ accelerometric device. The grazing area was estimated at 151 ha with a perimeter of 10 km. Grazing time and covered distance were estimated per day at 3 h and 2.7 km in winter, 9 h and 6.9 km in spring vs 12 h and 9.2 in summer. The short duration of grazing during spring compares to summer, can be explained by the high forage supply, coinciding with the vegetative peak of pastoral species. During rainy period (winter), intensity of pasture use decreases. In summer, goats are exhausted due to the high temperature which limits their movement in altitude. In spring, 62.4% of animal activity is devoted to grazing, for 68.7% in summer. In winter, grazing activity not exceed 25% of animal activity, the access to pasture becomes difficult, which explains the use of delimbing by breeders to reduce burdens of supplementation. During the dry seasons goats move more compared to winter and spring (6600 vs 4400 steps per day, respectively in summer and spring), which was confirmed by the GPS collars results. The study also revealed that the goats mainly consumed the palatable vegetation at ground level. Pasture area, itinerary and covered distance by goats vary depending on the season. The obtained information on the grazing behavior of goats by using new techniques, coupled with quantitative data on feed intake and biomass production of pastoral area, could be useful in future for a better management of herds in time and space.
This study aimed to evaluate the effect of maternal behavior on lamb and litter survival in D’man sheep, a meat prolific breed reared in an accelerated lambing system in Tunisian oases. The maternal behavior score (MBS) of 81 ewes was recorded during tagging of lambs in early (2-6 h) post lambing hours using 5 scores (1-5) and data were arranged in 3 classes (1, 2 = poor mother, 3 = good mother, and 4, 5 = excellent mother). Lamb survival (LAS) of 165 lambs was calculated from birth to weaning at 70 days old. Lambs that survived were given a score of 1, while those that did not were given a score of 0. Litter survival (LIS) was measured from birth to weaning by dividing litter size at weaning by litter size at birth. LAS, which averaged 83.0%, was affected (p = 0.007) by MBS class; it was higher in excellent mother’s class (94.3%) compared to the poor mother’s class (70.8%). In poor mother’s class, mean LAS was lowest for lambs born as triplets or more (54.5%, p=0.024). Mean LIS over all dams was 85.5 ± 2.9%. It was affected by MBS class (p = 0.0002); rate LIS increased as MBS increased (poor mother’s class = 69.4 ± 7.2, good mother’s class = 90.6 ± 7.7 and excellent mother’s class = 96.1 ± 7.8). LIS was higher in good and excellent mother’s classes compared to poor mother’s class. In conclusion, maternal care in prolific sheep is essential for the survival of progeny and crucial in case of big litter.
Evaluation of in vitro digestibility of available by-products in the North of Morocco

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In northern Morocco, goat breeding is the dominant activity of farmers. This livestock contributes of more than 70% of household income. His diet is based essentially on forest rangelands characterized by a variable feed offer. Therefore, it is necessary to diversify and improve its feed calendar to reduce overgrazing and increase livestock productivity. In this context, this work aims to characterize the digestibility of agricultural by-products to be introduced in the diet of goat herd. The studied by-products were Olive leaves; Fig leaves; Sorghum residues; Young Cactus cladodes; Old Cactus cladodes; “Desiree” potato tops; “Nicola” potato tops, Strawberry leaves; Faba bean straw and Bean tops. Degradability and kinetic degradation of samples were measured by in vitro method of Menke and Steingass (1989) using goat rumen fluid. Regarding digestion kinetic of 72 hours, it followed a logarithmic trend. Gas production was important in sorghum residue, cactus cladodes old and young with a production of 256.67, 255 and 235 ml / gDM respectively. Faba bean straw has a reduced gas production compared to the other by-product. Digestibility of dry matter (DMD) ranged from 57% for faba bean straw and 87% in strawberry leaves. The partition factor in old cladodes was 0.78 and 2.67 in potatoes tops. Microbial biomass production varied between 0.18 mg observed in potatoes tops and 0.36 mg in old cladodes. In conclusion, the studied by-products have very interesting digestion characteristics and can take their place in goat herds feed calendar.
Characterization of production environment and exploration of new phenotypes to improve genetic selection efficiency and animal adaptation to variety of environments

The overall sustainability and innovative capacity of the sheep and goat sector in Europe have to be improved to cope with future economic, environmental and societal challenges. Innovations in genetic resource management and breeding for sheep and goat populations will be explored in iSAGE European project (WP5) to help the industry to cope with such future challenges. In France, genetic evaluation for small ruminants is performed in a large variability of environments poorly characterized. In this regard, we will consider multi-generation data from existing French breeding programs and experimental field studies. Effects of herd for traits under genetic selection will be investigate in commercial farms in order to better characterize environment of production particularly using meteorological data but also feeding, breeding system and economic criteria. Such characterization will enable the follow-up to the trends of animal performances according weather changes. This work could also contribute to identify typology of farm for which we could test indicators of sustainability. Then, contrasted environments will be identified and genotype by environment interactions studies will be investigated in order to improve genetic selection efficiency in variety of environments. In addition to existing data, we will explore new phenotypes considered as key functional traits for resilience and for which stakeholders are particularly interested. These new phenotypes will be also explored in combination with feed efficiency in experimental facilities under contrasted environments or under feed shortage challenges. Genetic and genomic studies will be performed for new phenotypes used to assess resilience. The total merit indices will be revisited on technical and economic point of view in order to evaluate economic weights of each trait in the “breeding goal", for diversified production systems.
Casein αs1 constitutes a significant fraction of all milk caseins, which in turn have about 80% of the ewes' dairy Proteins, which are responsible for the quality of the cheese production. This study aimed to analyze the genetic αs1 casein polymorphism and to determine its effect on milk quality. Lactoscan analysis showed that chemical quality of the produced milk is acceptable as a whole. However, in comparison with a standard quality of milk sheep, there was obtained a high fat material (82.08 g / l) and slightly lower levels of solids not fat (105.5 g / l) and lactose (36.9 g / l). Protein (58.5 g / l) and ash (6.6 g / l) are in the standards. The average density (1032.78) is lower than that of standard milk (1034). The PCR-Restriction Fragment Length Polymorphism study was performed employing the endonuclease MboII. DNA amplification using primers produced fragments with sizes of 372 bp. The PCR products of primer digested by restriction enzyme produced two alleles A and C with respectively frequencies of 0.73 and 0.27. Three genotypes: AA, AC and CC with respective frequencies of 0.53, 0.4 and 0.07 were identified. Statistical analysis showed that allele A have a significant effect on ash, solid not fat and density. The use of genetic polymorphism can be sure technical innovation for increasing efficiency in sheep and goats.
The genetic polymorphism of the kappa and alpha-S1 casein locus was investigated in Tunisian goat. Blood samples were collected from local goat breed. Genomic DNA samples were obtained from leukocytes of 75 dairy goats and regions of interest in the gene were amplified through Polymerase Chain Reaction (PCR), then evaluated in agarose gels. For better characterization of the single nucleotide polymorphism, if exist, a PCR-Restriction Fragment Length Polymorphism study was performed employing the endonuclease XmnI. DNA amplification using primers produced fragments with sizes of 457 bp for alpha-S1 casein and 459 bp for the kappa casein. For the alpha-S1 locus, the PCR products of primer (223 bp) digested by restriction enzyme XmnI produced four fragments at 223 bp, 212bp, 161bp and 150-bp. The results showed that local goat breed had different genotypes A/A, B/C, C/C and D/D. Our results revealed that the CSN1S1 allelic variants in tested breed showed different genotypes, three of them were homozygous 12.5%, 60.5% and 12.8% respectively for A/A, C/C and D/D and the other was heterozygous B/C (14.2%). For the kappa casein locus, the PCR products of primers (459 bp) digested by restriction enzyme Alw44I produced two fragments of 459 and 381 bp. The Kappa casein allelic variants in tested animals revealed different genotypes, two of them were homozygous: AA or BB, AC or BC and CC. Genotypic frequencies were 12.5, 60.5 and 27% for AA or BB, CC and AC or BC, respectively. Identification of different variants of the Kappa and alpha-S1 casein can be used to improve milk quality of local goat breed.
High fiber level of olive cake (OC) is the main limiting factor for its use in animal feeding. Effective industrial-scale destoning process improves its nutritive value but the level of destoned OC to be included in the ruminant diets for safe and efficient feeding is yet unclear. Thus, this study was carried out to determine the voluntarily intake of OC for lambs and nutrient digestibility of diet that offered as free choice. A total of ten, Karya female lambs divided into two groups and were fed maize silage-alfalfa mix, pelleted and silage form of OC with (Con+) or without concentrate (Con-) as free choice for 3 weeks. The individual dry matter intake (DMI) of forage, pelleted OC, OC silage and concentrate were determined. The difference between two groups (with or without concentrate) was compared by independent t test. The silage-alfalfa mix, OC silage and pelleted OC intake of Con- and Con+ lambs were 778 and 192; 158 and 56 (P < 0.01); and 65 and 40 g/kg DM (P = 0.06), respectively. The concentrate consumption of Con+ lambs was 712 g/kg DM. The Con+ lambs consumed more DM and nutrients, and tended to (P = 0.06) grow faster than Con- lambs. The in vivo apparent DM, organic matter, crude fat, crude protein and non-fiber carbohydrates digestibility were higher in Con+ lambs, while fiber digestibility did not differ (P > 0.05) with concentrate supplementation. The results of study could give some information about the level and form of OC should use in ruminant diet.
Synthetic glucocorticosteroids are widely used in veterinary medicine for their anti-inflammatory and immunosuppressive actions. However they are deemed to have multiple side effects such as hypothyroidism. The aim of this study was to determine the effects of Dexamethasone (DEX) administered parenterally (IM) at therapeutic doses conventionally used in the anti-inflammatory and immunosuppressive treatments on the thyroid function of sheep. Fifteen sheep of Ouled Djellal breeds were randomly divided into three groups of five rams. The animals received an injection of Dexamethasone (DEXALONEND solution) at a rate of 1.52 mg DEX/d during 6 days for group 1 and 3.4 mg DEX/d during 6 days for group 2, the third group has served as a control group and did not receive any treatment. Blood samples taken over a period of 3 weeks were analyzed to define the plasma levels of free thyroid hormones fT4 and fT3. It has been shown that Dexamethasone induced a significant decrease (P <0.05) of serum fT4 and fT3 24 hours following the beginning of the treatment. Hormone levels have returned to their baseline values 24 hours after treatment withdrawal. From these results, we can deduce that Dexamethasone antithyroid-effects are transitory and therefore do not have a significant impact on the health of the animals.
Locale reproductive females contribute largely to maintain the productivity and the durability of the livestock system production using their adaptation ability. To overcome periods of high metabolic requirements, the ewes tend to mobilize their body reserves. This study tended to assess dynamics of body reserves of the INRA180 and Timahdite ewes, two Moroccan’s breed, from mating to weaning periods under a semi-arid livestock production system based on pasture. Ewes were aged of 55.5 and 35.2 months and weighted 45.4 and 41.3 kg respectively for Timahdite and INRA180. Body condition was measured using body weight, body condition score and fat thickness, and depth and area of Longissimus Dorsi Muscle using ultrasound technique. The results showed that breed, litter size and ewe’s age affected significantly the studied traits. Significant variations in ewe body condition between physiological stages were observed. The leanest ewes showed less important loss (1.89 vs 2.08 mm) of body reserves. Furthermore, loss of body condition at the end of pregnancy was significantly correlated with the litter size at birth. It appears, that the body scores coupled with the ultrasound measurements could improve the assessment of ewe's body reserves during the critical stages of production. However, better control of dietary intake during pregnancy and suckling periods especially in prolific breeds is recommended.
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<td>The experience of the ANGRA farmers in prolificacy improvement by the BMP15 ovine mutation FecXR in Rasa Aragonesa</td>
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<td>A. LAVIÑA (1), M. LÓPEZ (), L.V. MONTEAGUDO (2), M.T. TEJEDOR (2), A. MACÍAS (1), E. MARTÍN (1)</td>
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| Keywords | Prolificacy, Mutation, Rasa Aragonesa, FecXR |

The FecXR mutation is a variant of the ovine gene BMP15 involved in the increase of prolificacy. It was found in the breed Rasa Aragonesa, and since 2007, the National Association of Breeders of this sheep (ANGRA) included it in its genetic selection scheme under the denomination “Gene Santa Eulalia“ (or GASE). FecXR provides a sustainable molecular tool to improve productive efficiency avoiding additional treatments. Over 4000 ewes carrying this mutation are nowadays exploited by members of ANGRA. The positive effect of FecXR on prolificacy is well known, resulting in a clear improvement of incomes and cost effectiveness. This communication reports the results of a satisfaction survey conducted among 18 producers using FecXR in their flocks. The survey is based up on the farmers’ personal perception of different questions regarding the ewes carrying FecXR. The statistical analysis of data provides several conclusions about practical aspects that, prior to the diffusion of this variant, generated some doubt among producers. In fact, the producers do not observe differences among the FecXR carrier and wild type ewes as it refers to general management, even if most of them consider that the mutation provides a higher fertility, prolificacy and cost effectivenes. All of them should recommend the use of FecXR in other flocks in practice. A high degree of satisfaction with the use of FecXR is therefore observed.
The objective of the study was to investigate the influence of the cternal surface of the udder on the total milk production of dairy sheep. Study was undertaken on 54 Tunisian Sicilosarde ewes bred in Beja in the north of Tunisia. The cternal surface of the sheep udder's has been measured by an ultrasonography (Noveko) using a linear probe (4 MHz) at 45 days of the stage of the beginning lactation. Measurements were performed at 8 hours after the morning milking. ANOVA was carried using SAS software (version 1997). Results showed that 28% of ewes (n = 15) had little cternal surface of udder between [2 – 6 cm²] , 50% (n = 27) with mean cternal surface udder between [6 – 10 cm²] [and 22% (n = 12) with great cternal surface of udder between [10 – 13.5 cm²]. The total milk production was higher in the class of great cternal than the mean and little classes (120 vs 112 and 105 L; p<0.05). We found that multiparous ewes had cternal surface breast higher than the primiparous one (8.5±2.5 vs 4.5±1; p<0.05). The total milk production was higher in the multiparous ewes than the primiparous one (120±24 vs 108±18 L; p<0.1). A high correlation between the cternal surface udder and the total milk production was found (r=0.88; p<0.01). Our results suggest that the cternal surface udder influenced the total milk production of Tunisian Sicilo-Sarde dairy sheep.
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<td>Title</td>
<td>Genetic characterization of three genes associated with fertility performance in Egyptian small ruminant breeds</td>
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<td>Keywords</td>
<td>GDF9, GPR54, FecB, PCR-RFLP, DNA sequencing, Small ruminants</td>
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Marker-assisted selection (MAS) depending on the genetic and DNA markers became an essential tool for genetic improvement of economically important traits in farm animals. The fertility and reproduction trait enhancement is considered one of the main targets in livestock breeding programs. This work aimed to identify RFLPs and SNPs variations among three fertility genes in Egyptian small ruminant breeds. RFLP analysis of the amplified fragments at 462-bp from exon 1 of GDF9 using HpaII endonuclease showed the presence of two genotypes, GG with the nucleotide G at position 209 and AG genotype with a SNP (A/G) at this position. The frequencies of GG and AG genotypes as well as G and A alleles were 83.6%, 16.4%, 91.8% and 8.2%, respectively in Egyptian small ruminants. Depending on the presence of the restriction site of TaqI endonuclease (T^CGA) at position 100^101 in the 348-bp amplified fragment from exon 5 of GPR54 gene, the results showed the presence of two alleles, C and T with three genotypes, CC, TT and CT. There was a SNP (C→T) between the two different alleles at position 100. The total frequencies for CC, CT and TT genotypes in all sheep and goat animals were 33.6%, 62.1% and 4.3%, respectively and the frequencies of C and T alleles were 64.6% and 35.4%, respectively. The PCR amplified fragments of 190-bp from FecB gene were digested with AvaII restriction enzyme and the results showed that all tested animals have the same homozygous non-carrier genotype (+++ with uncut 190-bp fragments. The SNP (G→A) at position 160 resulted the destruction of G^GACC restriction site at position 160^161. It is concluded that the identification of favorable genotypes associated with production and reproduction traits is considered the first step towards the genetic improvements of these traits in different livestock. GDF9, GPR54 and FecB genes are associated with different fertility traits parameter like ovulation rate, ovarian follicular development, puberty and litter size in small ruminant breeds.
Fluorescence spectroscopy coupled with factorial discriminant analysis technique to identify sheep milk from different feeding systems

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Ewe’s milk, lactation, soybean meal, scotch bean, synchronous fluorescence, chemometric

Rapid measurement of milk properties and discrimination of milk origin is essential for quality control of milk products. Front face fluorescence spectroscopy (FFFS) and synchronous fluorescence spectroscopy (SFS) are proven technologies to provide intensive, cost effective and rapid analysis with high accuracy for many foodstuffs. The present study was undertaken to explore the potential of FFFS and SFS to monitor the quality of 45 ewe’s milk samples that are attributed to different feeding systems. Physico-chemical analyses and fluorescence spectra were performed on milk samples during lactation period (the first 11 weeks). The principal component analysis (PCA) applied separately to the physico-chemical and fluorescence spectral data set showed only small discrimination between milk samples according to their lactation periods and diet compositions. Similar results were obtained by applying factorial discriminant analysis (FDA) separately on each technique. In a second step concatenation technique were applied to FFF spectra acquired after excitation set at 250, 290, 380 nm and emission set at 410 nm. The obtained results showed a good discrimination between milk samples according to the feeding system given to the ewes throughout the lactation period. In addition, better discrimination was observed with FFFS than with SFS.
The GAEC Elizagaraia (brand Ekiola: http://www.fromage-de-brebis.fr/) has developed a range of diversified raw milk products (pressed cheese under PDO Ossau Iraty, soft cheese, lactic products, greuil) from a herd of mixed ewes (red-faced and black-faced manech). For the past 15 years, the herd management has been adapted to increase the health value of milk (ratio omega 3 / omega 6) and milk production in cooperation with Bleu-Blanc-Coeur association (BBC), by supplementation in extruded flaxseed, but also by reincorporating fodder (alfalfa hay) and concentrates favorable to this ratio. Monitoring and control of body condition of animals is also an important item. There has been a significant reduction in mastitis, despite high urea levels. In recent years, BBC has introduced new tools such as Visiolait based on the interpretation of MIR spectra, which makes it possible to appreciate nutritional balance (fiber, nutrients) as well as on the emissions of enteric methane. Dairy products are valued between 2.5 and 3 euros per liter of milk, depending on the share of fresh products marketed. Clients are increasingly sensitive to nutritional claims, the approach being taken to promote the GAEC's reputation. The GAEC supports 6 units of labour. Projects for the future are aimed at improving the equipment (sheepfold, salting room), strengthening the production of fresh produce, and restarting milking in the mountains. The greuil, in spite of a DLC still short, presents by its chemical composition a real interest for special diets.
The commitment of sheep and goat production systems in the agro–ecological transition: a participative approach for pastoral systems

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Keywords  
Ecological transition, innovative conception, sustainable development, pastoral systems, sheep and goat production

The importance of environmental challenges in agriculture and livestock production requires an ecological transition of the production systems including the sheep and goats ones. In this context, establishing the conditions for agro – ecological changes and building innovative pathways of changes could favor this transition. After a presentation of some theoretical concepts behind the idea of ecological transition and agro – ecology, the objective of this communication is to report the implementation of a participative approach involving scientists, technicians, teachers and breeders in Corsica Island focusing on pastoral systems. This approach aims to design the performances of the systems from their triple social economic and environmental dimensions, what is their proximity to the agro–ecological orientations and how to improve them. Designed initially to characterize the capacity of grazing goats to adopt the organic model, an easy–to-implement method is adjusted to the characteristics of the territory and agro-ecological criteria for sheep and goat herds and systems are chosen for the 10 groups of indicators: - Animal Nutrition and forage resources - Sustainable pasture management - Crops and forage practices - Animal health and prophylaxis - Animal welfare - Breeds and reproduction - General hygiene and human nutrition - Marketing and management - Socio–economic sustainability - Environmental sustainability and societal contribution This method, designed and tested for a large number of situations (Spain, Mexico, and Sardinia) allows building agro – ecological profiles. It has been mobilized in Corsica within a group of extension agents and teachers and the criteria of each group of indicators have been discussed for the Corsican pastoralism. The discussions during the sessions have shown that agro – ecology is not only an institutional injunction. It is also a methodological approach to design which innovations could support the sustainable development and changes in sheep and goat farming in pastoral systems.
The presence of antibiotic residues in milk is a concern because of technological and analytical reasons but mostly due to their side effects in human health. Although many methods have been developed to analyse antibiotic residues in cow milk, such methods not always correctly work with sheep and goat milk. In this work we present a study of the performance of a new system for the screening of antimicrobial residues in sheep and goat milk. The method combines a microbial inhibitor test (Eclipse Farm) and a device (e-Reader) that integrates incubation at 65°C and continuous monitoring of the colour change. Thus, it determines automatically the end-point of the assay and interprets results in an objective way. A preliminary study demonstrated the necessity to include a one-hour diffusion period at room temperature. The performance of the new system was validated according to the European Commission Decision 2002/657/EC. Sensitivity of the new system was evaluated on 12 molecules from several families of antimicrobials. The detection limits were close to the European maximum residue limits (MRL). Detection capabilities (CCβ) were also determined for 6 molecules representing the main antimicrobial groups used in dairy husbandry (penicillins, cephalosporins, tetracyclins, sulphonamides, macrolides and aminoglycosides). All molecules were detected at the MRL level. Robustness was also studied, demonstrating that the new method was unaffected by reasonable changes in the procedure. Eclipse Farm coupled to e-Reader has proved to be a valuable tool for screening a broad-spectrum of antimicrobial residues in sheep and goat milk.
The presence of antimicrobial residues in milk and dairy products, such as cheese, could cause negative technological effects and represents a risk for consumer health. In the cheese-making process, antibiotics could be retained in curd or eliminated in whey to a greater or lesser extent. Whey is a by-product used in the manufacture of foodstuffs for human consumption, animal feeding, among others. In order to guarantee food safety and animal health, it would be convenient to establish an analytical strategy to screen antibiotics in whey. Thus, a new system for screening antibiotics in raw milk was developed, coupling a microbial inhibitor tube test (Eclipse Farm) and a device (e-Reader) based on incubation and color change continuous monitoring. The aim of this work was to study the performance of the Eclipse Farm test coupled with the e-Reader for the detection of β-lactams and tetracyclines in goat’s cheese whey. A preliminary study demonstrated the necessity to include a one-hour diffusion period at room temperature and to adjust pH in the analysis of acid whey samples for a correct interpretation of the results. The performance was validated in agreement with European Commission Decision 2002/657/EC. Specificity was evaluated analyzing one hundred whey samples presenting very high values. Detection limits for amoxicillin, cephalaxin and oxytetracycline in fortified goat whey were calculated, and the detection capabilities (CCβ) were at or below the MRL levels. In conclusion, Eclipse Farm coupled to e-Reader represents an appropriate method to screen β-lactams and tetracycline residues in whey.
Goat cheese in the oasis regions of Morocco remains a poorly characterized and studied product, in spite of the genetic potential of the oases and the efforts deployed by the Moroccan State to promote this dairy product. The present work aims to contribute to the characterization of Drâa goat cheese through (i) sensory and microbiological evaluation and (ii) studying stability of this cheese during storage. Thus, 8 cheese bars (from a milk mixture of at least 2 goats / cheese tablet) have been produced at the laboratory scale. The microbiological and sensorial characteristics of cheese were determined. The stability study was focused on the monitoring of 3 parameters: fungal flora, drying rate and lactic acid content at intervals of 0, 8 and 16 days of storage. The results show that Drâa goat cheese contains (CFU/ml) respectively: 8,33.10^+08, 9,35.10^+06, 2,17.10^+04 and 6,83.10^+03 of lactic acid bacteria, psychrotrophic bacteria, yeast and Molds. Sensory analysis revealed a highly significant difference between the Drâa cheese and that produced with Alpine goat milk. The scores obtained by the hedonic test are 5.3/10 for the odor, 4.9/10 for the taste and 5.9/10 for the consistency. For the storage of Drâa cheese, it was concluded that the acidity (P = 0.03) and the fungal flora, yeast (P = 0.004) and molds (P = 0.003), increased with a significant manner during the 16 days of cold storage; however, no significant difference was recorded for water content.
In the European Union (EU), the European Commission has included in its Europe 2020 strategy, the ‘Sustainable growth: promoting a more resource efficient, greener and more competitive economy.’ It has also recognized the positive role of agriculture and livestock in rural areas in delivering ‘multiple economic, social, environmental and territorial benefits.’ In the frame of the research project FLINT (‘Farm Level Indicators for New Topics in Policy Evaluation’), one of the main issues was to provide a review of indicators and to collect related data from farms to determine the level of sustainability. The concept of the sustainability refers not only to the triple bottom line approach, Profit (economic), Planet (environmental) and People (social) but also to other issues like innovation, risk management, market outlets and quality labeling, advisory services, and climate change. The small ruminant sector was one of the sectors that included, as its contribution to the strategy of the sustainable growth has recognized. In this paper, we will try to present two cases referring to the dairy sheep sector in Greece (Epirus) and Spain (Navarra). A collection of core indicators will be presented to compare the sustainability level for the dairy sheep farming between the two countries. The assessment of the sustainability level of the sector will help to develop the appropriate decisions/policies either at the farm level or territorial level.

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<td><strong>Sustainability of the dairy sheep farming: Examples from Greece and Spain</strong></td>
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Ten mature Barbarine rams were used to study the effect of drinking water salinity on sexual behavior. Animals were allocated to two groups of five animals each, according to drinking water quality: [C: control water (potable fresh water, 0.5g/l), S: high-salt water (12 g NaCl / 1l of water). Scrotal diameter and body weight were recorded weekly in the trial. Sexual behavior parameters were recorded in the beginning and in the end of the trial. Rams in both groups lost weight (P<0.01) during the trial. However, live weight loss was more important in S group (P>0.05) on sexual behavior (anogenital sniffing, flehmen, penis erection, reaction time and libido score) was similar between (S) and (C) groups. Nevertheless (S) group showed values, significantly (P<0.05) different from those of (C) group on lateral approaches. The present results indicate the wide adaptation of Barbarine sheep for drinking saline water as indicated by the absence of significant negative effects on sexual behavior.
This study aims to determinate the physicochemical, microbiological composition of goat milk and its transformation into cheese. This work shows that the pH of goat milk is similar to cow’s milk. They are average respectively 6.73 and 6.76; therefore they have different acidity 20.33°D to goat milk, and 17°D to cow’s milk. The latter is less dense 1.027 than goat milk 1.029. The goat milk is more viscous with 3.5 cp than the cow milk 3.1 cp. Besides the goat milk has fat mater 28.66 g/l, the dry matter is 118g /l comparing respectively with cow milk fat mater equal and 22. 5 g/l and the dry matter 108.2 g/l. For the ash content, cow milk is higher (8.5g /l) than in goat’s milk (8.76 g /l). In addition this work contributes to the production of three types of cheese (goat cheese, fresh goat cheese flavored with Rosmarinus officinalis, cow cheese (Witness)), and the assessment of physico-chemical characteristics, microbiological and sensory analysis. It shows that the aromatization of cheese by the aromatic plant Rosmarinus officinalis retain the physicochemical status and improves its organoleptic and microbiological quality. Furthermore, the study sensory shows the flavored cheese is the more appreciated by the consumer.
La transhumance en élevage ovin steppique : réduction des coûts ou adaptation inévitable ?

D’après les statistiques du Ministère de l’Agriculture, du Développement Rural et de la Pêche de l’Algérie, la production totale des viandes rouges est égale à 486.290 tonnes en 2014, la moitié (48,09%) de cette production est fournie par dix wilayas, la première wilaya productrice de viandes rouges est Djelfa qui fournit 44.554 tonnes, ce qui représente 9,16% de la production nationale. En Algérie, la viande ovine représente la part la plus importante dans la production des viandes rouges. En 2014, cette filière -viande ovine- fournit 5,77% de ces viandes, soit l’équivalent de 290.649 tonnes. La wilaya de Djelfa est aussi la première productrice de viande ovine avec une production représente 13,33% de la production nationale, cette wilaya rassemble 11,66% (3.242.760 têtes d’ovin) du cheptel national. Notre étude consiste a déterminé les zones du pâturage et les mouvements migratoires des éleveurs durant la période automne 2014 – été 2015, pour cela, on a fait un suivi et une enquête qui touche un nombre d’éleveurs important à Djelfa. Les transhumants enquêtés sont obligés de faire ce type d’élevage à cause du rapport entre la superficie des terres possédées et la taille importante des troupeaux ovins élevés. Ils se déplacent de pâturage en pâturage en louant le droit d’accès quand ces pâturages sont appropriés privativement ou en y accédant librement quand les terres concernées relèvent d’un statut juridique public, à cet effet, ils traversent entre 100 à plus de 800 km pour chercher l’alimentation de leurs bétails.
Cyanobacterium Spirulina (Arthrospira platensis) is known for its nutritional benefits. The objective of the study was to develop a functional yogurt enriched with Spirulina. Spirulina powder (1-5 g/L of milk) was added to the standardized pasteurized milk, prior to fermentation. Physicochemical, textural and sensory properties were assessed. Addition into yogurt of Spirulina powder in concentrations above 3 g/L of milk led to a weaker sensory acceptability. However, flavouring with vanilla/mint aromas could improve overall acceptability. Additional formulations showed that the incorporation of 1.2 and 2.4 g/L resulted in an increase in nutritional value, but did not affect pH and syneresis. A higher curd strength was observed with 2.4g/L spirulina-product. Consumers acceptance was not affected by incorporating Spirulina up to 2.4 g/L into yogurt. In conclusion incorporating Spirulina powder can enhance the nutritional quality of yogurt, without affecting its sensory properties.
Ewe milk is a complex mixture of specific bioactive proteins, lipids, saccharides, and bioactive substances including immunoglobulin, enzymes, antimicrobial peptides, oligosaccharides, hormones, cytokines, and growth factors. This makes sheep or ewe milk an excellent choice for making cheese and it produces higher yields of cheese compared to other milk producing species. In this work ewe’s milk valorization purposes, seven samples were obtained separately from two Mohamadia’s zone firms. They were corresponding to the last stage of lactation. Then, an artisanal cheese was made using the dry thistle flowers. The experiment showed that the cheese obtained has a good quality with an interesting yield observed with Sardi milk which was estimated to 22%. The ewe's milk and cheese physic-chemical characterization showed a pH and acidity of the two milk breeds Sardi and Timahdit of (6.41 and 6.71) and (2.7 and 2.59). The fat content was 6%, for Sardi milk and 4.96% was obtained with Timahdit milk. Laboratory manufactured cheese contained a notable dry matter of 77.64% for the sardi milk. However, magnesium content of 1.64g/Kg was detected very high for the Timahdit milk. When Sardi's cheese has showed an important calcium amount of 29.15g/Kg. Finally, it was noticed that no spoilage was detected when milk and cheese were analysed.
La wilaya de Béchar, située au sud-ouest algérien et caractérisée par un climat de type désertique, compte un effectif caprin de près de 64 000 têtes dont près de 52 000 chèvres. Dans l'objectif de caractériser l'élevage caprin dans cette région désertique, une enquête par questionnaire a été menée auprès de 100 éleveurs. Les résultats montrent que les caprins sont généralement élevés en association avec les ovins et y sont alimentés de la même manière, soit surtout basé sur du pâturage (85% des cas) avec complément à l'auge (surtout de l'orge, du son de blé et des déchets de dattes). Les pâturages sont constitués des ergs, regs, hamadas et lits d'oueds avec leurs végétations spécifiques. Ce type d'élevage constitue souvent (90% des cas) l'activité principale des éleveurs. Ces derniers sont généralement sans instructions et aucun n'a suivi de formation agricole. Les deux tiers des éleveurs sont orientés vers la production de viande (chevreaux à l'engrais). Deux tiers des élevages enregistrent deux chevrotages par an. Comme attendus, la majorité des éleveurs ne possèdent pas de terres agricoles. La taille du troupeau caprin varie souvent de 25 à 50 têtes, alors que les grand troupeaux (>100 têtes) sont rares (5%). Ces élevages sont constitués surtout (80%) de la race Arabia et logés généralement dans des écuries, gourbis ou Zriba. L'élevage caprin dans cette région désertique se distingue par son caractère extensif, orienté surtout vers la production de viande en utilisant surtout les parcours et en exploitant les sous-produits de la palmeraie.
A significant percentage of the milk and goat products obtained from goat sector in the province of Malaga are destined for processing and marketing outside the territory, which constitute one of the main weaknesses of goat production in this area. As consequence, on the one hand, farmers do not participate of the added value obtained from processed products and, on the other hand, there is a very small consumption of products of proximity. These circumstances lead a progressive abandonment of traditional livestock in spite of its importance from an economic, social and environmental point of view.

Aware of this situation, the Malagueña Goat Breeders Association is carrying out a three-year project funded by the Daniel & Nina Carasso Foundation. The programmed actions are grouped around three fundamental axes: 1. To develop an own offer of local and quality products by the goat farmers. 2. To bring the goat and its products to consumers and involve them in a change of the production/consumption model, through the creation of a stable structure of tourism services and 3. To favor the transit of the herds to a more sustainable production model as, for instance, the organic livestock.
The sheep farming systems is a main activity in the region of Sidi Bouzid, which represents the first Tunisian breeding pole of meat sheep. This work has been undertaken to carry out twofold objectives. Firstly, it seeks to give more information on the functioning of these farming systems and secondly, it studies their sustainability and identifies the difficulties and constraints that limit this sector by providing opportunities to conserve animal resources and proposing solutions to improve them to make them more efficient and sustainable. Using the AFCM and the CAH methods, results have allowed us to distinguish between three groups of breeders and three levels of sustainability using the IDEA method. The first group represents large-scale farms (100±10ha) with large livestock number (200±10) and an important irrigated forage area (20±3) but their sustainability is limited by the socio-territorial level. The second group is represented by the small farms (5±3ha) and a limited animals' number (10±5) is constrained by the farm's economic conditions. The third group is represented by the medium size scale farms (50±5ha) and is limited by the agro-ecologic scale. Acting on associative actions in the case of the first group and on the subvention of agriculture goods in the case of the second group and using new technologies in animal breeding may improve the profitability and the sustainability of the sheep farming systems in the zone of Sidi Bouzid.
The aim of this paper is to characterize the strategies of management of the pastures by the goats breeders. 16 goats farms, located in mountainous area of Tizi-Ouzou, were followed during one year. The results show that the goat breeding, whose size of the livestock varies from 5 to 136 heads, is regarded as principal activity. The feed is based primarily on the exploitation of the pastures. The time spent by the animals on the pastures is 6 hour/day. The pastures constitute natural meadows and forests. The animals receive on average 135 g/head/day of complement. This last is constituted of concentrate intended initially for the cows, the sound, corn and barley.
Dairy sheep management system in the Basque Country (northern Spain) is based predominantly on part-time grazing from late winter to early summer. The milk produced is primarily used for cheesemaking and having a high nutritional quality milk at the lowest cost possible is important for cheese makers. Intensification of the system can have strong influence on farm profitability, environment, and milk and cheese quality. The aim of the present work was to investigate the effect of sheep stocking rate managed under part-time grazing on milk quality measured as fatty acid (FA) and tocol (TC) composition. Two homogeneous groups of 60 ewes each grazed on the same paddocks divided at high (H) and low (L) stocking rate, respectively. Bulk milk samples were taken once a month from mid-April to June. TC profile of milk samples was similar in both groups of animals over the sampling period although the highest contents of the major TC (α-tocopherol; mg/100 DM) were found in samples collected in June. Changes in the FA content (mg FA/100g milk fat) affected by stocking density were mainly observed in the unsaturated FA fraction. Samples from L group showed higher content than H group of linolenic (18:3n-3) and associated rumen biohydrogenation intermediates as rumenic (9c,11t-18:2), vaccenic (11t-18:1), and 11t,15c-18:2, which are considered beneficial for human health. Changes in diet due to stocking rate seemed to be linked to differences in the milk FA composition.
Milk is considered to be a healthy food, due to its composition well balanced on essential and non-essential nutrients (lipids, proteins, amino acids, vitamins, minerals, immunological agents, oligosaccharides and hormones). This very complex composition, make from milk a product that exhibits various biological activities (e.g. antioxidant, antimicrobial and immune-modulatory). Despite its nutritional importance, the Ewe milk and its derivatives are almost unknown by the Moroccan consumer. Indeed, this is due to several reasons, which include consumer habits and the availability of products on the Moroccan market. To approach this reality, an investigation on the Ewe's milk consumption has been carried out in the Rabat Salé Zemmour Zaer area. This work highlights the consumer preferences and ideas anchored to the consumption of dairy products in General and sheep's milk and cheese in particular. To better understand the information, a part of the investigation concerned administrations concerned in agriculture, in order to get their opinion when the socio-economic importance of Ewe's milk and its derivatives like the European and Mediterranean experience.