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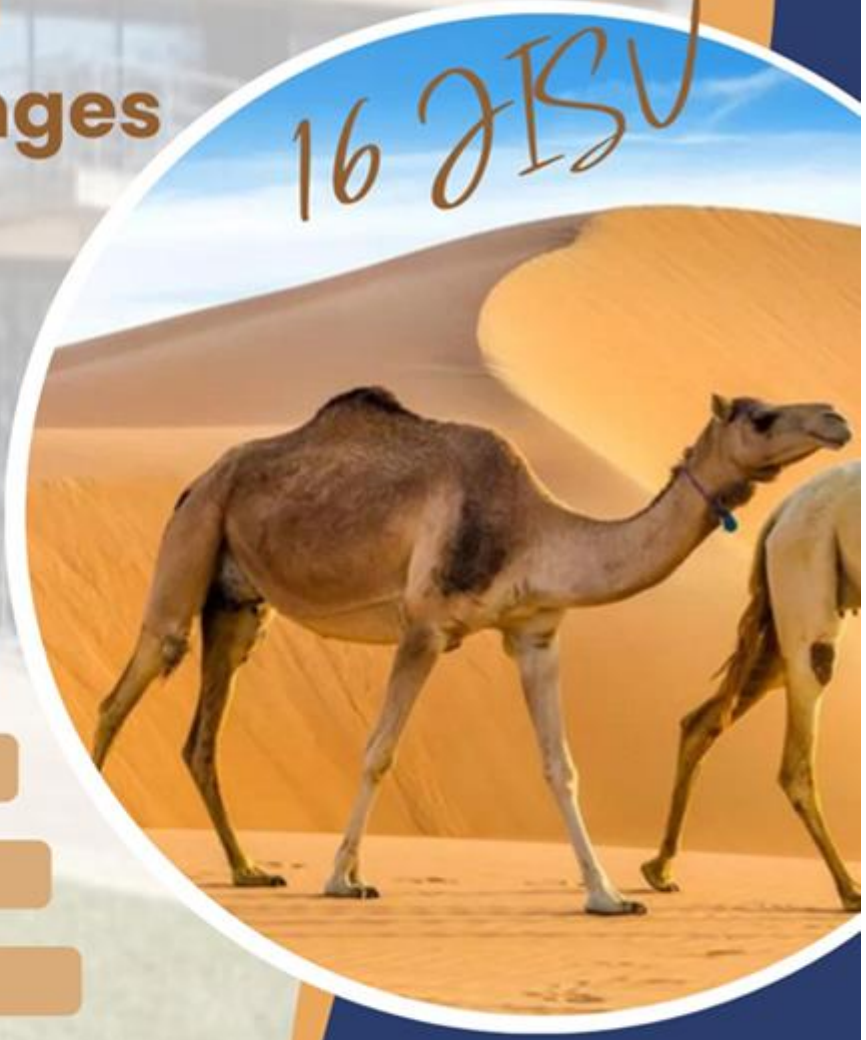
ABSTRACT BOOK

16th International Days of Veterinary Sciences

CAMEL BREEDING : Preservation and new challenges



November 16 & 17th , 2024

Topic 1 : Breeding systems and welfare

Topic 2 : Nutrition and diet

Topic 3 : Genetics and reproduction

Topic 4 : Diseases and prevention

Topic 5 : Valorization, hygiene and safety of camel products

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Opening speech by the Director

For several years, the Higher National Veterinary School has been organizing scientific days that address emerging issues and developments in the field of veterinary medicine.
These events provide a privileged space for reflection and exchange, where researchers, experts, and professionals come together to explore innovative solutions to the challenges of tomorrow. Each edition highlights a current topic, reflecting the growing impact of veterinary sciences in a global context.
For this 16th edition of the International Days of Veterinary Sciences, the chosen theme, “Camel breeding: preservation and new challenges” emphasizes a valuable yet underutilized resource, particularly in arid regions. Camelids, with their remarkable ability to adapt to desert environments, play a crucial role in food security, economic development, and ecosystem preservation in many parts of the world.
These days will address a variety of important topics, including breeding systems and animal welfare, nutrition and diet, genetics and reproduction, disease prevention, as well as the valorization and safety of camelid-derived products. We hope that the discussions during this event will strengthen international collaborations and lead to concrete recommendations that can be shared with stakeholders in the field, ultimately improving husbandry practices and promoting sustainable development.
I would like to express my gratitude to everyone who has contributed to the success of this event. A special thank you to our speakers, whether national or international, as well as to the presenters and the members of the organizing and scientific committees. I also thank the teachers from ENSV and other institutions, our students, and the administrative, technical, and support staff. Finally, I would like to sincerely thank our sponsors for their crucial contribution to the success of this event
I wish you all fruitful and enriching days.

Prof. S. BESSALEM
Director of ENSV

Mot de la Directrice

Depuis plusieurs années, l'École Nationale Supérieure Vétérinaire organise des journées scientifiques qui abordent les questions émergentes et les évolutions dans le domaine de la médecine vétérinaire.

Ces journées constituent un lieu privilégié de réflexion et d'échange, où chercheurs, experts et professionnels se rencontrent pour explorer des solutions novatrices face aux défis de demain. Chaque édition met en lumière un thème d'actualité, témoignant de l'impact grandissant des sciences vétérinaires dans le contexte global.

Pour cette 16ème édition des journées internationales des sciences vétérinaires, le thème choisi, « L'élevage des camélidés : préservation et nouveaux défis », met en avant une ressource précieuse mais encore sous-exploitée, notamment dans les zones arides. Les camélidés, avec leur remarquable capacité d'adaptation aux environnements désertiques, occupent une place cruciale dans la sécurité alimentaire, le développement économique, ainsi que la préservation des écosystèmes dans de nombreuses régions du monde.

Ces journées permettront d'aborder une variété de sous-thèmes importants, tels que les systèmes d'élevage et le bien-être animal, la nutrition et l'alimentation, la génétique et la reproduction, la prévention des maladies, ainsi que la valorisation et la sécurité des produits d'origine cameline. Nous espérons que les discussions au cours de ces journées renforceront les collaborations internationales et mèneront à des recommandations concrètes qui pourront être partagées avec les acteurs de la filière, afin d'améliorer les pratiques d'élevage et de promouvoir un développement durable

Je tiens à remercier chaleureusement tous ceux qui ont contribué au succès de cet événement. Un grand merci aux conférenciers, qu'ils soient nationaux ou internationaux, ainsi qu'aux communicants et aux membres des comités d'organisation et scientifique. Je remercie également les enseignants de l'ENSV et d'autres établissements, nos étudiants, ainsi que le personnel administratif, technique et de soutien. Enfin, je tiens également à exprimer mes remerciements les plus sincères à nos sponsors pour leur contribution essentielle à la réussite de cet événement.

Je vous souhaite des journées fructueuses et enrichissantes.

Prof. S. BESSALEM
Directrice de l'ENSV

Conference abstracts

Insight into the genetic diversity of the Arabian Peninsula camel populations

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Abstract

Studies of the genetic relationships between camel populations in the Arabian Peninsula have identified three distinct groups that correspond to their geographic location on the peninsula (North, Central, and West, South-West, and South-East of the Arabian Peninsula). These groups are based on geographic locations rather than ecological classifications. Genetic mixing and gene flow within populations were noted despite ecological differences, highlighting the need for conservation initiatives to maintain the genetic variety of dromedaries. Evaluations of genetic diversity carried out in the Arabian Peninsula have clearly identified distinct groups between native and non-Arabian peninsula dromedary populations, suggesting that there is little gene flow between them. These results highlight the need to protect regional genetic resources and create focused breeding initiatives to increase camel production and guarantee the resilience of native populations. Furthermore, dromedaries from the Southeast Arabian Peninsula have shown modifications linked to immunological response, metabolism, sensory functioning, and memory via genomic investigations that have revealed possible areas under positive selection. The implementation of genomic breeding initiatives targeted at enhancing dromedary production and preserving genetic variety is made possible by these genomic findings.

Global discovery of prion disease in dromedary in Algeria
Découverte mondiale de la maladie à prion chez le dromadaire en Algérie

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Abstract

Here we report a new prion disease in dromedary (*Camelus dromedarius*) in Algeria and designate it by the appellation of camel prion disease (CPD) discovered for the first time in the world by Dr Baaissa BABELHADJ. In the last years, neurological symptoms have increasingly been observed in adult male and female dromedaries presented for slaughter at Ouargla abattoir. The symptoms include weight loss, behavioral abnormalities and neurological symptoms such as tremors, aggressiveness, hyper-reactivity, typical down and upwards movements of the head, hesitant and uncertain gait, ataxia of the hind limbs, occasional falls and difficult getting up. Symptoms suggestive of prion disease were observed, at ante-mortem examination during 2015 and 2016, in 3.1% of 2259 dromedaries. Diagnosis was confirmed in three symptomatic dromedaries, sampled in 2016 and 2017 for laboratory investigations, by the detection of pathognomonic neurodegeneration and disease-specific prion protein (PrP^{Sc}) in brain tissues. In particular, histopathological examination, of the three dromedaries, revealed spongiform change, gliosis and neuronal loss preferentially in grey matter of subcortical brain areas. Moreover, Western blot, of the brain homogenates available only from two animals, showed the presence of PrP^{Sc} with a classical electrophoretic profile, with three main bands representing di-, mono- and un-glycosylated PrP^{res}, characterized by a mono-glycosylated dominant form. Interestingly the biochemical characterization showed a distinctive N-terminal PrP^{res} cleavage site for CPD, different of that observed in BSE, sheep passaged BSE and scrapie.
In animals, prion diseases occur in a small number of species and may exist as multiple strains. Most important are scrapie of sheep and goats, Chronic wasting disease of cervids and bovine spongiform encephalopathy for which a zoonotic potential has been demonstrated. The aim of this work is to conduct a diagnosis of TSE in dromedary camels for which neurological symptoms compatible with a TSE has been observed.
Formalin fixed brains of animals with neurological simptoms or clinically healthy, were analyzed by histopathology, immunohistochemistry and Western blot.
Analysis of ante-mortem inspection records of 937 dromedaries in 2015, in the Ouargla slaughterhouse, Algeria, indicated the presence of neurological disease with an average occurrence of 2.1%. The ante-mortem veterinary inspection performed by Dr. BABELHADJ Baaissa revealed weight loss, hesitant and uncertain gait, and behavioral abnormalities such as tremors and frequent head movements. In 2016, two dromedaries from the Sahrawi population, aged ten to eleven years, presenting clinical signs compatible with TSE were sampled for diagnostic investigations.
Spongiform changes associated with gliosis and neuronal loss were observed in several areas.
PrP pathological deposition was prominent in subcortical areas, highlighting intra- and extracellular deposition patterns.
Biochemical analysis revealed the typical presence of three PrPres bands.
Here we show for the first time the existence of a prion disease in dromedary camels (Camelus dromedarius). The extensive of the epidemics need additional investigation. Although the source of infection and the nature of the TSE agents involve is still under study, the identification of a prion disease, in an animal species entering the human food should be considered as a possible risk to human health. The improvement of TSE surveillance systems of human and animals, in area of interest, could provide knowledge on the hazardousness of this finding.

Factors influencing reproductive traits in Algerian dromedary camels

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Abstract

Camels are known to outperform other species under harsh conditions, producing high-nutritional-value food (meat and dairy products) where common ruminant livestock species (such as cattle, sheep, and goats) cannot efficiently thrive. Reproductive performance is a critical economic trait in livestock production, influenced by multiple factors. A lack of comprehensive insights into camel reproductive performance hinders the implementation of national strategic plans aimed at enhancing food animal production. Furthermore, research on camel reproduction and factors affecting reproductive performance has received limited attention from Algerian researchers. Various factors, including: genetic, environmental nutritional, biological, and pathological disorders, play a role. The biological limitations in camel reproduction include seasonal breeding, delayed onset of puberty in both sexes, and extended lactation anoestrus. Other influencing factors include management practices, nutritional levels, and breed differences. Common clinical findings in barren females include: clinical endometritis, ovarian hydrobursitis, and vaginal adhesions, while ovarian cysts and inactivity were not significant causes of infertility. Additional infertility causes include genital tract anomalies, hydrosalpinx, and vaginal tumors.

This review summarizes the factors affecting camel reproductive efficiency in Algeria, as well as the causes of infertility in barren female camels.

Particularités cardiovasculaires et ophtalmologiques chez le dromadaire (C*amelus dromaderus*) et conséquences pathologiques

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Résumé

Les yeux et le système cardiovasculaire du dromadaire ont des particularités et des spécificités que le cliniciens et le scientifique doivent connaitre pour mieux gérer son élevage et sa démarche diagnostique et thérapeutique. Ces particularités font du dromadaire un animal adapté et par excellence au milieu désertique.

Les yeux des dromadaires possèdent une double rangée de longs cils denses formant une barrière protectrice. Il possède aussi une troisième paupière caractéristique anatomiquement et qui joue un rôle important dans la protection oculaire, le maintien de l'humidité et la protection contre le soleil….

Le forme de l'iris et la fente pupillaire lui permettent une vision panoramique protectrice vis-à-vis des prédateurs. Le fond de l'œil est coloré portant la structure du tapis.

Le volume sanguin chez le dromadaire est de 93 ml par kg de poids corporel, soit une valeur supérieure à celle observée chez la plupart des autres animaux. D'autre part, la perte d'eau s'accompagne d'une augmentation de la viscosité du sang, qui se traduit à son tour par une augmentation de la température. Chez le dromadaire, le sang reste fluide quand il se déshydrate et, par conséquent, sa température augmente moins vite.

La bosse du dromadaire est une réserve d'énergie. Cette accumulation localisée évite la dissémination du gras en région sous-cutanée dans les autres parties du corps. Sa présence sur le dos de l'animal lui assure également un rôle dans la thermorégulation. L'animal se refroidit mieux car il est moins gras. Il transforme sa graisse en eau par des réactions physiologiques d'oxydation. Le dromadaire a la capacité de faire varier sa température interne en fonction de la chaleur externe, ce qui autorise à considérer que l'animal n'est pas un strict homéotherme,

Lorsque la température ambiante décroît, notamment pendant la nuit, la température interne du dromadaire peut descendre à 34 °C. Durant les heures les plus chaudes, la température rectale peut atteindre 42 °C sans que l'on puisse parler de fièvre. De tels écarts de température corporelle sont mortels pour la plupart des mammifères et sont assurés par le bon fonctionnement du système cardiovasculaire.

Le cœur du dromadaire est particulier, plus proche du cœur que celui des bovins et qui fait de lui un cœur d'athlète adapté à l'effort.

Nous avons fait des travaux sur le système cardiovasculaire du dromadaire (*Camelus dromaderus*) et réalisé notamment des tracés électrocardiographiques sur des dromadaires au repos et nous les avons analysé.

Le système lymphatique se caractérise par un faible nombre de nœuds lymphatiques et des emplacements inhabituels tels que le ganglion thoracique externe ou le ganglion cervical inférieur.

Toutes ces considération anatomiques, physiologiques et cliniques doivent être bien maitrisées par le clinicien pour une meilleure prise en charge diagnostique, pronostique et thérapeutique.

Potential role of camels as the reservoir of the next coronavirus zoonotic pandemic

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Abstract

The COVID-19 pandemic reset the importance of infectious diseases and the danger of zoonotic pathogens for humans. Although some coronaviruses are responsible for non-lethal common colds in humans, the pathogenicity of newly emerged coronaviruses dramatically increased causing high fatality rates and rapid adaptation and a high human-to-human transmission for SARS-CoV-2 ending by a pandemic. Middle East respiratory syndrome coronavirus (MERS-CoV) was first identified in Saudi Arabia in 2012 and still poses a public health threat. Unlike, the SARS-CoV-2 whole fatality rate was 1-2%, the fatality rate of MERES-CoV exceeds 35%. MERS-CoV is transferred to humans from infected dromedary camels following contacts. MERS-CoV infection has been found in dromedary camels raised in several Member States in the Middle East, Africa, and South Asia. There are nearly 45 million camels in the world however the MERS-CoV prevalence in these animals remains unknown. Typical MERS symptoms include fever, cough, shortness of breath, and in some cases pneumonia. However, the transmission human-to-human of this virus is poor and no substantial enhancement of transmission was observed. The preparedness for possible larger epidemics includes the current development of vaccines for human use. However, there is no cure to MERS-CoV infection, and training healthcare workers in infectious disease facilities can help to reduce outbreaks of MERS-CoV.

Preventing MERS-CoV infection relies on implementing effective control measures, avoiding unpasteurized or uncooked animal products, and practicing safe hygiene habits around dromedaries and in healthcare settings.

The development of veterinary vaccines that can cure and/or protect camels from MERS-CoV infection can help eradicate this virus thereby canceling the risk of zoonotic transmission to humans.

The dromedary and its Saharan floral resources: Valorisation, preservation and regeneration

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Abstract

The Saharan ecosystem is renowned for its harsh edapho-climatic conditions, which are highly restrictive to the spontaneous survival of living creatures. However, it has a very thin and sparse plant cover, with anatomical and physiological adaptations that enable it to survive in this very hostile Saharan environment. Thanks to these specific adaptations, the dromedary is the only livestock species capable of exploiting and valorising this very poor and highly lignified Saharan resource. In addition to their ability to produce and reproduce in such an environment, dromedaries make a major contribution to the preservation and proliferation of its plant cover.

We will present a summary of our latest work on the ecological role of the dromedary in its environment.

This animal has an ambulatory feeding behaviour that enables it to travel dozens of kilometres a day, grazing on a maximum number of plants and species, taking small quantities of the aerial part of each one without exhausting it or uprooting it. It doesn't crush the soil and the topsoil doesn't disappear as a result of being trampled. It is highly selective with regard to species and plant parts. It tends to graze heavily on the more abundant species and leaves the less abundant ones. In addition, the study of dromedary endozoochory has shown that they contribute greatly to the proliferation of the Saharan plant cover, by transporting considerable quantities of seeds in their droppings and disseminating them throughout the vast Saharan region. What's more, the passage through the dromedary's digestive tract gives these seeds high germination powers (some seeds can only germinate after passage). And let's not forget the preservative and protective role of the seeds' droppings, until favourable conditions (rainfall) allow them to germinate and emerge.

We can say that this animal is very useful for the preservation and proliferation of this Saharan plant cover.

Main risk factors of *T. evansi* infection in camels: a review

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Abstract

Trypanosomosis is a widespread disease due to different species of Trypanosoma. *T. evansi* is the main blood parasites of camels, all over the camel countries of the world from Africa to Asia (except Australia). Its dissemination is depending on the biting flies present in the environment. The risk of dissemination out of the desert countries is limited by the abundance of those vectors. Due to the low characteristics of the symptoms, laboratory diagnosis is essential for epidemiological studies. The diagnosis tools involved para-clinic examination (hematocrit, blood formula), blood examination (searching parasites after coloration), antibodies detection (ELISA test), antigen detection (PCR), detection of immune-response (CATTest, IGM, Igg). However, the prevalence estimated by such different technics can lead to large discrepancies in the observed values. The main risk factors explored in the literature are linked to the environment (season, humidity, types of farm management) and to individuals (age, gender, body condition, history of abortion, and breed). The evaluation of the risk factors could change from one study to another which are using different statistical procedures. It could be useful if a questionnaire-type could be proposed by OIE in order to harmonize the investigations.

Camel's genetic potential as future dairy animals in the context of climate change

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Abstract

All dromedary camels may give milk, including the desert riding camel Marrecha (Pakistani desert breed), which yielded an average of 5.62 ± 0.27 in an ordinary grazing regime. Camel milk has gained popularity over the last decade due to 3 main reasons; sustainability, nutrition in nature, and health-promoting features. Such state of situation is resulting in increased market demand for camel milk. Despite their amazing relevance, little progress has been made in camel breeding and selection for dairy production. Climate change is affecting milk production in cattle-based dairy systems in different regions affected by climate change jeopardizing livelihoods and food security. Hence, cattle pastoralists are replacing cattle with the camels.

Originally tamed for their milk, camels have now returned to their natural use after being used as beasts of burden. Research done in the Horn of Africa showed that camels are an excellent source of milk production DNA; when compared to other tropical animal species, camels produced more milk per kilogram of TLU per year. The camel maintains its output in challenging situations and is less impacted by negative factors such as a lack of feed, water, season, and lactation duration. The camel breeds found in the world's arid and semiarid lands (ASAL) vary greatly. There is significant variance in production across people, breeds, and locations. This version may be used successfully in the future. Camels are excellent dairy animals since they can produce 10-30 liters of milk per day for up to 9 months during lactation. Other animals might not be able to survive in the harsh and dangerous environments in which camels produce. Our farm's daily milk record data from 10 years shows an average of 8.13 kg per day during a 10-month lactation period. The yield is above average from April to August, peaking from June to August each year, and lowest from November to February.

The use of a milking machine is key to producing high-quality and safe camel milk for human consumption

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Abstract

To increase the milk yield of each camel and to improve the quality and safety of raw camel milk, the use of a suitable milking machine is necessary. The aim of this study was therefore to shed light on the right milking machine to obtain safe and high-quality camel milk.

A quarter-individual milking machine "StimuLactor" (Siliconform, Germany) was used on a camel farm. Three operating parameters were tested: vacuum level, pulsation rate and pulsation ratios. In addition, the milking machine was equipped with silicone teat liners. Daily milk yield was recorded and milk samples were taken for qualitative and safety analysis.

Our results clearly showed that the low vacuum level (36 kPa) was sufficient to successfully perform the milking process, with milking occurring gently and without straining the udder and without the teat cups falling off during milking. The use of a high milking vacuum can cause udder health problems in camels, which are reflected in a high somatic cell count in the milk produced and have a negative impact on udder health. Our experience has shown that a pulsation frequency of 90 cycles per minute delivers optimal results. A pulsation ratio of 65:35 was ideal for machine milking of lactating camels. These parameters of the camel milking machine correspond to the physiological requirements of lactating camels.

The right milking machine not only increases milk yield and quality, but also plays an important role in maintaining udder health in lactating camels.

Welfare assessment in dromedary camels

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Abstract

Two protocols for measuring welfare in dromedary camels kept in intensive systems and under nomadic pastoralist were developed. This study aimed to apply them in a market in Doha and in several herds kept under pastoralism in Pakistan.

The first protocol for intensive systems is composed of three levels of investigations (caretaker, herd and animal), instead the second protocol only by two (caretaker/herd and Animal). Both protocols are easy to apply and contain several Animal based measures (ABMs) and environmental based measures (EBMs) split following the four welfare principles (*Good Feeding, Good Housing, Good Health and Appropriate Behaviour*). A total of 105 measures were collected on a total of 528 camels kept in 76 pens at a market in Qatar. A total of 44 measures were collected in 54 herds for a total population of 1186 camels, of which 510 (495 females and 15 males; average age: 5-6 years old) in Pakistan. Starting from the scoring of the collected measures, indices aggregate at assessment (LAIs) and principle (PAIs) levels, and a Total welfare index (TWI) were calculated for each pen and herd. Pens and herds were then classified according to their TWI, using a traffic light system, and PAIs, using *a priori criteria*.

In Qatar, the lowest LAI was related to the caretakers ($p<0.05$) and the lowest PAI was the Good feeding index ($p<0.001$), while TWI ranged from 46.2 to 69.8. According to PAIs, most of the pens were classified as "unsatisfactory" (61.8%) and none as "excellent". Body Condition Score (BCS), Thirst index, disease and physical injuries, presence of a shelter, and cleanliness of bedding (for all $p<0.05$) were the measures which influenced the pens' classification the most. In Pakistan, using the PAIs classification, 4 herds resulted excellent, 42 satisfactory, and 8 unsatisfactory. Good feeding and Good housing were the most problematic PAIs. TWI varied from 55.7 to 82.2, and using a traffic light classification, 12 herds resulted green, 22 orange, and 20 red.

As expected, camels kept under pastoralism had a higher level of welfare than camels kept in intensive systems. In both systems it was still possible to suggest guidelines for the improvement of those pens and herds with criticalities. Recommendations to improve the quality of life of the dromedary were provided and positively received. Our findings are a first step to propose welfare standards for dromedary camels.

Is the elimination of camel *Trypanosoma evansi* infection (surra) feasible in North Africa?

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Abstract

With an increasing worldwide population that presently exceeds 41 million*, dromedary camels (*Camelus dromedarius*) are an important source of meat (>604,000 tons/year*), milk (>4 million tons/year*), manure, and transportation of goods, in many regions of Africa and Asia. Hence, control and/or elimination of trypanosomosis due to *Trypanosoma evansi* (Surra), which is known to be the major camel health burden, would be beneficial to the economies of human populations living in arid and semi-arid regions of the world, which they are already exposed to political upheaval (terrorism, riots), poverty, and precarity (drought, climate modification).

It has been proposed that due to the relatively straightforward epidemiology of surra in camels (most often single parasite with seasonal transmission in a single host species), control of surra is affordable and should be based on implementing: (1) national veterinary services capabilities; (2) efficient diagnosis and control methods; (3) joint integrated control of surra, gastrointestinal helminthoses (mainly haemonchosis), and sarcoptic mange. In this presentation, I discuss how to better define the tools for control of Surra, toward elimination in camels in North Africa.

I suggest an integrated control program against camel trypanosomes, by following a progressive control pathway (PCP).

Furthermore, I propose simultaneous programs to control two additional diseases of great socioeconomic importance, gastrointestinal parasitoses and sarcoptic mange.

Role of dromedary camels in the emergence of infectious animal diseases

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Abstract

Dromedary camels are increasingly the subject of several scientific investigations, showing that they are receptive and carriers of several zoonotic pathogens. An appraisal is also given of the relative public health importance of these infections according to One Health concept. Microscopic, serologic and molecular findings are appropriately generated in order to exploit epidemiological data, and phylogeographic specificities associated to bacterial and viral vector-borne infections. Indeed, camels and their ticks harbour similar species and genotypes of pathogenic bacteria and virus commonly identified in other animals, e.g., *Anaplasma* spp. *Rickettsia* spp., *Borrelia* spp., *Coxiella* burnetii, *Brucella* spp., rift valley fever Phlebovirus, and The *Crimean-Congo* hemorrhagic *fever Nairovirus*. This evidence suggests an epidemiological role of camels in the spread of these pathogens in their natural habitats. However, these infections are commonly asymptomatic in camels resulting in underestimation of the impact of these infections. Furthermore, camels have recently been proven to have their own specific unclassified bacterial strains, such as *Candidatus Anaplasma camelii* and *Candidatus Bartonella camelii*, implying that possible interactions may lead to the emergence of new pathogenic and zoonotic bacteria. In camel-rearing areas of the world, spatial and temporal spread of these infections, due to climatic and ecological changes and human activities such as development projects and urbanization, is expected. Hence the data presented herein provides a basis for strategic frameworks for the research and the development of novel diagnosis and control strategies worldwide, which are needed to protect camels, other livestock, and people in contact with dromedaries from threats that infectious pathogens can pose.

Health benefits and functional properties of camel milk

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Abstract

Camel milk plays an important role in the nutrition in different parts of the world, especially in the arid and semi-arid areas.

Camel milk contains health substances, such as bioactive peptides, lactoferrin, zinc, unsaturated fatty acids. These substances could be useful ins the treatment of some human diseases like tuberculosis, asthma, jaundice and gastrointestinal diseases. Composition of camel milk is more valuable than cow milk.

Milk composition is affected by many factors like feed, breed, age, lactation stage, region and season. Whey protein in camel milk has indigenous proteases such as chymotrypsin A and cathepsin D.

In addition to their high nutritional value, whey proteins have unique characteristics, including physical, chemical, physiological, functional, and technological features that are useful in the food. The hydrolysis of camel milk proteins leads to the formation of bioactive peptides, which affect major organ systems of the body and impart physiological functions to these systems. Antioxidant, antimicrobial, angiotensin-converting enzyme (ACE) inhibitory, antidiabetic as well as anticholesterol activities of camel milk are all representing the major value for these bioactive peptides.

Field investigation

Current challenges and opportunities for camel farming in Algeria: Incorporating environmental considerations into management of camel rangelands

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Abstract

Camel Farming can be considered essentially as part of the medium-term solution, for food security in Algeria. The purpose of this field investigation is to provide a clearer insight into current status of camel production and to outline the technical issues related to its sustainability in an era of increasing challenge and change. Despite the economic potential of camels, several challenges remain, including a rangelands degradation, low breeding efficiency and health risks highlighting the need to focus on new opportunities and explore perspectives on the genetic improvement in camels and health management that contribute most to sustainable production of milk and meat. Rangeland management remains also an area that is ripe for improvement.

In conclusion, Camel herding in the Algerian Sahara faces multiple constraints, requiring interventions at several levels, multi-disciplinary effort and effective linking between farmer participatory research and national research organizations are important requisites for increasing camel-based livestock systems taking into account ecological, social and economic considerations.

Keywords: camel farming, rangelands, food security, challenges, opportunities, Algeria.

Oral communication abstracts

Topic 01

Breeding systems and welfare

Evaluation of Dromedaries' Welfare in Terms of Health in Some Farms in Southern Algeria

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Abstract

The dromedary is essential for the Algerian economy and food security, especially in arid areas where it adapts to extreme climatic conditions. Its ability to exploit limited resources makes it a crucial asset. However, this livestock faces health risks, particularly during transhumance to neighboring countries. Therefore, evaluating their well-being is vital to preserve their health and productivity. Currently, this evaluation is inadequate for camelids compared to other domestic species. It is necessary to develop objective and standardized methods to optimize their well-being.

In 2022, ten camelid farms, comprising 50 dromedaries aged 2 to 5 years, were surveyed over a period of three months. The evaluation focused on health criteria, according to the Padalino protocol for camelids. Ten welfare criteria were assessed, including: injuries, joint swelling, lameness, diarrhea, hair loss, nasal and ocular discharge, mastitis, respiratory distress, and the general condition of the animals. Scores were assigned according to this protocol, inspired by Welfare Quality assessment.

The results revealed a high rate of scores indicating health problems: 67% of dromedaries had severe injuries, 55% had lameness, and 32% had skin issues (hair loss). Other problems included mastitis (20%), nasal discharge (12%), ocular discharge (8%), vulvar discharge (2%), respiratory difficulties (4%), and diarrhea (9%). These results highlight a significant deterioration in the health of dromedaries, necessitating improved care to optimize their well-being.

The welfare assessment protocol used is a valuable diagnostic tool that enables breeders to identify at-risk farms and implement targeted improvement actions.

Keywords: Dromedary, welfare, evaluation, health, Welfare Quality assessment.

The diversity of camel farming systems in the Hoggar region (Southern Algeria)

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Abstract

In order to apprehend and characterize the nature of the systems practicing camel rearing, to shed light on the conditions under which camels are reared through their feeding, reproduction and selection of broodstock and to identify the objectives of rearing practices and production constraints as an essential step towards the development of a program for the improvement, management and maintenance of this animal resource.
In another aim to identify their functioning and identify the breeds that exist within the population "Tergui", and the problems and obstacles that hinder the development of this type of livestock farming in the region, thus contributes to improve and strengthen knowledge about the camels species and its environment.
We tested the statistical tool on a set of 277 Camels breeders using a questionnaire, which was carried out in the localities of the Hoggar region (South Algeria).
The result of a PCA followed by an CAH highlighting the diversity of farms graphically shows the identification of the 04 farming modes: On the other hand, the dominant type and species for each farming system, with the size of the camel herd ranging from 4,027 head, 2,063 head, 1,965 and 1,768 head respectively, or the species (ecotype) Mehri dominates the nomadic mode and the Azzerghaf and Marouki dominate the transhumant mode, while the Abahou dominates the semi-sedentary mode. This demonstrates the importance of camel farming in the region, despite the fact that the surveyed population is of the order of 27,516 head, all distributed over 38% goats, 36% camel and 26% sheep, and that 60% of breeders own more than 80 head. Livestock farming is faced with multiple problems that keep its production level low and remains traditional and evolves on the fringe of technical progress.

Keywords: Genetic characterization; dromedary; Animal genetic resources; Food security; Typology.

Exploring the Dromedary Rearing Situation in Algerian Steppe Region

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Abstract

Camel rearing occupies an important place in the agro-pastoral and social life of the local populations in steppe regions. Djelfa is a province located at the heart of Algerian steppe. To properly assess the characteristics of in this region, more than thirty farms were investigated.
Seen during our survey, we observed a predominance of a local variety, called: "Ouled-Nail", steppe camel; plus minority, non-local varieties: "Aftouh" and "Chaambi" of origin from Tindouf and Biskra, respectively. We also note that there is a sexual distribution in favor of females (73%). Young camels were 41% compared to 59% of adult animals. We observed a predominance of age groups over 50 years old. All the camel populations surveyed live in herds with one to two adult male camels. It should be noted that in the steppe region, the number of camels in the herd does not exceed fifty individuals.
In 86% of the herds examined, the breeders are from the region and have two houses (one in the city and the other in the countryside). Generally, it is the members of the family themselves who carry out daily agro-pastoral activities. This type of breeding has a good attraction for rural people thanks to multiple reasons, especially camel milk (600DA/L ~ 4 Euro/L). The survey carried out revealed to us that 22% of them have a single breeding of dromedaries, on the other hand 78% have mixed breeding. Most of the breeders surveyed, 83%, are private owners (private land); while the remaining 17% are tenants, landless.
This diagnosis of the state of breeding in the Djelfa region aims to establish the true status of camel breeding in the steppe in order to carry out a camel preservation plan and to exploit it as an asset of the steppe region.

Keywords: Breeding, dromedary, steppe, Djelfa.

Le camelin en Algérie : Un nouvel essor des systèmes d'élevage pour un nouveau sort de la filière

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Résumé

L'Algérie détient l'une de ses plus grandes richesses biologiques dans son milieu aride ; il s'agit en l'occurrence du dromadaire qui, en termes d'effectif, se hisse au 18ème rang mondial, 8ème sur la scène arabe et 1er au niveau maghrébin. Le cheptel est réparti sur trois principales régions ; le Sud-Est, le Sud-Ouest et l'extrême Sud avec respectivement 52%, 18% et 30% de l'effectif total.

Cet animal dont l'histoire l'avait relégué jusqu'à une certaine époque au second plan comparativement aux autres animaux d'élevage, mais l'aube des années 2000 lui fut annonciateur d'un nouvel essor marqué par un véritable regain d'intérêt confirmé par l'évolution de ses effectifs allant crescendo pour plafonner les 459 616 sujets en 2022 alors qu'ils étaient comptés à peine à 154 000 têtes au lendemain de l'indépendance. Cette notable progression des effectifs s'est accompagnée d'une évolution des systèmes d'élevage, alors que les mutations socio-économiques des communautés nomades et l'engouement en la demande de produits camelins ont contribué à modifier les pratiques et les logiques d'élevage qui à leur tour ont impacté les filières camelines aussi diverses les unes des autres.

Par ailleurs la mise en place du Conseil National Interprofessionnel pour piloter la filière cameline serait le catalyseur incarnant aussi bien la réorganisation de systèmes d'élevage spécialisés que leur intégration dans une économie rentable et viable ; gage de création de richesse et moyen de sécurité alimentaire.

Ce à quoi tente de mettre en évidence la présente étude, type synthèse, menée dans différentes régions potentiellement camelines dont les potentialités sont fort intéressantes et la conjoncture s'y prête en termes du renouveau de systèmes d'élevage incarnant une logique vocationnelle. En somme, c'est d'un nouveau sort de la filière qu'il s'agit via l'implication de l'ensemble de ses acteurs.

Mots clés : Algérie, Dromadaire, Elevage, Renouveau, Filière.

Protecting camels in Algeria: between tradition and innovation

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Abstract

Algeria, with its vast Sahara, is rich in biodiversity, but the harsh conditions of this region make camel breeding particularly challenging. The dromedary is a valuable resource for herders, but its well-being is often threatened by water scarcity, poor grazing quality, and the consequences of nuclear tests. To ensure the sustainability of camel breeding, innovative practices must be adopted. This article aims to propose concrete solutions, including partnerships with Middle Eastern countries and the cultivation of specific plants to improve camel welfare while developing ecological and tourism initiatives.

This research was conducted in several Saharan regions of Algeria. Interviews were conducted with herders and veterinarians to understand their daily challenges. The idea of creating special areas for the cultivation of camel feed plants was discussed. Case studies of similar projects in countries such as Qatar, the UAE, and Saudi Arabia were also examined for lessons learned. The impact of nuclear tests on the environment and camels will be analyzed to better understand the current challenges.

Preliminary results show that herders are supportive of the idea of designated areas for growing camel feed plants, providing a constant supply of food for the camels. By learning from the best practices of countries like Qatar and the UAE, herders can improve camel nutrition and veterinary care. Moreover, monitoring stations would ensure effective veterinary care and train herders in best practices. The integration of these practices could also help mitigate the effects of nuclear tests on the environment. The project is also part of an ecological and tourism initiative, contributing to the preservation of the species while promoting the economic development of local communities.

The establishment of designated areas for the cultivation of camel feed plants in Algeria represents a unique opportunity to improve camel welfare and ensure the sustainability of camel breeding. By combining sustainable agriculture, lessons learned from Middle Eastern countries, and efforts to mitigate past environmental impacts, we can create a model that preserves local culture while addressing the needs of herders and their animals. These efforts will not only contribute to the health of camels but also to food security and the economic development of Saharan communities, while aligning with ecological and tourism initiatives.

Keywords: Camel breeding, animal welfare, camels, Algeria, sustainable agriculture, partnerships, ecology, tourism.

Topic 02

Nutrition and diet

The use of halophytic plants for camel feeding in El-Shalatein

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Abstract

In El-Shalatein, Red Sea Governorate, camels play an important role to combat desertification and achieve food security. They are considered a major source of livelihood and the only source of milk for people living in the area. Most camels in Egypt are located in the Red Sea Governorate, in which the arid climate limits options for raising cattle but camels, which can go up to a week without water, have the advantage of being one of the most drought-resilient species. Consequently, pastoralists in El-Shalatein have been shifting their production from cattle to camel. In a changing climate scenario, Camels, in particular, have a lot of promise for protecting poor and marginal farmers 'socioeconomic standing as an alternative source of income. The study aimed to evaluate the halophytic plants utilization supplemented with different concentrate supplement levels under arid environments.

The experiment was carried out in Wadi-Hodien, El-Shalatein. Because the underground water is affected by salinity (8000 ppm), the seedlings of *Acacia saligna* and *Atriplex nummularia* were cultivated (halophytic plants). However, fifteen lactating camels with their calves were divided into three feeding treatments, five per each. Animals in the control group were fed alfalfa hay alongside the concentrate supplement at a level of 50% of the metabolizable energy used for maintenance (MEm), while those in the second and third groups were daily grazing on halophytic plants alongside two concentrate supplement levels,50 or 100% of the MEm, respectively. Experiment was lasted two months in which concentrate supplement was individually given in the morning and afternoon. Energy expenditure was estimated by heart rate monitors after being calibrated by the open-circuit respiratory system.

Chemical composition of the halophytes was varied depending on the stage of growth. The protein content declined, and the fiber content increased with advanced age. However, the required fertilization alongside continued irrigation and mowing resulted in higher palatability and greater nutritive value. *Acacia* was less palatable than *Atriplex* due to higher tannin concentration in *Acacia vs. Atriplex.* The forage intake and digestibility were significantly lower for halophytic plants in comparison to the control forage (alfalfa hay). Concentrate supplement levels significantly affected the forage intake and digestibility. Energy expenditure was going on the same trend with the forage intake and digestibility. Moreover, the salinity in camel milk was clearly appeared by feeding halophytic plants.

Halophytic plants may maintain animals without deterioration, but they cannot cover the production requirements, hence supplementary feeding is required for lactation.

Key words: El-Shalatein, arid region, camels, halophytes utilization, energy expenditure.

Topic 03

Genetics and reproduction

Variation de la Cinétique hormonale (œstrogènes et progestérone) au cours du cycle œstral chez la chamelle (*Camelus dromedarius*)

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Résumé

Dix chamelles de race sahraouie, âgées de 10 à 12 ans, ont été utilisées pour déterminer la cinétique du développement folliculaire associée aux dosages plasmatiques de la 17β œstradiol et de la progestérone. Du sang total a été collecté sur tubes secs et la reprise de l'activité ovarienne a été suivie à l'échographie pendant 40 jours, à intervalle de 2 à 3 jours, après mise bas. L'échographie couplée au dosage de la 17β œstradiol et de la progestérone, nous a permis d'identifier 4 phases de développement folliculaires. La cinétique plasmatique des 2 hormones est inversement proportionnelle au cours des 4 phases. La 17β œstradiol a augmenté de façon linéaire durant la phase de recrutement (taille des follicules ≤3 mm) et de croissance (3 mm < follicules ≤ 9 mm) avec une teneur 24,1 ± 0,54 pg/ml et 38± 6,13 pg/ml respectivement et atteint un pic de 51,82 ± 12,22 pg/ml durant la maturation (9mm < follicules ≤ 21 mm). Ensuite cette teneur a diminué jusqu'à 31,17 ± 11,17 pg/ml à la phase d'atrésie (follicules > 21 mm). Au cours de la phase de recrutement, la teneur plasmatique de la progestérone a été de 0,42 ± 0,28 ng/ml. Ensuite, nous avons enregistré une diminution continue de cette teneur de la phase de maturation, 0,21 ± 0,17 ng/ml, jusqu'à la phase de croissance, 0,19 ± 0,006 ng/ml, cette dernière a été suivie d'une légère augmentation du taux de cette hormone au cours de la phase de l'atrésie 0,56 ± 0,13 ng/ml. Six chamelles ont montré des follicules, de taille ≥ 5 mm de diamètre, au 10éme jour post partum. Au 21éme jour après la mise bas, les 10 chamelles ont montré des follicules ovariens. L'analyse statistique a montré une corrélation significative entre la taille des follicules et les concentrations de 17β œstradiol (P<0,001). Cette étude confirme la précocité de l'activité ovarienne chez la chamelle après la part.

Mots clés : Chamelle, Post-partum, follicule, 17β œstradiol, progestérone.

Genetic diversity and structure of Algerian`s camel population "Tergui" (*Camelus dromedarius*) by morphological characters in Tamanrasset region

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Abstract

In Algeria Camel populations and their genetic variability are not well described. Studies in the colonial period were based on a nomenclature mainly related to tribal names rather than the measurement of phenotypic and zootechnical parameters. The present study aims to define the characteristics and discriminating parameters of the main camel populations in Algeria from the zootechnical point of view, which are particularly useful in terms of production performance and adaptation quality. In order to identify and characterize the genetic variability of camel populations in Algeria, the study focuses on the analysis of genetic variability, its morphological parameters and some zootechnical performances. The analysis methodology is based on the study of the genetic diversity of camel populations through visible and measurable genetic profiles. For this purpose, the statistical processing using Statistica 8.0 software of phenotypic and biometric profile data are the basis of the data obtained to describe these populations by uni- and multi-varied analyses to demonstrate intra-group variability including sub-populations. The results obtained highlight the existence of distinct races (phenotype) within the populations. This reflects the variability within the populations morphologically and demonstrates significant polymorphism and provides ample information on the structuring of the populations. And the determination of the most discriminating parameters and to evaluate, the percentage of classified assets. These parameters were sufficient to distinguish the diversity of races and ecotypes and the structuring of camel populations.
This study would be a potential reference for future work and genetic tests based on DNA polymorphism analysis, which are excellent confirmatory tools for the identification and structuring of the species making up our camel populations.

Keywords: Algeria; phenotypic characterization; Statistical analysis, PCA, CAH.

Reproductive Disorders in Camels: case reports

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Abstract

Reproduction and its pathological disorders in dromedary camels are poorly known compared to other domestic animal species (cattle, small ruminants and horses). It is necessary to clarify these problems in detail in order to overcome the reproductive problems, and to provide some techniques and procedures as solutions and practical guides for practitioners.
Our study highlights clinical cases in camels from southern Algeria. Among the problems of dystocia and postpartum compilations encountered in the she-camel, many cases were reported: caesarean section, uterine reversals, irreducible torsion of the uterus, placental retentions, congenital malformation, vaginal and Uterine prolapse.
A caesarean section can be performed on the left flank under xylasine sedation and local regional anesthesia or by infiltration. The placenta is of the diffuse epitheliochorial type, it is expelled within 50 minutes to 06 hours following delivery.
Reproductive disorders in camelids are very similar to those in other animal species. Intervention techniques in camelids are the same as those of other species. These accidents have a negative impact on the camel's gynecological life and thanks to the intervention of our veterinary community this heritage will be preserved and contribute to the national economy.

Keywords: Dromedary, reproductive pathologies, clinical cases.

Study and identification of the uterine bacterial flora of the camel during the postpartum period

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Abstract

Uterine health is one of the limiting factors in female reproduction. The postpartum period, where the period following parturition is characterized by the opening of the cervix, presents an increased risk of uterine infection following a massive invasion of germs into the uterus. The cervix remains open for several days and in this context, uterine infection is largely influenced by the balance between contaminating bacteria and local immunity. In this context, 10 camels were followed during the postpartum period (day 5 to day 40 in 6 weeks) in order to identify the uterine bacterial flora and its evolution. The study of the bacterial flora and its evolution during the postpartum period constitutes the raw material for understanding pathologies related to the female genital tract (endometritis). Our bacteriological study based on uterine swabs, this study was done by bacteriology methods at the microbiology laboratory of the veterinary institute of the University of Blida 1 and its identification by API 20 Strep and API 20Staph galleries. The study allowed us to isolate 354 bacterial strains from 84 samples. The bacteria identified are 100% Gram positive and are divided into 80.2% staphylococcus species (*Staphylococcus lentus*, *Staphylococcus xylosus*) and 19.8% streptococcus species (strep pyogenes; strep, pneumaniae; enterococcus, faecium; leuconostoc, ssp, streptococcus bovis and uberis, aerococcus viridans 1, 2 and 3, enterococcus faecalis and avuim, streptococcus dys. ssp. equisimilis, streptococcus mitis 1, lactococcus ssp lactis).
Concerning Gram negative, no bacteria were isolated. The number of isolated bacteria is very high during the first week, then a regression is noted for an increase on the 30th day.
The uterine bacteriological study during the postpartum period in the camel, allowed us to conclude that the uterine bacterial flora in the camel is very rich in lactic bacteria which allows a high local uterine defense in comparison to other species.

Keywords: Camel, postpartum, uterus, bacterial flora.

Topic 04

Diseases and prevention

Harnessing Artificial Intelligence for the Prevention and Management of Zoonotic Diseases in Camels: Innovations and Impacts

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Abstract

The emergence of zoonotic diseases linked to dromedary camels presents significant public health challenges globally. These diseases, which can transfer from animals to humans, threaten health systems and economic stability, especially in regions where dromedaries are prevalent. The integration of artificial intelligence (AI) into surveillance and management frameworks offers innovative solutions for enhancing the detection and prevention of these zoonotic threats. This study investigates AI's role in addressing zoonotic pathogens associated with dromedary camels, emphasizing a One Health approach that encompasses human, animal, and environmental health.

This research synthesizes findings from multiple studies on zoonotic diseases transmitted by dromedary camels and recent advancements in AI technologies. A systematic literature review was conducted to identify key zoonotic pathogens and evaluate existing surveillance frameworks. The study also examined case studies demonstrating AI's effectiveness in improving diagnostic accuracy and public health response capabilities. Data from peer-reviewed journals were analyzed to assess current surveillance systems and identify areas where AI can enhance efficiency.

The findings indicate that zoonotic diseases such as Middle East Respiratory Syndrome (MERS) pose considerable public health risks. Current surveillance systems often lack the necessary integration for timely outbreak detection. AI technologies can significantly enhance these systems by:

Improving Diagnostic Capabilities: Advanced algorithms analyze extensive datasets to identify disease outbreak patterns.

Enhancing Surveillance Systems: AI facilitates the integration of diverse data sources for real-time monitoring of zoonotic threats.

Predictive Analytics: Machine learning techniques enable stakeholders to predict potential outbreaks based on historical data.

The One Health framework is crucial for fostering collaboration among public health officials, veterinarians, ecologists, and data scientists to develop effective interventions against zoonotic diseases.

Integrating AI into the surveillance and management of zoonotic pathogens from dromedary camels presents a transformative opportunity for enhancing public health preparedness. By leveraging AI within a One Health framework, stakeholders can improve their capacity to monitor disease dynamics and implement targeted interventions effectively. Continued investment in research and interdisciplinary collaboration is essential for refining these strategies and addressing the challenges posed by emerging zoonoses.

Keywords: Dromedary Camels, Artificial Intelligence (AI), One Health Framework, Surveillance Systems, zoonotic diseases.

Molecular characterization of *Trypanosoma evansi* in Dromedary Camels from Algeria

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Abstract

Surra is a zoonotic disease caused by *Trypanosoma evansi* (*Trypanozoon*), a salivary trypanosome native to Africa which affects a wide range of mammals worldwide and causes mortality and significant economic loss. The present study was devoted to the molecular characterization of *T. evansi* derived from naturally infected dromedary camels in Algeria.
A total of 148 blood samples were collected from mixed age camels living in one of four geographic regions (Ouargla, El Oued, Biskra and Ghardaia) of Algeria. Samples underwent PCR amplification and sequencing of the internal transcribed spacer 1 (ITS1) complete sequence. DNA of *Trypanosoma* spp. was found in 19 camels (12.84%). *Trypanosoma* spp. molecular positivity was not affected by sex ($p = 0.50$), age ($p = 0.08$), or geographic location ($p = 0.12$). Based on multiple sequence alignment of the obtained DNA sequences with representative *T. evansi ITS1* sequences available globally, the Algerian sequences were grouped within four different haplotypes including two which were original.
Results of this study provide preliminary data on which future studies of genetic diversity and molecular epidemiology of *T. evansi* can be based.

Keywords: *Trypanosoma evansi*, Camels, Algeria, Molecular characterization, ITS1, Haplotypes.

Prevalence and abundance of parasites gastrointestinal in Camelins in the El-Oued region (Algeria)

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Abstract

The breeding of the camels has played a very important and leading role in the social and economic life of the populations of the arid and desert areas of Africa and Asia. The objective of this study is to identify gastrointestinal parasites in camelids in the El-Oued region. The study aims to estimate parasite infestation rate by calculating the prevalence and abundance of parasites through coprological analysis. El-Oued is a desert climate with very large temperature variations (40°C), low and irregular rainfall (0.2mm), strong winds and low relative humidity (12%). We have a total of 98 samples from the month of November 2022, divided into one sample for 13 young camels, one sample for 35 pregnant females, one sample for 40 adult females and one sample for 10 sick females. Analyses of camelid excreta were performed in the laboratory using the flotation method. For a quantity of 50 grams of fecal matter was used. The results of the coroscopy examinations carried out on camelids from the El-Oued region for one month revealed a high prevalence of gastrointestinal parasitism, indicating its importance in cameline pathology. Parasitological analysis of droppings identified strongly eggs such as *Nematodirus* sp. and *Strongylus camelus*, as well as Coccidia's such as *Eimeria* sp. and *Eimeria cameli*. The species *Nematodirus* sp. is the highest with 100% prevalence among youth. *Eimeria* sp. are the most common among pregnant women with a prevalence of 57.14%. The species *Eimeria cameli* dominates in adult females with a P (%) = 100%. In females with diarrhea, two dominant species were observed: *Eimeria cameli* and *Nematodirus* sp. with prevalence of 51.43% and 48.57%, respectively. However, it is important to note that these results are preliminary and that this study needs to be further developed and extended over a longer period of time. In order to improve camelina production, it is recommended to control gastrointestinal parasites by mass prophylactic treatments during the period from March to early April.

Keywords: Camelids, Prevalence, Flotation, gastrointestinal parasites.

Etude moléculaire d'*E. granulosus* sensu lato chez le dromadaire (*Camelus dromedarius*) dans l'extrême Sahara Algérien

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Résumé

L'échinococcose kystique est une maladie parasitaire causée par un métacestode appartenant au complexe *Echinococcus granulosus sensu lato (s.l.).* Cette maladie revêt une importance économique et de santé publique considérable. L'échinococcose kystique est endémique aussi bien chez les bétails que chez l'homme dans les pays d'Afrique du Nord, dont l'Algérie. En Algérie, la plupart des études ont été concentrées sur l'estimation des taux de prévalence au niveau des abattoirs, particulièrement chez les ruminants, tandis que, peu d'études ont été rapportées sur le génotypage et la diversité génétique de ce complexe *E. granulosus s.l.* La présente étude a été menée pour estimer la caractérisation moléculaire d'*E. granulosus s.l.* chez le dromadaire (*Camelus dromedarius*) de l'extrême Sahara Algérien, en utilisant deux marqueurs génétiques mitochondriaux récemment développés (gène codant pour NADH déshydrogénase sous-unité 2 et NADH déshydrogénase sous-unité 5), pour une identification fiable des différents génotypes. De Janvier 2017 à Décembre 2020. Au total, 75 kystes hydatiques ont été collectés. Le génotypage a montré la présence d'*E. granulosus sensu stricto* (*s.s.*) (G1, G3) et *E. granulosus s.l.* G6 sur la base des séquences du gène nad5 (649 pb) et les séquences concaténées des deux gènes nad5 et nad2 (total de 1336 pb), respectivement. 11 haplotypes différents (ALG1-ALG11), dont quatre haplotypes (ALG8-ALG11) pour *E. granulosus s.s.* G1, un haplotype (ALG7) pour *E. granulosus s.s.* G3 et six haplotypes (ALG1-ALG6) pour *E. granulosus s.l.* G6 ont été déterminés par l'analyse du réseau phylogénétique. La présente étude rapporte des données épidémiologiques très importantes sur l'échinococcose kystique chez le dromadaire de deux régions de l'extrême Sahara Algérien en ce qui concerne la prévalence, le génotypage et la diversité génétique au sein d'*E. granulosus s.l.* Par conséquent, le dromadaire pourrait jouer un rôle essential dans le maintien du cycle épidémiologique d'*E. granulosus s.l.* dans le désert. La caractérisation moléculaire des échantillons G1, G3 et G6 sur la base du séquençage de génome mitochondrial complet serait d'une importance considérable pour une compréhension plus complète de l'épidémiologie moléculaire de l'échinococcose kystique chez le dromadaire en Algérie.

Mots clés : *Echinococcus granulosus sensu lato*, génotypes, haplotypes, dromadaire, Algérie.

Histopathological study of the dromedary camel after infection with COVID 19

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Abstract

COVID-19 has been detected in camels, particularly dromedary camels, which are susceptible to coronaviruses. Dromedary camels are considered a potential reservoir for coronaviruses, including those related to MERS (Middle East Respiratory Syndrome). Research has shown that camels can be infected with SARS-CoV-2, the virus causing COVID-19, though the precise transmission dynamics remain under study. While there is limited evidence of direct transmission of SARS-CoV-2 from camels to humans, the possibility of zoonotic spillover exists. In our research, we aim to determine the condition of the morphofunctional zones of the spleen's parenchyma when influenced by the antigen of this virus through subcutaneous inoculation of the antigenic product of COVID-19. In this article, we present data on morphological changes in the spleen in dromedaries at the early stages of the coronavirus process. For this purpose, an experiment was conducted on 30 animals. were injected subcutaneously with the human beta coronavirus covid 19 strain at a dose of 0.001 mg/ml. Control animals (n=5) were injected with sterile saline at a dose of 1 ml. The animals were removed from the experiment on the 25th day after infection by decapitation and exsanguinated. A standard method of preparing histological preparations was used for the study. It was found that at the early stages of infection, the pathological process develops dynamically. The development of the inflammation process causes morphofunctional changes in the spleen, which inhibit the immunological and hematopoietic functions of the organ. White pulp hyperplasia is commonly a response to the COVID antigen and inflammation, resulting in an increased lymphocyte count in the spleen. Additionally, there is notable congestion in the red pulp, caused by inflammation and hyperemia in this region.

Keywords: Covid 19, spleen, camel histopathology.

Topic 05

Valorization, hygiene and safety of camel products

Physicochemical characterization and organoleptic evaluation of camel milk marketed in the Timimoun region

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Abstract

Recently, the dromedary has been the subject of several research studies. Given its multiple products, in particular, the emphasis is placed on milk and the dairy industry in a scientific and modern way, given the national production which remains insufficient due to the population growth of the Saharan regions. The objective of this study, conducted on camel milk in the Timimoun region, is to evaluate the organoleptic and physicochemical characteristics of milk produced by dairy camels in the Saharan rangelands of Timimoun. The aim is to demonstrate the interest of camel breeding in providing raw milk for the local population in order to reduce dependence on powdered milk.

12 milk samples were collected from five breeders in the Timimoun region, who took, according to their statements, from 5 breeds (Sahraoui, Targui, Baldiya and Bent N'yagui). The sample collection was carried out during the period from April 30 to May 12, 2024. The analyzes were carried out at the quality control laboratory (CACQE) of the wilaya of Timimoun.

The laboratory study of the analyzed samples allowed us to record an average pH of 6, an electrical conductivity of 6.5 ms/cm, an acidity of 14.6 and a density of 1.03. The rates of fat, lactose, and proteins, dry matter and ash are 4.3%, 4.8%, 3.7%, 11.3% and 0.4% respectively. The organoleptic analysis of the samples studied shows that the studied camel milk is characterized by a white color, a typical odor, a sweet or sour taste and a foreign flavor for all the samples studied.

The results of the physicochemical and biochemical analysis of the samples taken do not reflect any anomaly from the point of view of physicochemical quality. The development of this type of breeding allows an increase in the share of milk collected and marketed in the region.

Keywords: Physico-chemical parameters, camel milk, desert pastures, Timimoun.

Milk production potential assessments: Case of Tergui she-camels in Tamanrasset Region

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Abstract

In order to evaluate the dairy potential of the 'Tergui' camel herd in the Tamanrasset region, and the components of sustainability in the context of arid regions. The study aims to show that the dairy potential of camel breeding constitutes one of the solutions for strengthening the sector. By exploiting the biometric characteristics of the camel udder in relation to milk yield and ecotypes, the evaluation showed that a total of 276 multiparous camels were used to evaluate the morphological change in the udder after milking and to study the evolution of udder characteristics at the beginning (4 months), middle (9 months) and end (18 months) of lactation. Measurements were taken directly before and after milking at each stage of lactation using the AT4 method. On average, front and rear teat length, diameter and distance between teats were 6.87±1.88, 6.09±1.85, 5.43±1.05, 12.62±1.92 cm respectively before milking.
However, there was a significant difference in the length and diameter of the front teats and the distance between the teats before and after milking. Front teat length increased significantly after milking, while diameter and teat distance decreased significantly. Teat depth and teat distance were positively correlated with milk yield and significantly affected ($p<0.05$) by stage of lactation and showed the highest value in mid-lactation: 46.1±4.2, 99.9±5.3, 9.6±1.8 respectively. Teat length and diameter did not change. Total milk yield reached its highest value in mid-lactation. Three udder types were identified: smallest, medium and largest. Teat diameter and distance differed significantly between all ecotypes. Teat length and total milk production showed no difference between the Atlegh and Alemlagh ecotypes. Variability in teat measurements during milking and stage of lactation increase the possibility of selecting good breeders and improving milk production efficiency in the Tergui population.
However, the evaluation showed that milk samples from 60 camels of different breeds (Amelal n=10, Abahou n=10, Amelal n=20 and Atlelagh n=20) were randomly collected from extensive farms to study the effect of breed on some physico-chemical components of camel milk. Milk yield, specific gravity, acidity, fat content (FC), solids-non-fat (SNF) and protein were affected by breed ($P<0.05$). Significant differences ($P<0.05$) between breed types were recorded for milk yield, fat, lactose, SNF and protein.
The results showed a strong positive correlation ($P<0.01$) for density, fat, SNF, lactose and protein. But between fat and lactose, fat and protein were positively correlated ($P<0.05$). Conductivity was highly significantly negatively correlated ($P<0.01$). The study concludes that the breed has physico-chemical components in camel milk and that there is a significant effect on some of the breeds.

Keywords: Camel, lactation stage, Mahri, Marrouki, Milk yield, Hoggar.

Innovative functional Merguez made with Spirulina platensis as a natural additive using camel meat

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Abstract

Taking into account that many advantages have been associated with the consumption of spirulina (microalgae) and clean label animal origin products such as camel meat, our work aimed to examine the effect of Spirulina (*Spirulina platensis*) integration in artisanal Algerian *Merguez*-type sausages made with camel meat exclusively as raw material and to assess their nutritional, physicochemical, microbiological and sensorial quality attributes. We developed fresh Merguez-type sausages. The idea was to offer an innovative meat product to increase camel consumption.

Two final formulations, a control sausage and innovative product version using spirulina, were developed through an iterative process and stored in vacuum conditions under refrigeration (1 ± 1° C). The following parameters were analyzed for spirulina: ash, crude protein, moisture, lipid content, total phenolic compounds, and total carbohydrates. The obtained sausages were investigated in terms of proximate composition as well as sensory (exterior appearance, color in section, odor intensity and overall acceptability), microbiological (Total aerobic psychrotrophs, *Brochothrix thermosphacta* and Lactic acid bacteria) and physicochemical (pH, TBA-RS, TVB-N, moisture binding capacity and cooking loss) carried out on days 1, 5, 10, 15, 20, 25, 30 and 35 after packaging and the shelf-life of the packaged sausages was also determined according to a multivariate criterion.

The shelf-life was significantly extended for treated samples, concluding that the multivariate method was a powerful technique as microbiological, physicochemical, and sensory criteria were considered.

Camel sausage research can thus contribute to the creation of innovative products that will meet the health and development needs of the populations of southern Algeria, while contributing to the sustainable development of Saharan regions. In addition, this article supports the idea of incorporating spirulina into the meat sector, both from a nutritional and health point of view, as it offers numerous advantages.

Keywords: *Spirulina platensis*, Camel Merguez-type sausages, vacuum storage, quality attributes, shelf-life.

Investigating Campylobacter and *Staphylococcus aureus* in Camel Meat and Feces: Prevalence, Isolation, and Antimicrobial Resistance in Southern Algeria

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Abstract

Camels are vital to local agriculture and culture in southern Algeria, serving as essential resources for many communities. Understanding the dynamics of foodborne diseases associated with these animals is crucial for public health and food safety. Therefore, this study aimed to investigate the role of camels as potential sources of various foodborne pathogens and to determine their antibiotic resistance profiles. To achieve this, fifty healthy-appearance camels were admitted to the slaughterhouses of Ouargla, Tindouf, and Ghardaïa in southern Algeria this study was conducted from June 2022 to June 2024.
Two different samples were collected from each camel, including fresh feces and raw meat. These specimens were processed to detect various foodborne pathogens using standard bacteriological techniques. Additionally, antimicrobial susceptibility testing was conducted using the disc diffusion method, following the recommendations of CASFM, 2022.
The occurrence of Campylobacter in feces and raw meat was 16% (8/50) and 20% (10/50), respectively, with the most common being *C. jejuni* (10%), followed by *C. coli* (4%) and *C. lari* (2%). The respective samples showed typical colonies of *S. aureus* at 12% and 24%, resulting in an overall prevalence of 18%. Regarding the antibiogram results, all strains of *Campylobacter* exhibited resistance to enrofloxacin and erythromycin. However, all recovered strains of *Staphylococcus aureus* were found to be susceptible to enrofloxacin.
In conclusion, the high levels of pathogenic and indicator bacteria in raw camel meat suggest unhygienic conditions at the abattoir. The study revealed a significant prevalence of multidrug-resistant *Campylobacter* and *Staphylococcus* species in camel meat and feces, posing a potential threat to human health and limiting therapeutic options.

Keywords: Abattoir, *Camelus dromedarius*, Raw meat, feces, *Campylobacter, Staphylococcus*, Algeria.

Exploring the Protein Profile of Camel Milk from El Abiodh Sidi Cheikh region, El Bayadh

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Abstract

Camel milk has garnered significant attention due to its unique antimicrobial properties and distinct protein profile compared to bovine and human milk. This study aimed to quantify and characterize the protein fractions in camel milk sourced from the El Abiodh Sidi Cheikh region of El Bayadh, Algeria.

We employed a multistep fractionation process to isolate casein and whey proteins, followed by advanced analytical techniques for quantification and compositional analysis. Milk samples underwent initial skimming, followed by acid precipitation of casein at pH 4.6 and subsequent pH normalization to 6.8. Whey proteins were precipitated using 45% ammonium sulfate, with the remaining proteins isolated at 80% saturation. Protein quantification was performed using the Bradford assay, while SDS-PAGE (12%) was utilized for the compositional characterization of the isolated fractions.

The Bradford assay indicated a protein concentration of 3.97 mg/ml in our sample. Based on the literature and the molecular weights of the detected bands, the major identified components include α-lactalbumin (13–14 kDa), α-casein and β-casein (~30 kDa), lactoferrin (~80 kDa), lactoperoxidase (~78 kDa), lysozyme (13–14 kDa), and camel serum albumin (>60 kDa). Our findings corroborate and extend previous research on camel milk, demonstrating the consistency of protein composition across different geographical regions.

This study provides camel milk's first comprehensive protein profile from the El Abiodh Sidi Cheikh region, contributing to the growing body of knowledge on camel milk composition. Our results validate the reliability of previous findings and establish a foundation for future research into nutritional value, therapeutic applications, and potential commercialization of camel milk products from this specific region.

Keywords: Camel milk, Characterization, Bradford assay, SDS-PAGE, Protein.

Dromedary meat: future prospects and potential

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Abstract

Algeria has a dromedary population of more than 416,000 head, and while its contribution to national red meat production remains marginal, it plays a more significant role at the regional level. This study aims to provide an overview of camel meat production and consumption, along with a detailed analysis of the quality attributes of Sahraoui dromedary meat. The findings indicate promising potential for camel meat to contribute to national food security. However, improvements in breeding, management, and product valorization are necessary to fully unlock this potential.

The sensory quality of dromedary meat is strongly influenced by the age at slaughter, a factor that is closely related to the biochemical composition and characteristics of the muscle tissue. Camel meat from younger animals was found to undergo a slower acidification process during the post-mortem period, which in turn leads to greater myofibrillar fragmentation over time. This biochemical progression results in meat with a lower shear force, indicating softer muscle fibers and, consequently, increased tenderness. These factors combine to improve the overall sensory experience, leading to higher levels of consumer satisfaction in terms of taste and texture.

Among the most significant biomarkers identified in this study for assessing dromedary meat quality are the pH value measured withing the six hours post slaughter, the myofibrillar fragmentation index, and specific protein fragments such as actin and troponin T. These biomarkers were found to be positively correlated with desirable attributes like tenderness, juiciness, flavor, and the overall acceptance of the meat. By integrating these biomarkers into carcass quality assessment, it would be possible to more accurately classify and grade dromedary carcasses, thus ensuring that consumers consistently receive high-quality products.

Additionally, Expanding meat production, optimizing quality control, channeling lower-quality cuts into processed products, and diversifying camel-based offerings would significantly enhance consumer perception and demand for dromedary meat among Algerians.

Keywords: Dromedary, meat, biomarkers, consumption, Algeria.

Poster abstracts

Topic 01 : Breeding systems and welfare

Etude des caractères zootechniques de l'élevage camelin dans la wilaya de MEGHAIER

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Abstract

Le dromadaire est un animal sobre, rustique ; pour cela il est considéré comme le mieux adapté au milieu aride où les conditions de vie sont extrêmement difficiles. L'objectif de notre étude est de déterminer la conduite de l'élevage camelin et son évolution, les races, l'alimentation, la reproduction et la production du dromadaire dans la région de la wilaya de D'El MEGHAIER. La méthodologie utilisée était basée sur une enquête de terrain à l'aide de questionnaires visant la caractérisation zootechnique de l'élevage camelin sur un échantillon de 20 éleveurs pour une période allant du mars 2024 jusqu'à avril 2024.
Les résultats de notre travail ont révélé que la taille du troupeau est variable. Nous avons distingué trois classes. Classe moins de 30 têtes où les troupeaux appartiennent aux éleveurs eux-mêmes ; Classe de 30 à 99 têtes où les troupeaux appartiennent aux éleveurs eux-mêmes et des éleveurs qui s'associent avec des commerçants ou associés avec le gros propriétaire ; Classe supérieur à 100 têtes où les troupeaux appartiennent aux éleveurs eux-mêmes ou associés avec le gros propriétaire. Les races identifiées sont *Sahraoui, Reguibi, Chaambi* et *Ouled sid cheikh*.
L'alimentation des troupeaux est basée essentiellement sur l'exploitation des parcours naturels, en extensif durant toute l'année et composée des plantes appréciées par le dromadaire. La reproduction a eu lieu en Hiver entre décembre et janvier, sans préparation spéciale en raison d''un chamelon par année. De nombreux paramètres de la reproduction ont été traités. Concernant la lactation, elle varie de 6 à 18 mois, le sevrage se fait entre 8 à 24 mois.
Enfin, l'ensemble des résultats obtenus sur du dromadaire nous a permis d'estimer que cet animal, comparativement aux autres espèces d'élevages, présente un impact écologique positif.

Mots-clés : Élevage camelin, reproduction, parcours, zone aride.

The Lifeline of the Sahara : Breeding and Welfare of Algerian camels

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Abstract

This poster examines camel production and animal welfare in the Algerian context, focusing on the role of camels in the Saharan area from cultural, environmental, and economic perspectives. Camels, also known as the 'desert ships,' play a crucial role in the livelihoods of both nomadic Bedouin tribes and sedentary societies, providing essential resources such as transportation, milk, meat, and wool. Their adaptability to extreme environments makes them indispensable for life in the inhospitable desert regions of Algeria.

In the post-breeding period, ensuring the welfare of these animals becomes essential. This involves a wide range of considerations, including health care, proper feeding, and adequate housing. The regular involvement of trained veterinarians and consistent access to suitable food sources are critical for maintaining the well-being of camels, particularly in the face of shifting climatic conditions. Ecological challenges such as drought, habitat degradation, and global warming pose significant threats, requiring sustainable and proactive strategies.

This poster explores how traditional practices in camel breeding can be preserved while integrating new methods through the collaborative efforts of local communities, scientists, and policymakers. By blending tradition with innovation, these stakeholders aim to develop sustainable breeding systems that align with both animal welfare and ecological concerns. Such strategies not only support camel populations but also promote long-term environmental and economic stability in Algeria.

Keywords: Camels, Breeding Systems, Welfare, Algeria, Challenges, Sustainability.

Évaluation des pratiques d'élevage et de la santé des dromadaires dans la région d'Illizi

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Résumé

Le dromadaire se caractérise par sa capacité d'adaptation aux conditions extrêmes du Sahara, lui permettant de survivre, de se reproduire et de produire dans cet environnement hostile. En tant qu'animal domestique, il joue un rôle dans la valorisation des vastes étendues sahariennes, constituant une ressource vitale pour les populations des zones désertiques. Cette étude a pour objectif d'analyser les pratiques d'élevage et l'état sanitaire des dromadaires dans la région d'Illizi. Une enquête, réalisée auprès de 13 éleveurs et 10 vétérinaires, a porté sur un cheptel camelin estimé à 2 985 têtes, réparties à travers la wilaya d'Illizi. Il a été observé que les systèmes d'élevage nomade et semi-nomade limitent les améliorations des pratiques reproductives, avec un taux de fertilité moyen de 50 %. La durée moyenne de lactation est de 15 mois, pouvant atteindre 18 mois en cas de sevrage tardif. Sur le plan sanitaire, les principales pathologies rencontrées sont la gale (77 %), les tiques (69 %) et la trypanosomose (38 %).
Le taux de mortalité est plus élevé chez les jeunes (30 %) que chez les adultes (5 %).
En outre, 46 % des éleveurs recourent à l'automédication avec des produits traditionnels. Pour améliorer les performances de reproduction et la santé des dromadaires, il est crucial de garantir une alimentation adéquate tout au long de l'année, de mettre en place des programmes de déparasitage adaptés, et de sensibiliser les éleveurs aux meilleures pratiques de reproduction et de biosécurité.

Mots-clés : Elevage, production, dromadaire, santé animale, pathologies, parasitoses, pratiques d'élevage, région d'Illizi.

Etude des races Camelines les plus rencontrées en Algérie

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Résumé

Le Camelin est un animal domestique, au même titre que d'autres animaux d'élevage (ovin, caprin, équin…) et l'espèce d'élevage la plus adaptée à la valorisation des grands espaces sahariens. Il est considéré comme une ressource animale inestimable pour les habitants désertiques grâce à ses productions. Pour cela, notre étude est basée sur l'étude des races camelines les plus rencontrées en Algérie.
Notre travail est basé sur une synthèse bibliographique en collectant ses informations à travers des articles scientifiques publiés sur ce contexte. En effet, deux populations sont les plus représentées en Algérie exactement dans la région sud : la Targui et la Sahraoui, ce qui justifie le choix de ces deux populations. La population « Sahraoui » qui représente un excellent animal de travail pour la production de viande et de poils. Certaines femelles sont de très bonnes laitières. Son aire de répartition s'étend du grand Erg occidental au centre du Sahara.
Il y'a également la population « Targui » qui représente un animal de course par excellence (méhari). C'est un animal haut sur pattes, élancé, avec une robe grise à poils très courts et fins. C'est le dromadaire des Touaregs du Nord, localisé au Sahara central, au Hoggar et à l'extrême Sud algérien (Tamanrasset). On peut également le rencontrer un peu plus au nord, recherché comme reproducteur et comme animal de course.
En conclusion, Il convient donc à l'ensemble des acteurs du monde agricole saharien, aux politiques comme aux producteurs, aux développeurs comme aux scientifiques, d'associer leurs efforts pour contribuer au maintien et au développement des races camelines en Algérie et de favoriser le maintien d'un tissu rural, et d'une activité économique dans les zones à tort réputées improductives du Sahara.

Mots clés : Dromadaire, races, Sahraoui, Targui, Algérie.

Effect of lairage conditions on the pH of meat from dromedary camel "*Camelus dromedarius*" reared in the Oued Souf region

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Résumé

Animals destined for meat production are generally exposed to stressful conditions prior to slaughter, such as handling, stocking densities, fasting and lairage, which affect their welfare and meat quality (Barka et al., 2016). The aim of our work is to examine the various correlations that exist between the animal's physiological parameters and muscle pH, and their relationship with meat quality.

At the municipal slaughterhouse in the province of Oued Souf in Algeria, eight male dromedaries from the Sahraoui population aged from 12 to 18 months were stabled for more than 48 hours before slaughter. Blood was collected by jugular vein puncture into dry EDTA tubes for measurement of cortisol levels (Corti), creatine phospho kinase (CPK) and blood glucose (Gm). Heart rate (HR) and rectal body temperature (RT) were also measured. A part of the *Longissimus Lumborum* (LL) muscle was removed after 24 hours postmortem for pH measurement. Pearson correlation analysis was carried out with XLSTAT, 2021. $P < 0.05$ was considered statistically significant.

Data analysis of physiological parameters measured on the animals showed: Corti = 127.40 ± 93.9 ng/mL, CPK = 142.70 ± 51.1 Ul/L, Gm = 1.25 ± 0.332 g/L, TR= 38.22 ± 0.597°C and HR = 60 ± 7.53 beats/min. In addition, the muscle revealed a pH = 5.95 ± 0.086. Blood glucose was positively correlated with rectal temperature (r= 0.78) and heart rate (r= 0.86) ($P < 0.05$). pH showed a positive correlation with cortesolemia (r= 0.82) and a negative correlation with creatine phospho kinase (r=-0.56) ($P < 0.05$).

An interesting relationship between the animal's cortesolemia and the post-mortem pH of "*Longissimus Lumborum*" muscle was observed, which may serve as a good predictor of Sahraoui dromedary camel meat quality and merits further research into the control of pre-slaughter physical and/or physiological stress levels.

Keywords: Dromedary, Sahraoui, Lairage, Stress, Meat.

Camel breeding in Algeria: a heritage to preserve and a resource to enhance

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Abstract

Camel breeding plays a pivotal role in Algeria's economy and culture, particularly in the vast Saharan regions. Dromedaries, often called "ships of the desert," are indispensable for transportation and resource acquisition. The Algerian camel population, estimated at around 400,000, comprises dromedaries, species uniquely adapted to the harsh desert conditions. These camels are valued for their milk, meat, and leather, which significantly contribute to local livelihoods and cultural practices.

Algeria boasts a diverse camel breed landscape, each breed tailored to specific environments and purposes. The Targui, associated with the Tuareg people, is renowned for its endurance and load-carrying capacity, producing substantial amounts of milk. The Chaâmbi, though smaller, is well-suited to the extreme desert conditions. Other breeds, such as the Ouled Nail, Méhari, and Sahraoui, also contribute to milk and meat production and are integral to cultural events like camel races.

Camel breeding supports nomadic and semi-nomadic communities by providing a reliable source of income through nutrient-rich camel milk and high-protein meat. Despite the challenges of climate change and desertification, dromedaries remain resilient due to their adaptability to drought and sparse vegetation. However, the erosion of traditional knowledge due to modernization threatens sustainable management practices.

The camel value chain in Algeria extends from breeding and production to marketing and distribution. Key stages include breed selection, animal health management, milk and meat production, and product promotion in both local and international markets. Supporting herders through training and infrastructure development is crucial for the sustainability of the industry.

Addressing the challenges facing camel breeding requires a multifaceted approach. This includes enhancing infrastructure, such as water points and markets, providing comprehensive training for breeders, and promoting camel products on a national and international scale. By integrating traditional knowledge with modern techniques, camel breeding can thrive, bolstering local economies and ensuring food security in harsh environments.

Keywords: Camel breeding; value chain; Saharan economy; camel milk and meat; sustainable development.

Topic 02 : Nutrition and diet

Contribution to the floristic study of camel routes in the Tademaït plateau Algerian sahara

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Abstract

The dromedary, essential in arid regions, adapts remarkably well to hostile environments. This study analyzes its ecological role in the Saharan pastoral spaces of Algeria, particularly its feeding behavior on the Tademaït plateau.
Floristic inventories were conducted at three Plateau sites: Labiode, Oued Talh, and Oued In Belbel. Vegetation surveys were carried out during flood and low-water periods, assessing coverage, density, and spatial distribution for each plant species.
The results reveal seasonal floristic diversity in the pastures, including both perennial and ephemeral species. The dromedary travels between 20 and 50 km daily, optimizing resource use and promoting biodiversity through the dissemination of seeds via its feces. Overall, its feeding behaviors have a positive ecological impact on the Saharan pastures.
The Tademaït plateau is a vast flat and stony expanse located in the southwest of Algeria, bordered by the Grand Erg Oriental and Occidental. This hyper-arid climate, with less than 50 mm of annual precipitation, features tabular reliefs and a network of dry valleys. The vegetation is sparse, comprising resilient species such as perennial grasses and thorny shrubs.
In conclusion, while the vegetation of the Tademaït plateau adapts to drought, it remains vulnerable to human activities such as overgrazing and wood collection. These pressures, combined with the effects of climate change, threaten local ecosystems. Therefore, sustainable management measures are essential to preserve this biodiversity, which is a key indicator of the desert identity of the Algerian Sahara. The study also highlights the importance of research and monitoring to ensure conservation and develop management and restoration strategies at the regional level.

Keywords: Tademaït Plateau, camels, vegetation.

Etude sur l'alimentation du dromadaire

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Résumé

Le Dromadaire est d'une grande importance dans l'économie locale grâce à ses performances de production avérées et ses utilisations citées auparavant. Ces performances chez le dromadaire comme chez toute autre espèce dépendent étroitement de l'alimentation. Pour cela notre étude est basée sur l'alimentation du dromadaire.
L'évaluation des besoins nutritionnels chez le dromadaire est déduite des normes établies pour les ruminants. Il est rapporté que le métabolisme de base et les besoins d'entretien n'ont pas étaient suffisamment étudiés dans le cas du dromadaire. Les besoins nutritionnels chez le dromadaire augmentent grâce à son mode de pâturage ambulatoire où les déplacements sont inévitables. Pour ses préférences alimentaires : le dromadaire est connu par sa capacité à consommer des types d'aliments rejetés par les autres ruminants, il consomme des espèces très variées sur le plan botanique comme sur le plan chimique mais les plus appréciées sont celles assez riches en azote et en énergie et en fibres, par exemple : *Acacia* et *Ephedra alata*. En Algérie leur alimentation se compose principalement de : végétation locale (herbes et buissons), foin et fourrages, et des pâturages saisonniers. L'alimentation du dromadaire est un sujet fascinant de l'adaptation à des environnements arides. Grâce à sa capacité à consommer une grande variété de végétaux, y compris des plantes épineuses et sèches et à son système digestif efficace, le dromadaire a pu tirer profit de ressources alimentaires qui restent limitées.
Enfin, la compréhension de son régime alimentaire est non seulement essentielle pour la conservation de cette espèce, mais elle a aussi un rôle crucial dans les économies locales.

Mots clés : Dromadaire, alimentation, performances.

L'impact des plantes médicinales sur la nutrition et la production laitière des chameaux

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Abstract

Les plantes médicinales ont un rôle important dans l'amélioration de la nutrition animale, notamment chez les chameaux qui vivent dans des environnements arides et désertiques. Ces plantes apportent des nutriments essentiels et offrent des propriétés thérapeutiques favorisant la santé des animaux. L'objectif de cette étude est d'analyser l'impact des plantes médicinales sur la santé des chameaux et sur la production laitière, notamment le lait de chamelle, reconnu pour ses vertus nutritives et médicinales.

L'étude a consisté à nourrir un groupe de chamelles avec des plantes médicinales comme l'armoise et le fenugrec pendant une période de six mois. Les indicateurs étudiés comprenaient la digestion, l'état immunitaire, la production laitière et la qualité du lait. Un groupe témoin a été nourri sans ces plantes pour comparaison. Les paramètres de santé, de lactation et la présence de parasites ont été suivis et analysés.

Les chameaux nourris avec des plantes médicinales ont montré une amélioration significative de leur digestion et de leur immunité, ainsi qu'une réduction de l'infestation parasitaire. En termes de production, les chamelles du groupe expérimental ont produit plus de lait, avec une teneur accrue en protéines et en composés bioactifs bénéfiques. Le lait de chamelle obtenu présentait également des propriétés antioxydantes améliorées, soulignant l'effet positif des plantes médicinales sur sa qualité.

L'intégration des plantes médicinales dans l'alimentation des chameaux contribue à améliorer leur santé, augmenter leur production laitière et enrichir la qualité du lait de chamelle. Ces résultats mettent en lumière l'importance d'adopter cette pratique dans les régions désertiques pour améliorer la productivité et la durabilité des systèmes d'élevage. Les plantes médicinales offrent une solution écologique pour renforcer la résilience des chameaux face à des conditions environnementales difficiles.

Mots-clés : Plantes médicinales, nutrition animale, chameaux, santé animale, production laitière.

Topic 03 : Genetics and reproduction

Biotechnologies in camel reproduction: benefits and challenges

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Abstract

Camel breeding biotechnologies are advanced techniques to improve camel reproduction, such as artificial insemination, in vitro fertilization, embryo transfer, and sperm and embryo cryopreservation. They increase herd productivity, preserve genetic diversity, and facilitate the introduction of desirable new characteristics. These biotechnologies have certain limitations, particularly in terms of cost, complexity, and accessibility for camel breeders. These require specialized equipment and technical expertise, which may limit their use in rural areas where camel breeding is predominant.

Previous studies have shown that several factors can influence the success of artificial insemination in camels, mainly the gelatinous form of the dromedary ejaculate. This form requires liquefaction, which is one of the constraints of sperm preservation, and one that can challenge logistics and long-term storage.

Despite these challenges, it is clear that camel breeding biotechnologies offer considerable potential for improving camel breeding. By continuing to study and develop these techniques, it is possible to optimize their use to contribute to the sustainability and productivity of camel herds while preserving the genetic diversity of this species.

Ultimately, these technological advances offer promising prospects for the future of camel breeding. In this study, we can discuss briefly the applications and the areas where reproductive biotechnology is at the utmost level of importance in camel breeding and genetic improvement.

Keywords: Biotechnology, dromedary camel, cryopreservation, sperm.

Dominantes pathologiques de l'appareil génital de la chamelle et analyse de la fonction sexuelle chez le chameau par mensuration testiculaire au niveau de l'abattoir d'EL-OUED

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Résumé

Le dromadaire représenté par plus de 250 000 chamelles, fait l'objet d'une attention particulière ces dernières années de la part des autorités algériennes, en vue de sa meilleure connaissance, de sa sauvegarde et de son développement. Cependant, la maitrise de sa reproduction que ce soit à des fins zootechniques ou thérapeutiques, constitue un vrai challenge pour l'éleveur et le vétérinaire. L'objectif de cette étude était de screener les différentes anomalies de l'appareil génital chez le dromadaire (mâle et femelle) rencontrées au niveau de l'abattoir d'EL-OUED. Un total de 32 appareils génitaux des chamelles et 15 testicules de dromadaires de différents âges ont été inspectés et mesurés à l'aide de pied-à-coulisse. Les résultats obtenus montrent une fréquence élevée de femelles gestantes réformées (18,75%). Les affections ovariennes observées sont représentées principalement par l'hydro-bursite (9,37%), kystes ovariens (6,25%), atrophie ovarien (3,12%), suspicion de tumeur (3,12%). Le pourcentage des affections utérines est de (6,25%) représentées par du pyromètre (3,12%) et la rétention placentaire (3,12%). Chez le mâle, aucune anomalie macroscopique n'a été enregistrée. Les moyennes des mensurations testiculaires sont respectivement de 8,12±1,80 cm ; 4,14±1,00 cm ; 12,11 cm, 87,35±41,06. 88,50±41,58 gr pour la longueur testiculaire, la largeur testiculaire, la circonférence testiculaire, le volume testiculaire et le poids testiculaire. Ces paramètres testiculaires évoluent avec l'âge ; toutefois, la variation la plus élevée est constatée chez les mâles âgés de 4 ans et de 7 ans. En conclusion, il a été montré que les femelles sont plus susceptibles d'avoir une anomalie au niveau du tractus génital par rapport aux mâles et que l'étude des infertilités chez le dromadaire devrait se focaliser principalement que chez la femelle.

Mots Clés : Tractus génital, Testicules, Dominantes pathologiques, Abattoir, Dromadaire.

Étude comparative ostéo-crâniométrique des chamelles Sahraoui et Targui (*Camelus dromedarius*, L., 1758) dans le sud-est Algérien

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Résumé

Ce travail qui se propose de réaliser une première approche ostéo-crâniométrique chez le dromadaire dans le Sahara septentrional algérien, en vue de voir s'il existe une différence entre les mesures crâniennes sur des chamelles de la population Sharaoui et Targui.
L'étude a été réalisée sur un échantillon de 20 crânes de chamelles adultes (plus de10 ans) destinées à la boucherie.
Cinquante (50) mesures linéaires proposées par A. von den Driech (1976) : 35 pour le crâne et 15 pour la mandibule, partitionnées en longueurs, largeurs et hauteurs du crâne ont été retenues pour l'étude.
Une analyse en composante principale ACP a été également utilisée.
Les résultats de cette analyse ont montré une qualité de présentation inférieure à 50% ce qui signifie qu'il n'y a pas une grande différence entre les crânes des femelles adultes, le premier axe de l'ACP note 33.18% de l'inertie totale tandis que le deuxième axe présente 12.01%.
En continuité avec cette thématique, les mesures effectuées sur les crânes des mâles adultes et jeunes-adultes donnent des résultats prometteurs.

Mots-clés : Crâne, *Camelus dromedarius*, Sahraoui, Targui, ostéométrie, Algérie.

Effect of zone and age on the morphological characteristics of the 'Sahrawi' breed in the northern Algerian Sahara

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Abstract

The characterization of Algerian camel populations by morphological characterization is the first step towards the management and preservation of this important resource. It is with this in mind that this study was conducted on dromedaries of the Sahrawi population, selected in three regions of Algeria (Ouargla, El Oued and Ghardaïa). The objective was to improve the management of dromedary herds by studying regional phenotypic and genetic variations. Thirteen body measurements were carried out on a sample of 150 adult dromedaries (27 males and 123 females). Body measurements were taken using a 2.5 m height rod and a 5 m retractable tape measure. Measurements included: Height at withers (HW), Chest girth (CG), Length of hind limbs (LHL), Height at hump (HH), Body length (BL), Tail length (TL), Neck length (NL), Neck girth (NG), Upper head length (UHL), Down head length (DHL), Head girth (HG), Ear length (EL), Thigh girth (TG). Body weight was estimated using a barometric formula. The results show that dromedaries (male and female) from the Ouargla region, especially those of "Hamra" color and middle to old age, tend to have the largest body measurements and often a higher weight. In contrast, male dromedaries from the El Oued region aged 6 to 14 years, have the lowest values for various body measurements. This observation highlights the influence of age and region of origin on the morphological characteristics of dromedaries. These valuable results can be significantly exploited to optimize the selection and management practices of dromedary herds by taking into account regional factors, age and genetic characteristics.

Keywords: Morphological characters, Sahrawi breed, northern Algeria Sahara.

Camel male's testosterone profiling

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Abstract

Camel bull testosterone profiling has witnessed increased attention in recent years due to its implications in the breeding management, reproductive performance, and animal health. This study reviews recent advances in understanding testosterone dynamics in dromedary and Bactrian camels, highlighting variations across age, season, and physiological statesand also the fluctuations of the camel's testosterone due to the climatic change. Recent studies have demonstrated that testosterone levels in camel bulls exhibit significant seasonal fluctuations, with peak concentrations observed during the breeding season (average 5-10 ng/mL) compared to lower levels in the non-breeding season (1-3 ng/mL). Age also plays a critical role, with younger bulls exhibiting lower testosterone levels, which increase substantially as they reach sexual maturity around 3-4 years of age, reflecting both endocrine changes and behavioral caracterestics not to forget the major role of the testosterone in muscle building; erectile function and the libido of the camel bull.
Furthermore, advancements in analytical techniques, such as liquid chromatography-tandem mass spectrometry, have enhanced the accuracy of hormone quantification. The role of testosterone in influencing behaviors such as aggression and libido has been elucidated, providing insights into the importance of the selection of mating bulls that have a huge impact on the female fertility This review synthesizes findings from the past decade, emphasizing the need for standardized protocols in testosterone profiling and male selection in order to enhance camel reproductivity.

Keywords: Camel, reproduction, testosterone.

Dimorphisme sexuel des métapodes de dromadaires (*Camelus dromedarius*, L., 1758) : Cas de la population Algérienne Reguibi

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Résumé

Cette étude porte sur l'analyse statistique du dimorphisme sexuel chez le dromadaire. Les variables ostéométriques linéaires des os canons (métacarpes et métatarses) sont étudiées chez une population Algérienne : la Reguibi. Un échantillon de 40 métapodes gauches de dromadaires adultes a été constitué (20 métacarpes et 20 métatarses). Pour chaque animal, le poids de carcasse, l'âge et le sexe ont été notés. Une fois préparé par cuisson, chaque os a été mesuré (7 mesures linéaires) et les indices de gracilité de l'extrémité proximale et de la diaphyse ont été calculés.
Les résultats de ce travail reposent sur un échantillon de 10 mâles de 11 à 15 ans et dont le poids de carcasse varie de 268 à 542 kg et de 10 femelles de 11 à 15 ans et dont le poids de carcasse varie de 195 à 305 kg. La gracilité des métacarpes adultes est relativement importante avec des indices de la diaphyse faibles de l'ordre de 10,6% pour les mâles et de 9,9% pour les femelles. Le dimorphisme sexuel est bien marqué et l'ostéométrie des métapodes permet de sexer l'échantillon sans trop de problème. Les paramètres de largeur et d'épaisseur, ainsi que les indices, sont bien corrélés au poids de carcasse, ce qui permet d'estimer la masse des individus à partir de dimensions osseuses.

Mots-clés : Dimorphisme sexuel, ostéométrie, métacarpe, dromadaire, population Reguibi, Algérie.

The development of the thymus during the neonatal phase of ontogenesis in the dromedary of southern Algeria

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Abstract

The thymus, a central organ of the immune system, is responsible for immunogenesis, as well as lymphocyte proliferation and differentiation. During embryogenesis, the thymus develops earlier than other peripheral immune organs. In dromedaries, its formation occurs in the early stages of embryonic development (15-20 days), influenced by life periodization and critical ontogenesis phases. At birth, the thymus is already fully formed and functional. Advances in immunology have greatly expanded our knowledge of the morphofunctional patterns of immune system organs. Yet, many aspects, particularly the thymus structure, remain under-researched, especially in productive animals across various species and breeds. The study, conducted at the Department of Veterinary Sciences, Taoura University of Souk Ahras, used five Targui breed dromedary fetuses, aged 5-7 months of intrauterine development, averaging 60.0 kg in weight. The research aimed to identify the macroscopic and microscopic morphological patterns of the dromedary fetal thymus during prenatal ontogenesis and gather morphometric data. Findings revealed the thymus starts at the thirteenth tracheal ring, extend to the third rib, and comprise three lobes: cervical, middle, and thoracic. The cervical lobe surpasses the others in all linear measurements, except for the thoracic lobe's width. The growth rates of the cervical and thoracic lobes are not synchronous.

Keywords: Thymus, lobe, camel, fetus, ontogenesis.

Particularités anatomiques du Dromadaire

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Résumé

Le dromadaire est consiéré comme un animal très important dans les régions désertiques du monde en raison de sa capacité de supporter les conditions très dures de même qu'il constitue une composante de l'écosystème désertique. Très peu de travaux sont réalisés sur le dromadaire, pour cela notre étude est basée sur ces particularités anatomiques.
Ces derniers sont comme suit : Digitigrade ; Présence de canines ; les narines se ferment hermétiquement en cas de vent de sable. Les sinus du nez sont amples et profonds ; de grandes paupières équipées de longs cils protégeant les yeux du sable ; Pharynx descend très bas dans le cou, Œsophage long et ne se rétrécit pas, calibre équivalent à celui de la trachée ; Estomac à 3 compartiments: Rumen, Réseau, et un troisième avec une forme intestinale comprenant le feuillet (omasum) et la caillette (abomasum), difficile à distinguer par leur aspect macroscopique ; Absence de vésicule biliaire, rate plus grande ; Présence d'un os du diaphragme ; Une seule paire de mamelles ; Absence de cornes ; Grand os du cœur ; Reins avec surface unie ; 12 vertèbres thoraciques ; 7 vertèbres lombaires ; 16 à 18 vertèbres coccygiennes, queue courte ; Utérus bifide (en T ou Y)et asymétrique , corne gauche plus longue, La gestation a toujours lieu dans la corne gauche ; Placenta diffus, Poumons non lobés
L'évolution du dromadaire dans les milieux difficiles tient en partie à l'anatomie et à la physiologie de son système. Ces particularités découlent de différences anatomiques notables par rapport aux ruminants.

Mots clés : Particularités, anatomie, Dromadaire.

Overcoming Challenges in Camel Semen Cryopreservation: Advances and Optimization Strategies

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Abstract

Artificial insemination (AI) using cryopreserved semen is the most widely used reproductive biotechnology, it has enabled rapid genetic advancements in cattle, whereas it has experienced much slower progress in camel due to difficulties posed by the collection of semen, long copulation time, transcervical pipette passage, induced nature of ovulation, and semen characteristics, including high viscosity and low sperm concentration. The aim of this study was to synthesize key findings from recent research on camel semen cryopreservation techniques, and identify the main challenges in order to optimize freezing protocols and improve post-thaw sperm viability and fertility outcomes.
A thorough literature review was carried out from the "Science Direct" database.
The findings revealed that Current advancements, such as enzymatic treatments to reduce semen viscosity and the use of novel antioxidants to reduce cryodamage, could offer new perspectives in camel semen cryopreservation and AI and the implementation of these more reliable reproductive technologies, could result in significant improvements in productivity, allowing access to elite male genetics and better control of sexually transmitted diseases. However, the application of these biotechnologies needs to involve specialized professional roles. Additionally, the review addresses the impact of these techniques on sperm motility, acrosome integrity, and overall conception rate.
Understanding these factors is essential for developing effective cryopreservation protocols that support both breeding programs and conservation efforts. Future research should focus on refining these methods to enhance reproductive success in camels.

Keywords : Semen, camel, cryopreservation, artificial insemination.

Topic 04: Diseases and prevention

Les dominantes pathologies du dromadaire dans le sud-ouest Algérien (Etude bibliographique)

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Résumé

Le dromadaire (*Camelus dromedarius*) ou chameau d'Arabie ; espèce de chameau de la famille des camélidés est un animal sobre et rustique d'où sa résistance et survie dans les milieux arides où les conditions de vie sont extrêmement difficiles.
En Algérie, le dromadaire a toujours fait partie prenante du paysage socio- économique du Sud, qu'il soit désertique ou steppique. En effet, en plus de l'utilisation classique à des fins de production (lait, viande, cuir, et poil), le dromadaire joue un rôle capital comme animal de bât ou de travail. C'est aussi un animal de selle, et à ce titre, il représente un auxiliaire important pour l'utilisation et la valorisation des espaces et de la flore désertique ou semi-désertique. Malgré cette importance économique et sociale, peu du travail sur la biochimie, l'anatomie, la zootechnie, la physiologie et la pathologie de cet animal ont été réalisés en Algérie, Pour cela nous avons opté pour une synthèse bibliographique sur les principales pathologies infectieuses pouvant affecter le Dromadaire.
Il existe plusieurs maladies décrites par plusieurs scientifiques, ces atteintes peuvent se répartir dans plusieurs appareils : digestif, respiratoire, génital, nerveux, locomoteur, ophtalmique et rénale. Parmi elles, on trouve des maladies bactériennes dont la fièvre charbonneuse ; la brucellose ; la septicémie hémorragique ; la peste du chameau ; la salmonellose et la paratuberculose ; ainsi que des maladies virales comprenant la variole ; l'ecthyma contagieux ; la rage et les infections a virus para-influenza type 3.
En conclusion de cette étude ; le recours à la connaissance épidémio-clinique des pathologies infectieuses dominantes du Dromadaire permet de privilégier des traitements curatifs et préventifs et de limiter la mortalité importante rencontrée chez cette espèce.

Mots-clés : Dromadaire ; pathologie ; infectieuse ; Mortalité.

Prevalence and Major Pathogens Associated with Clinical and Subclinical Mastitis in Camels (*Camelus dromedarius*) in M'sila and Biskra regions of Algeria

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Abstract

Mastitis is a significant concern in dairy camels, particularly in arid regions such as Algeria, where it affects both milk production and quality. This study aimed to assess the prevalence of clinical and subclinical mastitis in dromedary camels in the regions of M'sila and Biskra and to identify the primary bacterial pathogens involved. A total of 200 lactating camels from 13 herds were examined, with clinical mastitis diagnosed through visual and physical inspection, and subclinical mastitis detected using the California Mastitis Test (CMT). Aseptic milk samples from affected quarters were subjected to bacteriological isolation and identification. The overall prevalence of mastitis at the camel level was 35%, with 7.5% attributed to clinical mastitis and 27.5% to subclinical forms. At the udder-quarter level, 11.87% of quarters were affected. Staphylococci were the predominant pathogens, accounting for 70.4% of the 98 bacterial isolates, of which 31.63% were coagulase-positive staphylococci (CPS), including *Staphylococcus aureus*, and 38.77% were coagulase-negative staphylococci (CNS). Other isolated pathogens included *Micrococcus* sp., *Streptococcus* sp., *Bacillus* sp., *E. coli*, and *Enterococcus* sp. These findings align with previous studies in Algeria and other countries, which similarly reported a high prevalence of mastitis and Staphylococci dominance. The high occurrence of subclinical mastitis underscores the need for systematic pathogen monitoring and effective control measures. Implementing integrated management strategies is crucial to improve camel milk quality, reduce economic losses, and mitigate public health risks.

Keywords: Mastitis, prevalence, staphylococci.

Antibiotic resistance profile of staphylococci isolated from camel mastitis in the arid zone of Algeria

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Abstract

Camel mastitis is a significant veterinary problem with serious public health implications, especially in regions where raw milk consumption is prevalent. Staphylococci, both coagulase-positive and coagulase-negative, are commonly associated with mastitis in camels, and the growing issue of antimicrobial resistance (AMR) among these pathogens is a pressing challenge. This study aimed to investigate the antibiotic resistance patterns of staphylococcus spp. isolated from camels with clinical and subclinical mastitis in order to guide management strategies that can mitigate public health risks. 69 staphylococcal strains were isolated using conventional bacteriological techniques, including 38 coagulase-negative staphylococci (CNS) and 31 coagulase-positive staphylococci (CPS). These strains were tested for susceptibility against 12 commonly used antibiotics. The results showed that 34.78% of the isolates were susceptible to all antibiotics, while 21.73% exhibited multidrug resistance (MDR). Notably, significant resistance was observed to penicillin (33.33%), tetracycline (31.48%), and erythromycin (21.74%), with CPS strains showing particularly high resistance rates. The high level of antimicrobial resistance, particularly among CPS strains, presents a substantial challenge in managing mastitis in camel herds. The misuse and overuse of antibiotics likely contribute to the development and persistence of resistant strains, complicating treatment efforts. Moreover, the detection of MDR strains in a significant proportion of isolates raises concerns for public health, as raw milk consumption in these regions could facilitate the zoonotic transmission of resistant bacteria to humans. This study underscores the critical need for enhanced management practices in camel herds, focusing on improved milking hygiene and more careful antibiotic usage. The implementation of regular surveillance programs to monitor antimicrobial resistance is vital for early detection and for adapting antibiotic treatments to the specific resistance profiles. These measures are essential not only for the sustainable management of camel herds but also for safeguarding public health, especially regarding the safe consumption of camel milk.

Keywords: Mastitis, camel, antimicrobial resistance, CNS, CPS.

Genotypage d'*Enterocytozoon bieneusi* chez le dromadaire dans la région de Biskra

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Résumé

Enterocytozoon bieneusi est une espèce zoonotique des microscporidies. Il s'agit d'un parasite appartenant aux fungi à localisation intracellulaire qui infecte plusieurs espèces animales incluant, mammifères, oiseaux, poissons ainsi que l'homme. En raison de sa petite taille qui fait environ 2 microns, sa recherche dans les laboratoires que ce soit de recherche ou de diagnostic rend sa mise en évidence difficile par la microscopie, même avec l'utilisation de techniques spécifiques. Le recours au diagnostic moléculaire est parfois de règle pour le mettre en évidence. Les études moléculaires sur le gène ITS ont permis de connaitre 500 génotypes appartenant à 15 groupes classés de 1 à 15. Contrairement à d'autres espèces animales domestiques, on connait peu sur Enterocytozzon et ses génotypes chez le dromadaire. Cette étude préliminaire a été menée chez le dromadaire pour examiner l'identité des génotypes d'*E. bieneusi* chez les dromadaires dans la région de Biskra. Au total, 39 échantillons fécaux diarrhéiques ou non ont été collectés chez les jeunes chameaux. Nested PCR ciblant le gène ribosomal internal transcribed spacer (ITS) a été utilisée pour identifier Enterocytozzon bieunesi. Le génotypage a été réalisé par l'analyse de la séquence PCR du gène ribosomal internal transcribed spacer. Huit des échantillons analysés étaient positifs pour *E. bieneusi*. Ce dernier a été identifié comme deux génotypes apparentés (Macaque1 et un nouveau génotype) dans le nouveau groupe de génotypes *E. bieneusi* 8. Bien qu'ils ne soient pas des hôtes connus d'*E. bieneusi*, les dromadaires sont apparemment infectés par des variantes génétiquement distinctes de ce pathogène.

Mots-clés : Genotypage, *Enterocytozoon bieneusi*, Dromadaire, Biskra.

Enquête sur Cryptosporidium chez le dromadaire dans la région de Tindouf

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Résumé

La cryptosporidiose est une maladie due à un protozoaire cosmopolite du genre *Cryptosporidium* qui affecte un large éventail animal domestique et sauvage ainsi que l'homme. Il s'agit d'une zoonose à transmission directe de l'animal à l'homme ou indirecte via l'eau de boisson et les aliments. La maladie se caractérise par des troubles digestifs parfois sévères chez les jeunes individus ou les immunodéprimés. La plupart des données sur la biologie, la pathologie, et la prévalence de l'infection à *Cryptosporidium* spp. chez les animaux d'élevage sont limitées aux animaux d'élevage. Chez le dromadaire très peu d'études sont disponibles. Bien que de nombreux chameaux (*Camelus dromedarius*) sont élevés dans les régions semi-arides et arides de notre pays ; peu d'informations concernant *Cryptosporidium* chez cette population d'animaux. A cet effet, une enquête est effectuée portant sur 54 échantillons de fèces de dromadaire issue de 03 fermes différentes réparties dans la région de Tindouf, provenant d'individus diarrhéiques et non diarrhéiques de différentes âges et élevés dans un mode semi extensif. Les échantillons ont été analysés au laboratoire de parasitologie de l'ENSV en utilisant la méthode de coloration de Zheil-Neelsen modifiée. Les résultats obtenus dans la région étudiée n'ont révélé aucune présence du protozoaire dans tous les prélèvements. Il est fortement recommandé de réaliser d'autres enquêtes avec un échantillonnage plus important et en raison de la difficulté du diagnostic coproscopique à mettre en évidence le protozoaire, les analyses moléculaires sont d'une grande indication afin de mieux comprendre l'épidémiologie moléculaire de ce parasite chez cette espèce animale.

Mots-clés : Recherche, Cryptosporidium, Dromadaire, Tindouf.

Contribution à l'étude de la brucellose chez les dromadaires et les facteurs de risques associés, au sud de l'Algérie

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Résumé

La brucellose est une maladie causée par une bactérie intracellulaire facultative du genre Brucella. Elle affecte un large éventail d'hôtes mammifères. Le diagnostic n'est pas basé sur les symptômes cliniques, une combinaison de tests sérologiques, moléculaires et bactériologiques est recommandée pour la détection de l'infection par brucellose. L'objectif de l'étude est d'évaluer la prévalence de *Brucella spp* chez les dromadaires en utilisant deux tests sérologiques : RBPT et ELISA et d'identifier les facteurs de risque associés. Une étude transversale a été menée sur 132 dromadaires dans deux wilayas du Sud de l'Algérie (Ghardaïa et Menea). Un questionnaire structuré a été réalisé pour recueillir des données sur les animaux. La séroprévalence obtenue a été de 5,3 % et de 1,4 % en utilisant le test ELISA et le RBPT, respectivement. Les facteurs de risque possibles associés à l'infection ont été analysés en utilisant une régression univariée et logistique. Les résultats ont montré une séroprévalence plus élevée chez les femelles (P = 0,01) et chez les animaux vivant dans des troupeaux ayant des antécédents d'avortement (P= 0,004, OR= 2,76, CI 95% = 2,37–104,54). La brucellose est endémique chez les dromadaires en Algérie et des mesures prophylactiques doivent être prises pour réduire l'infection chez les animaux et l'homme.

Mots clés : Brucellose, dromadaires, diagnostic, ELISA, RBPT.

Bartonella infection in dromedary camels from Algeria

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Abstract

Bartonella species infect a wide range of domestic and wild mammals. These bacteria transmitted by hematophagous vectors are being recognized as important zoonotic pathogens that occur worldwide with presentations that range from subclinical to severe disease. In this study, we investigate the prevalence of *Bartonella* spp. in camels from Algerian Sahara.
Blood samples were collected from 80 camels living in the region of Laghouat. The samples were screened for *Bartonella* spp. by qPCR. Positive samples were confirmed by standard PCR followed by sequencing.
Two of the 80 (2.5%) camels were positive to *Bartonella* spp. Sequencing and BLAST analyses of *gltA* sequences identified *Bartonella* strains which were very close to a newly proposed species "*Bartonella dromedarii*" (99.59% similarity with GenBank accession numbers KJ909817.1, KJ909815.1 and KJ909814.1). The identification of new *Bartonella* variants in camels suggests a continuous evolution of strains' diversity which is related to a complex maintenance of this bacterium in nature, as was observed in other mammals. The camels in our study could have been in contact with wild canids and felids as well as rodents which are the animals most frequently found in the Algerian desert.
This is the first study to investigate exposure to Bartonella species in camels from Algeria. The epidemiological and public health importance of *Bartonella dromedarii* in camels is still not clear. Close contacts between humans and camels, and the zoonosis potential of *Bartonella* spp. indicate the need for further studies in our country.

Keywords: *Bartonella* infection, molecular detection, dromedary camels, Algeria.

First report of Anaplasma species in *Camelus dromedarius* from Algerian Sahara

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Abstract

Anaplasmosis is an infectious disease caused by a Gram-negative obligate intracellular bacterium of the Anaplasmataceae family (order Rickettsiales). These arthropod-transmitted bacteria are important emerging pathogens of both animals and humans. However, no information on *Anaplasma* infection in *Camelus dromedarius* in Algeria has been published. The aim of this study was to investigate the prevalence of *Anaplasma* species in domestic camels from Algeria and evaluate the associated risk factors.

Blood samples were collected from 80 randomly selected camels in Laghouat province, southern Algeria. The samples were screened for *Anaplasma* spp. by qPCR. All positive samples were confirmed by standard PCR followed by sequencing. Data on age, sex, tick infestation and location of the camels were analyzed using the SPSS version 17.0 and association of these with vector-borne bacterial pathogens was determined using Chi-square ($\chi 2$) test. *P* value lower than 0.05 was considered as indicative of significance.

Twenty-four of the 80 (30 %) camels were positive for *Anaplasma* spp. with *Anaplasma phagocytophilum* (22.5%, 18/80) being the most prevalent species, followed by *Anaplasma platys* (7.5%, 6/80). None of the factors (age, sex, tick infestation and study sites) was significantly associated with the prevalence of *Anaplasma* spp. in the camels ($p>0.05$).

The present study is the first report of anaplasmosis in *"Camelus dromedarius"* from Algeria. In Algeria, the link between *Anaplasma* spp. infection and their arthropod vectors is mostly unknown, and more research is needed. However, further epidemiological and molecular studies are required to evaluate the situation of the disease across the country and to identify the genetic features of *Anaplasma* spp. in camels.

Keywords: *Anaplasma phagocytophilum*, *Anaplasma platys*, qPCR, *Camelus dromedarius*, Algeria.

Trypanasomiasis of the camels in the Laghouat region

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Abstract

Camels are an essential source of meat and milk. However, the most common is the one-humped camel (*Camelus dromedarius*) used for drought power, and transportation. Camel farming suffers from many debilitating parasitic diseases, including blood-borne infections. Camel trypanosomosis, also known as surra, is a disease of camels caused by *Trypanosoma* spp. The disease is the most important single cause of economic losses in camel rearing areas, causing morbidity and mortality. The aim of this study was to investigate the prevalence and identify blood parasites mostly *Trypanosoma* spp in camels in the Laghouat region by assessing their prevalence according to certain risk factors. We used Giemsa-stain blood smear method to search for haemoparasites. Data analyzed by the SPSS software (version 21), as well as a Chi 2 test was used to determine the relationship between the prevalence of the infestation and certain parameters. During the study period, blood samples were taken from 115 camels, 82 of which were female and 33 of which were male. We found that one haemoparasite specie is represented by *Trypanosoma* spp which is reported in 3 camels with 2.6 %. The results showed a significant influence of treatment, clinical aspect, breeding method and study site on the parasitic infestation rate ($P < 0.05$). Other factors (sex, age) had no significant influence ($P > 0.05$). The results obtained showed a low prevalence of different species of haemoparasites (2.6 %). Parasites have been studied for a very long time, most of the knowledge concerns parasites of medical or veterinary interest. Despite, their omnipresence within the living world, the role of parasitic infections on populations is still very poorly controlled.

Keywords: Camels, *Trypanosoma* spp, blood smear, Laghouat.

First molecular detection of *Leishmania spp.* in camels population from Adrar, South of Algeria

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Résumé

Leishmaniasis are vector-borne diseases caused by obligate protozoan parasites from the genus *Leishmania* (*Trypanosomatida: Trypanosomatidae*), this disease is transmitted by the bite of infected female sand fly. The epidemiological cycles of leishmaniasis require the presence of a reservoir that hosts the amastigote form of the parasite.
The epidemiological situation of leishmaniasis is unclear in southern Algeria, most studies focus on the central and eastern parts of the country, no data about the role of camels (*Camelus dromedarius)* in the epidemiology of leishmaniasis, the aim of the present study is to investigate for the first time the exposure of camels in the wilaya of Adrar to *Leishmania* by molecular tools (nested PCR).
The study was conducted from January to Mars 2022, our study covers a total of 61 camels, male and female; all camels are adults with an age between 4-18 years old.
Camels included in this survey were sampled from state slaughterhouses and livestock market.
A total of 61 whole blood samples were tested by *nested* PCR for the detection of *Leishmania* DNA; 52 camels were positive, giving a prevalence of 85.24%.
The present study revealed the occurrence of camels leishmaniasis in Adrar. A high infection rate of camels was found. These findings provide interesting data about the current epidemiological status of camels in Adrar, it will has an impact on human health. Further studies are needed to clarify the epidemiological situation in the region and to determine the role of camels in the epidemiology of human leishmaniasis.

Keywords: Camels leishmaniasis, *Leishmania* spp., infection, Adrar.

Study of non-compliances in post-mortem inspection techniques and determination of seizure reasons for camelids slaughtered in Adrar: case of the Aoulef slaughterhouse

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Abstract

Red meat sector in Algeria primarily involves sheep, cattle, and to a lesser extent, goat and camel meats. The slaughter of animals aims to provide healthy carcasses that are suitable for human consumption and do not pose a risk to public health. Consequently, pre-slaughter methods, slaughtering practices, and sanitary inspection must be properly implemented.
This study aims to detect non-compliance in the post-mortem inspection techniques of camel carcasses and viscera at the Aoulef slaughterhouse, and to identify the reasons for any seizures encountered at this facility.
The Aoulef slaughterhouse covers an area of 600 m². It includes a housing area, a slaughter room, a room for emptying gastric reservoirs, sanitary facilities, and an administrative sector. To determine non-compliance in post-mortem inspection techniques according to international regulatory requirements, investigation forms detailing each type of examination (visual inspection, palpation, incision, and lymph node inspection) were developed. Additionally, to characterize the lesions, a sanitary inspection of the carcasses and organs of 84 male camels was conducted.
The results of this study indicate that only the lungs, liver, and heart are inspected. Non-compliance rates of 100%, 89%, 58%, and 40% were recorded during lymph node inspection, incisions, visual examination, and palpation, respectively. Finally, no reasons for seizure (0%) were observed among the camels slaughtered at the Aoulef facility. The sanitary inspection technique employed appears to be incomplete, which may explain the absence of observed lesions.
Due to the high rates of non-compliance, certain pathologies, particularly those subject to mandatory reporting, may go unnoticed during post-mortem inspection, posing a significant risk to human health.

Keywords: Camels, post-mortem inspection, reasons for seizure.

Cross-Sectional Study of Coccidiosis in Dromedaries in two Slaughterhouses from the South of Algeria

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Abstract

A prospective examination was conducted at two slaughterhouses in southern Algeria. First, this investigation was to ascertain the prevalence of intestinal parasites in camels, elucidate the associated microscopic lesions, and identify the risk factors contributing to this infestation.
We procured four segments of the intestines from 31 dromedaries that appeared healthy. Subsequently, these samples were collected, subjected to routine processing, and subsequently stained with haematoxylin and eosin (H&E).
Intestinal parasitic infection showed a prevalence rate of 45.16% (14/31). Two types of parasites were discerned in the intestinal specimens through microscopic examination, namely Eimeria (41.93%; 13/31) (p-value = 0.046) and Taenia (3.22%; 1/31) (p = 0.001). *Eimeria cameli* was observed in the ceacum (41.93%; 13/31), jejunum (12.90%; 4/31), and in one instance in the duodenum (3.22%; 1/31). However, numerous development stages of coccidia were identifed, including gamonts, schizonts and oocysts. Deep microscopic lesions attributed to *Eimeria cameli* were detected, such as enteritis, eosinophilic infltration and inflammation. However, molecular studies have been carried out.
Effective strategies for controlling parasites specific to dromedary camels need to be developed.

Keywords: Algeria, camels breed, *Eimeria*, histopathological.

Hemoparasites of dromedary camel (*Camelus dromedarius*) in some regions of Algeria

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Abstract

Dromedary camel (*Camelus dromedarius*) is considered the best adapted animal to arid and semi-arid environments where living conditions are extremely difficult. It suffers from many pathologies responsible for direct effects on the national camel herd. The decrease in milk production and the drop in growth are the most frequent consequences; an impact on the country's economy is absolutely noted. Trypanosomes and ticks represent the most serious diseases of the dromedary in the world, including Algeria.
Our study was carried out in different regions of Algeria (Hassi Bahabah, Zaafrane, Touggourt, Ben Guecha, Oued Mzi, Musrane and Jamaa). 110 dromedaries were collected, of which 94 individuals were females against 16 males, living in different breeding conditions.
Blood samples were collected for serodiagnosis of *Trypanosoma* sp. Regarding external parasites, Ticks were collected and preserved in ethanol (70°) for later identification in laboratory. Of the 110 samples, a mixed infection was reported with a rate of 62%. Trypanosomes affected 65 individuals, with a female predominance (59 females infested). All age classes of dromedary camel had at least one infestation with trypanosomiasis or ticks. Four species of the genus *Hyalomma* sp. were recorded infesting the dromedary in all study regions, of which the species *H. dromadarii* is the most dominant.
The detected parasites in camels are similar to counterparts in other ruminants, posing serious challenge to animal farming. Future studies should be carried out to better understand the epidemiology of these parasitic diseases and their economic and public health impact.

Keywords: *Camelus dromedarius*, *Trypanosoma* sp., ticks, Algeria.

Prevalence and etiology of mastitis in camels in southeastern Algeria

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Abstract

Mastitis is an important disease on camel farms in Algeria, affecting camels at different stages of lactation. This study included several camel farms in the wilaya of Oued-Souf and Ouregla in south-eastern Algeria. The objective of our study was to estimate the prevalence of the disease and to detect the bacteria involved. The number of animals in the herds surveyed was 56 dromedaries, and the CMT test revealed that mastitis had a prevalence of 26%; it was most prevalent in females aged between 14 and 35 years (57%), and the majority of cases occurred in summer, with a prevalence of 38% compared with 19% in spring. Bacteriological analysis showed that staphylococcus aureus was the main cause of subclinical mastitis (79%), followed by *Escherichia coli* (21%). The bacterial strains isolated were resistant to certain antibiotics such as streptomycin and olfloxacin, but were also sensitive to amoxicillin and sulphamethoprim.

Keywords: Mastitis, camel, prevalence, *staphylococcus*, *Escherichia coli.*

Hydatid cysts infestation in *Camelus dromedarius* at the slaughterhouse of Tindouf, Southern Algeria

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Abstract

Cystic echinococcosis is a neglected zoonotic parasitic disease of worldwide occurrence, caused by the metacestodes of *Echinococcus granulosus* sensu lato. In Algeria, cystic echinococcosis has a highest impact on public health and livestock production. Sheep-dog cycle has been described as the main cause of human contamination, but the role of other intermediate hosts such as infested camels is poorly studied.

The present survey was conducted to estimate the infection rate of hydatid cyst in dromedary camels at the slaughterhouse of Tindouf, Southern Algeria. From January 2017 to January 2020, a total of 15772 carcasses were examined for cysts detection through gross examination, palpation, and incision of internal organs.

Overall, 31 camels (0.20%) were found to be infested. Infection rate was 0.13% in males (19/14660) and 0.27% in females (3/1103). Regarding the age of camels, 10/5047 aged of 5 to 7 years and 12/10725 over 7 years showed an infection rate of 0.20% and 0.11% respectively. Sex and age of 9 camels were not recorded during the present study. The most frequent localization of cystic lesions was in liver (26/31; 87.10%), lung (3/31; 9.69%), and finally in both lung and liver (mixed infection) (2/31; 6.45%). Microscopic examination of the liquid of all hydatid cysts showed a fertility rate of 6.38% (3/47). All fertile cysts were recorded in liver (3/38; 7.89%).

This epidemiological study provide data on the importance of cystic echinococcosis in dromedary camels from Algeria, and the role of camels in the epidemiological cycle of *E. granulosus* sensu lato.

Keywords: Algeria, dromedary camel, fertility, hydatid cyst, prevalence.

L'utilisation de l'urine du chameau dans le traitement et la prévention des différentes pathologies

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Résumé

L'urine de chameau est utilisée depuis des siècles en médecine prophétique, dans le cadre des anciennes pratiques bédouines et de la tradition musulmane. Selon l'Organisation mondiale de la santé, malgré qu'elle soit largement utilisée, l'emploi de l'urine de chameau comme médicament manque de preuves scientifiques. L'objectif de cette synthèse bibliographique est de faire le point sur les connaissances des propriétés, la composition et les utilisations thérapeutiques de l'urine du chameau. Les chameaux jouent un rôle important dans le mode de vie pastoral en répondant aux besoins essentiels de subsistance. Diverses pathologies, telles que la tuberculose, les hémorroïdes, l'ascite, l'augmentation de la taille de l'abdomen, les coliques gazeuses et l'anémie étaient traitées à l'aide d'urine d'animaux tels que les chameaux. La composition de l'urine de chameau est différente de celle des autres espèces. Les éléments inorganiques présents dans l'urine de chameau, notamment le sodium, le potassium, le fer, le zinc et le magnésium, sont plus élevés que dans l'urine des autres espèces. L'urine de chameau contient également différentes nanoparticules, cristaux et nanobilles de formes et de tailles variées, qui offrent une puissante activité cytotoxique sélective contre plusieurs lignées de cellules cancéreuses. Il a été prouvé que l'urine de chameau possède des propriétés antidiabétiques, anticancéreuses, antibactériennes, antivirales et antifongiques. Elle a également des effets hépato-protecteurs et cardiovasculaires.

Mots clés : Chameau, composition, propriétés, thérapie, urine.

Enquête sérologique sur la brucellose cameline au niveau de la région d'Oued Souf

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Résumé

En Algérie comme dans la plupart des pays en développement, la brucellose cameline est certainement une des plus importantes zoonoses. Les camelins servent comme moyen de transport. L'enquête a été menée dans 5 communes réparties sur la wilaya d'El-Oued située au Sud- Est de l'Algérie. Elle a été portée sur 375 animaux entre mâle et femelle âgés plus de 6 mois. Les structures de l'élevage des camélidés dans la wilaya d'El Oued sont généralement présentes dans les zones marginales marquées à la fois par l'aridité du climat.
L'étude a été conduite sans interruption du mois de septembre 2021 jusqu'au mois de mai 2023. L'objectif de cette étude est de faire le point sur la brucellose présente chez les camélidés dans la wilaya d'El Oued, au travers d'une enquête sérologique par l'utilisation de test sérologique d'épreuve à l'antigène tamponné EAT au niveau du laboratoire d'analyse vétérinaire régional de la wilaya d'El-Oued Souf. Notre enquête a permis d'établir que la prévalence individuelle de l'infection cameline dans cette population est probablement très faible dans les cinq exploitations étudiées.
Il ressort de notre enquête que l'épreuve à l'antigène tamponné a montré l'absence totale de la brucellose cameline. Enfin, nos résultats ont permis, pour la première fois, le dépistage de la brucellose chez les camélidés dans la wilaya d'El Oued.

Mots clés : Test sérologique d'épreuve à l'antigène tamponné (EAT), brucellose, dromadaire, Oued Souf.

Epidemiological Investigation of Neurological Syndrome in Dromedaries in Algeria's Sahara

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Abstract

The camel symbolizes the lifestyle of many populations in Algeria, where neurological syndromes have been observed for several years. In 2018, Dr. BABELHADJ identified prions in these animals at the Ouargla slaughterhouse, facilitating the diagnosis of related syndromes. This study aims to evaluate the incidence of neurological signs and gather preliminary information on prion diseases in this species.

We conducted an epidemiological survey across key camel farming regions (Ouargla, Ghardaia, Adrar, Tindouf, and Tamanrasset) by completing 65 questionnaires from randomly selected herders between late 2021 and early 2022. The collected data focused on the expression of neurological signs and the characteristics of affected herds.

Our study revealed variations in neurological signs among camel herds across different wilayas. Herders reported that adults were most affected, with neurological signs observed in 86% of cases in Ouargla and 100% in both Illizi and Ghardaia. Affected animals in Ouargla, Tamanrasset, and Ghardaia were primarily from pasture-based systems, while nomadic herds showed no signs. In Tamanrasset, 88% of supposedly healthy animals were nomadic, and in Adrar, 11 asymptomatic animals were identified (45% nomadic, 36% transhumant, 9% pasture-based). Additionally, 14% of herds with neurological signs in Ouargla were near a discharge area.

The treatments administered were effective, with significant improvement noted in Tamanrasset and Ghardaia, and recovery signs in Ouargla. This highlights the need for timely care for suspected cases and the importance of maintaining camel herd health.

Our investigation revealed a significant presence of neurological syndromes in dromedaries across various regions of the southern Sahara. Given our findings, it is advisable to keep camel herds away from public dumps, which appear to be a primary source of contamination due to access to meat products. Additionally, Neurological signs strongly suggest potential prion pathology, underscoring the need for a follow-up study involving sampling to confirm or refute the presence of prions.

Keywords: Camel, neurological syndromes, prion disease, South Algeria.

Urinary Infections in Camels: Implementation of the Speed Biogram Kit for Rapid Diagnosis

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Abstract

Urinary infections in camels represent a significant health issue, affecting both their welfare and productivity. These infections can be caused by various pathogens, including bacteria, viruses, and parasites. Bacterial species such as *Escherichia coli* and *Staphylococcus aureus* are often identified as responsible for infections, which can lead to cystitis, pyelonephritis, and renal infections.
In recent reported cases in the wilayas of Boussaâda, Oued Souf, and Ghardaia, we consulted veterinarians to apply rapid detection kits for urinary infections (Speed Biogram), which allowed for the identification of an infection caused by *Staphylococcus aureus* and two others due to *E. coli* in camels exhibiting clinical symptoms. These cases highlight the importance of rapid and accurate diagnostics for effective intervention.
Predisposing factors for urinary infections include poor hygiene conditions, stress, an unbalanced diet, and anatomical abnormalities. Camels, as animals adapted to arid environments, are often exposed to dehydration, which can contribute to the development of infections. Clinical signs can vary but commonly include difficulty urinating, the presence of blood in the urine, and lethargy. Early diagnosis is essential to avoid serious complications. Treatment generally relies on the administration of appropriate antibiotics. Preventive measures, such as improving farming conditions, ensuring access to clean water, and providing adequate nutrition, are crucial for reducing the incidence of urinary infections.
In conclusion, urinary infections in camels pose a major challenge for breeders. Raising awareness of this issue, combined with appropriate veterinary practices, is vital for maintaining the health and productivity of herds.

Keywords: Urinary infections, Dromedary camels, *Staphylococcus aureus, Escherichia coli*, Rapid detection, Veterinary practices, Speed Biogram.

Contribution à l'étude de la cryptosporidiose chez le dromadaire dans la région sud-est Algérien

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Résumé

Souvent, la diarrhée néonatale des jeunes animaux constitue un problème préoccupant aussi bien pour l'éleveur que pour le vétérinaire. La morbidité et la mortalité sont élevées, engendrant des pertes économiques considérables.
L'objectif de cette recherche est d'estimer la fréquence de la maladie et sa distribution selon quelques paramètres zootechniques, d'évaluer l'importance de *Cryptosporidium spp* dans l'installation de la diarrhée chez les chamelons ainsi pour apprécier le rôle des mères infectés dans la dissémination du parasite et dans d'infestation des nouveau-nés.
Une technique de coloration de ziehl-neelsen modifié par Henriksen et Polhenz (1981) a été utilisée sur 50 prélèvements fécaux, dont 25 échantillons des chamelles et 25 prélèvements des chamelons diarrhéiques et non diarrhéiques prélevés dans la région de Ouargla.
L'observation microscopique a montré que sur 50 prélèvements de fèces, 09 sont révélés positifs au *Cryptosporidium* spp., soit 18% ; concernant les veaux 06 prélèvements sur 25 étaient positifs (24%) ainsi la fréquence est plus élevée chez les chamelons diarrhéiques comparativement aux chamelons cliniquement sains (20% vs 4%), l'âge des chamelons compris entre 2 et 3 semaines est la tranche la plus sensible (60%) à l'infestation par rapport aux autres tranches d'âge.
Les mères infectées incluses dans notre étude peuvent être considérées comme une source de contamination des chamelons, car tous les cas positifs des chamelles (3/25 soit 12%) sont associés aux cas positifs des chamelons.

Mots clés : *Cryptosporidium spp*, ziehl-neelsen, protozoaire, chamelons, diarrhée, Ouargla.

Serological study of camel brucellosis in the wilaya of El Oued

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Abstract

Camel brucellosis is a zoonosis that has been reported for decades in African, Near and Middle Eastern countries, with high prevalence rates. Although described in neighboring countries such as Tunisia and Libya, camel brucellosis has been the subject of only rare studies in Algeria, and the control program established by the veterinary services does not concern this species. As a result, very little epidemiological data exists for this disease, so we conducted our serological survey in 2010 in the wilaya of El Oued in south-eastern Algeria on the Tunisian border, which has a large camel population.

Samples were taken from 161 camels of different sexes, ages and breeds, from 24 farms in various communes of the wilaya. The results obtained using 3 serological tests, namely Rose Bengal Test (RBT), complement fixation and competitive ELISA, did not reveal any positive serum. These results show that the individual prevalence of camel infection in this population is between 0 and 2.3% (95% CI).

This could be explained by the extensive rearing of the animals tested. As the females give birth away from the herd, contagion is minimal. However, this does not mean that brucellosis does not exist in the region, given the epidemiological context (high prevalence of caprine and bovine brucellosis, mixed herds, shared grazing and watering places, trade with neighbouring countries, nomadic lifestyle, etc.). This work should be carried out on a larger scale in southern Algeria, in order to assess the real situation of camel brucellosis in our country.

Keywords: Brucellosis, camel, El Oued, RBT, ELISA, complement fixation.

Udder infections in she-camels

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Abstract

Camels play very important roles in the life of nomadic tribes rearing them. It is well known that they play major roles in improving desert dwellers' socio-economic status and survival. Camel milk is an important source of protein and energy and some vitamins such as vitamin C, for those who are unable to get it from other sources. Besides, During the last few years, awareness about camel milk's nutritional and medicinal benefits in urban communities has rapidly increased. Consequently, the demand for the product has also increased. The lack of information about mastitis in camels in Algeria has stimulated this research. An attempt was made in this paper to study the incidence of mastitis with isolation and identification of bacterial organisms in the milk of infected quarters, as well as detection of the susceptibility of isolated microorganisms to antimicrobial drugs. The clinical mastitis was detected in 3 out of 67 she-camels at a percentage rate of 4.47%. The positive samples revealed mixed infection of Gram-positive bacteria, including Streptococcus agalactiae, *Staphylococcus aureus* and Gram-negative bacteria, including Escherichia coli. Antibiotic susceptibility pattern of bacterial isolates showed high sensitivity to Doxycycline, Tetracycline and Streptomycin, while all bacterial isolates were found resistant to Ampicillin and Erythromycin.

Keywords: Camel, mastitis, Algeria, Bacteria.

Diagnosis of Heamoparasites in dromedary camels by cytology

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Abstract

The dromedary (*Camelus dromedarius*) occupies a very important place in Africa, in the Middle East. In the arid and semi-arid areas of Algeria, and in daily pastoral life, the breeding of camels is a major activity of local populations.
Our study was conducted in carried out at the daïra of Aoulef wilaya of Adrar from March to May on 29 dromedaries of both sexes (14 males and 15 females), of different age classes in the purpose of dedicating some biochemical parameters such as: ALAT, ASAT, Urea and Creatinine, and to determine the factors that influence variations in these biochemical parameters. as well as the carrying out of blood smears whose purpose is to diagnose some parasites of blood.
Blood samples were taken on EDTA and heparinized tubes, The blood contained in the EDTA tubes was used for the preparation of blood smears for cytology, the purpose of which is to search for the possible presence of blood parasites such as (*Babesia* spp, *Theleria* spp, *Anaplasma* spp, trypanosomes...etc). The MGG coloring was used to color the prepared slides
For ALAT the results of 29 dromedaries vary between 0.58 IU/L and 119.58 IU/L, Thus the ASAT vary between: 33.25 IU/L and 299.83 IU/L whose mean is 88.50.
The smear reading allowed us to highlight *Anaplsma* spp and *Babesia* spp.
The study of biochemical parameters in dromedaries reveals variable results which may be due in most cases are mainly parasitic pathologies that are very common in this species.

Keywords: Dromedary, blood, parasites, cytology.

Etude des tiques du dromadaires dans le sud algérien

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Abstract

Dans les zones arides, semi-arides et désertiques, l'élevage du dromadaire (*Camelus dromedarius*) joue un rôle essentiel dans la vie des populations locales. Les tiques sont des ectoparasites hématophages obligatoires qui infestent la plupart des vertébrés dans le monde, des régions les plus chaudes du globe aux plus froides. Les tiques sont des vecteurs importants d'un large éventail de micro-organismes, notamment des bactéries, des helminthes, des virus et des protozoaires. Elles sont considérées comme un problème majeur de santé publique humaine et vétérinaire à l'échelle mondiale. Ces acariens sont l'un des ectoparasites les plus prédominants qui affectent négativement la productivité des dromadaires soit en transmettant des agents pathogènes infectieux, soit en provoquant des lésions traumatiques et une anémie sévère.

La présente étude a tracé comme objectif l'identification des espèces de tiques parasites de camelins dans deux régions du Sahara algérien, à savoir : El-bayadh et Tindouf.

Au total, 263 tiques ont été collectées. Après identification morphologique par les clefs dichotomiques, toutes les tiques appartenaient à l'espèce *Hyalomma dromedarii.*

Au terme de notre étude, nous pouvons conclure que les tiques peuvent constituer un grand problème de santé animale, soit par leur effet direct de spoliation de sang ou par leur effet vecteur. Des études ultérieures élargies dans le temps et dans l'espace doivent être planifiées pour mieux étudier l'infestation du dromadaire par les tiques.

Mots clés : *Camelus dromedarius*, El-bayadh, Tindouf, *Hyalomma dromedari*i, Algérie.

A case study of hydrobursitis in a sahraoui she-camel: an histopathological investigation

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Abstract

In this study, we investigate ovarian abnormalities through microanatomical and histopathological analyses of affected ovaries. The objective was to study types of gonadal pathologies that influence the fertility of these animals. Ovarian tissue samples of infertile Sahraoui breed, were collected in southeastern Algeria.
Gonads were harvested after slaughter and rapidly fixed in 10% formaldehyde, then processed for histology. In brief, the tissues were dehydrated, and embedded in paraffin. After microtomy, 5 µm sections thickness were stained with Hematoxylin and Eosin.
Macroscopically, various masses were identified in the ovary, including a unilateral bursa filled with a significant amount of volume of creamy pink serous fluid, topped with a whitish foam layer. Another mass, unaffected by the suspected hydrobursitis, was presumed to be a corpus luteum. The ovary also contained growing follicles as well as hypertrophic or cystic ones. Histological examination of the follicles revealed the presence of large cell cords, which were more abundant than the small ones. The term "hormonal imbalance" is used to describe this type of pathology.
The hydrobursitis is a follicular cyst that form when the follicle fails to ovulate normally, thereby disrupting ovarian function. Excessive amounts of legumes and goitrogenic (anti-thyroid) foods in the diet can adversely affect the estrous cycle and decrease fertility in she-camels.
A restrictive diet may be a primary factor in disrupting reproductive activity and ovarian function in female camels, as it affects hormone secretion or leads to hormonal imbalance. This term refers to the pathology responsible for the development of hydrobursitis.

Keywords: Ovarian abnormalities, hydrobursitis, Sahraoui camel, follicles.

Identification of *Cryptosporidium spp.*, and *Giardia duodenalis* and *Entamoeba histolytica* in Dromedary Camels (*Camelus dromedarius*) and their environment, from the Algerian Sahara

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Abstract

Intestinal microbial parasites are major contributors to the global burden of gastrointestinal disease. Such infections are mainly caused by *Cryptosporidium*, *Giardia duodenalis*, and *Entamoeba histolytica.* In this work, we aimed to explore the occurrence of these three parasites in camels (*Camelus dromedarius*) in Algeria.
A total of 68 samples (63 stool samples from camels and five from the environment) were collected from two desert regions in Algeria and analyzed using PCR and qPCR methods.
Overall, 7% of the camels tested positive for zoonotic subtypes of *Cryptosporidium* spp., while 16% of the camels tested positive for *G. duodenalis*. Two environmental samples also tested positive for *G. duodenalis*. None of the samples were positive for *Entamoeba histolytica*. Our results provide one of the first molecular-based identification of these gut parasites in dromedary camels in Algeria. The presence of *G. duodenalis* in the host and the environment unveils, in part, the circulation route of this parasite.
Our results will spearhead further investigations into the prevalence and epidemiology of gut parasites in hoofed animals and raise questions concerning their role in health and disease in the area.

Keywords: *Camelus dromedarius*; *Cryptosporidium* spp.; *Giardia duodenalis*; *Entamoeba histolytica*; Algeria.

Genital Tract Pathologies of she camels Slaughtered at El-Oued Abattoir in south Algeria

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Abstract

The camel species has been considered an animal of great importance in the desert regions, due to its ability to withstand extremely harsh conditions. With its production potential (milk and meat) and their adaptation to arid condition of the south region of Algeria, dromedary can contribute to satisfy the needs of proteins of animal origin of the population.
The aim of this study was to detect genital disorders in 74 female camels from Chambi and Tergui breeds slowghtred at the El-Oued abattoir in the South and arid region of Algeria and determine the prevalence pathological lesions of the she-camel's genital tract.
The results obtained showed a high incidence of slaughtered pregnant cows (17.6%) with no great difference in frequency between the 1st and 2nd trimester of pregnancy.
82.43% of non-pregnant females has been recorded. However, the prevalence of Abnormalities genital tract was detected in she-camels and estimated to 29.73%. The most common defects were uterine infections and inflammatory congestion of the uterine mucosa, followed by follicular cyst, pyometra and salpingitis.
The dromedary plays an essential role in the economy of the Saharan zones. For this, we propose that it is important to investigate the causative agents of these pathologies in the many abattoirs located in the southern regions of Algeria.

Keywords: Female camel; genital tract; pathological; ovarian; uterine; El-Oued abattoir.

Genotypage preliminaire de Cryptosporidium chez le dromadaire dans la région de Biskra

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Abstract

La cryptosporidiose est une maladie causée par un protozoaire cosmopolite du genre *Cryptosporidium* qui affecte un grand nombre d'espèces animales domestiques et sauvages ainsi que l'homme. La maladie se caractérise par des troubles digestifs parfois sévères chez les jeunes individus ou les immunodéprimés. Chez les animaux de rente et même ceux de compagnie, la recherche de ce parasite a fait l'objet de plusieurs études et ce à l'échelle mondiale et qui ont permis de connaitre l'épidémiologie et l'épidémiologie moléculaire. En revanche, chez le dromadaire très peu d'études sont disponibles sur la présence de ce protiste zoonotique et encore moins sur les génotypes/espèces du parasite chez cet animal. Cette étude préliminaire a été menée pour identifier et genotyper Cryptosporidium chez les dromadaires dans la région de Biskra. Au total, 39 échantillons fécaux ont été collectés chez les jeunes chameaux issus de 03 élevages. L'analyse de la séquence de Nested PCR de la petite sous-unité d'ARNr a été utilisée pour détecter et génotyper *Cryptosporidium* spp. *C. parvum* présent a été sous-typé par analyse de séquence du gène de la glycoprotéine de 60 kDa. Deux des échantillons analysés étaient positifs pour *C. parvum*. Le premier a été identifié comme un nouveau sous-type génétiquement lié à la famille des sous-types If de *C. hominis*. Bien qu'ils ne soient pas des hôtes connus de *C. parvum*, les chameaux sont apparemment infectés par des variantes génétiquement distinctes de ce pathogène. D'autres études sont fortement recommandées pour mieux connaitre l'épidémiologie de cette parasitose chez les chameaux.

Mots-clés : Genotypage, Cryptosporidium, Dromadaire, Biskra.

Les maladies virales des camélidés : dromadaires & chameaux

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Abstract

Les chameaux sont considérés comme des animaux d'élevage particulièrement robustes en raison de leur capacité à se développer dans des conditions difficiles et arides. Aujourd'hui, les chameaux et les dromadaires sont révélés sensibles à un grand nombre d'agents pathogènes et porteurs de plusieurs maladies infectieuses, dont la plupart entraînent des pertes économiques importantes notamment. Parmi ces maladies virales, on trouve la variole du chameau est la maladie virale la plus fréquemment diagnostiquée, ainsi que l'échthyma contagieux, la papillomatose et la rage. Bien que l'infection par plusieurs autres virus, notamment la peste bovine, la fièvre catarrhale ovine, la peste équine et la fièvre de la vallée du Rift, ait été démontrée par des méthodes sérologiques, les chameaux n'ont pas montré de signes de maladie malgré un contact étroit avec le bétail affecté. En Algérie, la maladie à prion a été détectée chez trois dromadaires (*Camelus dromedarius*) âgés de onze à quatorze ans en 2018. Ces trois animaux, présentaient des signes cliniques neurologiques compatibles avec une maladie à prion dénommée Camel prion disease. L'analyse par western blot a mis en évidence les trois bandes caractéristiques de la protéine prion pathologique (PrPSc, pour scrapie prion protein) avec des caractéristiques différentes de la protéine impliquée dans l'encéphalopathie spongiforme bovine classique (ESB-C) ou l'ESB-C après passage chez le mouton. Cette protéine à prion était également présente dans le système lymphoïde d'un dromadaire. Selon des études 3,1 % des dromadaires présentaient ces symptômes, ce qui correspond à une fréquence assez élevée. Il existe peu d'informations sur l'efficacité des immunisations virales chez les chameaux et des recherches supplémentaires sont nécessaires.

Mots clés : Maladies viral, dromadaire, chameaux, variole, prion.

Contribution of camels to the transmission of *Cystic echinococcosis*: an 19-year retrospective study in Algeria

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Abstract

Cystic echinococcosis (hydatidosis), is a parasitic disease caused by infection with the larvae of the tapeworm Echinococcus granulosus. Although the main cycle of the disease involves dogs and sheep, camels can also play a key role in the spread of the parasite, particularly in areas where these animals are domesticated, increasing the risk to human populations.
The camel, as an intermediate host, has received less research attention compared to other domestic animals, yet it can significantly contribute to the transmission of the parasite to humans. Understanding the infection dynamics in camels may lead to more effective control strategies to lower human disease incidence. Additionally, hydatidosis can adversely affect camel health, impacting farmers' productivity and income. Therefore, studying and managing this disease could enhance herd health and reduce economic losses for local communities.
The objective of this study is to analyze trends in cystic echinococcosis over a 19-year period, based on retrospective data collected from January 2005 to July 2023 on susceptible and positive cases.
Over 332,689 camels slaughtered for meat production in different slaughterhouses in Algeria were examined for the occurrence of cystic echinococcosis. The overall prevalence of infection was 1.43%, with 4,756 positive cases. The annual infection rate ranged from 0.20% in 2006 to 0.02% in 2020.
Positive cases were recorded throughout the year, with a peak of 80 cases in March 2010 and 569 cases in 2006.The greater number of cases occurred in spring (29.15%), with a highly significant difference by month and by season ($p<0.00001$). The average annual incidence of cystic echinococcosis was 0.08%. A very good significant linear correlation ($r = 0.843$, $R^2 = 71\%$, $p=0.008<0.05$), was observed between the cases of cystic echinococcosis recorded in dromedaries and the number of human cases reported.

Keywords: Cystic echinococcosis, prevalence, Season, dromedary, human, Algeria.

Topic 05: Valorization, hygiene and safety of camel products

Gastro-protective against ethanol-induced gastric ulcers and antihyperglycemic activities, of camel milk, in mice

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Abstract

The milk of the dromedary, *Camelus dromedarius*, Camel milk, or nicknamed the white gold of the desert, has several biological properties. In this study, we investigated the anti-ulcerogenic on HCl/Ethanol induced gastric ulcers and antihyperglycemic effect of Camel milk in mice.
In order to evaluate the gastroprotective effects, two parameters were examined : a macroscopic analysis which would be solely interested in the observable external lesions and an estimation of the ulceration percentage. The anti-ulcerogenic activity of the Camel milk was compared to known drugs, used as reference molecules « Omeprazole ». The first parameter, lesions of the gastric mucosa evaluated by macroscopic examination, exhibited a significant reduction of lesions caused by the ethanol/Acetique in mice's stomach in tha batch treatead by Camel milk at concentration of 0.5 ml /mice. The second parameter, showed a decrease of ulceration percentage in the batch treated by camel milk at concentration of 0.5 ml /mice.
The antihyperglycemic effect was determined on pasteurised (boiled and unboiled) and unpasteurised (boiled and unboiled) camel milk. Oral hyperglycemia was induced in mice and the antihyperglycemic effect of the Camel milk was compared to a reference molecules « Metformine ». Blood glucose kinetics were measured over 120 minutes. The comparison of the blood glucose curves of the drug and negative control batches, as well as those of the batches treated with pasteurised (boiled and unboiled) and unpasteurised (boiled and unboiled) camel milk, are virtually superimposed. Heat treatment of the milk did not affect the antihyperglycaemic activity of camel milk. Nevertheless, we noted that the time taken to regulate blood glucose levels was faster with unboiled milk. Specific insulin in camel milk is suspected of being responsible for this hypoglycaemic effect.
These results confirms that Camel milk has gastroprotective and antihyperglycemic effects. It can be used for the development of anti-ulcer and antihyperglycemic therapy devoid of secondary effects.

Keywords: Camel milk, *Camelus dromedarius*, gastroprotective effetc, antihyperglycemic effect, omeprazole, Metformine.

Survey on the use of camel milk in Algeria

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Abstract

The dromedary, *Camelus dromedarius*, an artiodactyl mammal of the camelid family, has no equal when it comes to adapting to the desert. All its physiological mechanisms are adapted to enable it to survive in this arid and hostile environment. This domesticated herbivore is very useful to humans. Indeed, camel milk is nicknamed the white gold of the desert for its nutritional qualities, containing three times more vitamin C and ten times more iron than cow's milk. In Algeria, it is sold over the counter in supermarkets and by private individuals.
The aim of our work is to carry out a survey on the use and marketing of camel milk. In order to achieve our objective, we distributed two questionnaires. The first was an electronic questionnaire aimed at the general public to explore their knowledge and use of camel milk. The second questionnaire was distributed to retailers.
The results of the questionnaire aimed at the general public showed that 58% of those questioned had never consumed camel milk and that only 50% were aware of the virtues and benefits of this product. As for packaging, 90% of consumers would prefer it to be sold in bottles. The second questionnaire revealed that the price of camel milk, which is much sought-after, varies between DA1,000 and DA1,200 per litre. However, its availability depends on the season and the way it is reared.
We conclude that the market for this product, with its many biological virtues, is booming in view of the incessant demand, and that there is scope for great progress and better organisation of the camel milk sector.

Keywords: Camel milk, biological properties, marketing, survey.

The parasitic infections in camels at abattoirs in the western and southern regions of Algeria

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Abstract

The aim of veterinary health inspection in abattoirs is to remove from circulation all meat that might present a danger to the consumer, particularly in relation to the parasites that infest the animals. In some regions of Algeria, dromedary slaughter dominates over other ruminant species.
The aim of this study was to assess the prevalence of parasitic seizures encountered during sanitary inspections in abattoirs**.**
The study was carried out in two abattoirs in the wilaya of Tamanrasset, two abattoirs in the wilaya of Bechar and one abattoir in the wilaya of El Bayadh in western Algeria.
1,943 camel head were slaughtered across the 5 abattoirs. A post-mortem inspection of the 5th quarter was carried out immediately after slaughter, and the skinning and cutting operations were completed.
The post-mortem sanitary inspection reported a prevalence of seizures for parasitic causes of 0.45 % (N=662) and 0 % (N=369) in the Tamanrasset and Ain Salah abattoirs respectively. In the two abattoirs of Bechar, this prevalence reached 38% (N=900). In El Bayadh (N=12), no seizures due to parasites were reported.
In all the abattoirs inspected, only hydatidosis and strongylosis were recorded. Other frequently reported parasitic diseases affecting other ruminant species, such as fasciolosis, cysticercosis, etc., were not observed in all these abattoirs. Could their absence be linked to a climate unfavourable to the evolutionary cycle of parasites, or that dromedaries are not affected by these parasitosis, given that the distribution of parasitosis in ruminants varies from one species to another, or to the inspection technique itself?
In-depth investigations would be more than necessary to answer all these questions.

Keywords: Dromedary, Parasitosis, Abattoir, Hydatidosis, Strongylosis.

Lait de chamelle : valeur nutritive et propriétés thérapeutiques

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Résumé

Le lait de chamelle joue un rôle essentiel dans le régime alimentaire des populations des régions semi-arides et arides. En termes de valeur nutritionnelle, le lait de chamelle est supérieur à celui de la vache mais proche de celui de l'humain. Il contient des concentrations élevées de nombreux composés bioactifs essentiels à la santé humaine. Malgré ses multiples avantages nutritionnels et sanitaires considérables, les produits alimentaires fabriqués à partir de lait de chamelle sont encore très limités par rapport à ceux fabriqués à partir de lait de vache. Ceci est lié essentiellement au manque d'installations de traitement dans les zones d'élevage de chameaux, en plus, les nomades pratiquent l'autoconsommation de lait de chamelle cru et fermenté. Par ailleurs, le lait de chamelle est considéré comme une excellente alternative au lait humain dans les cas où l'acquisition de lait humain est limitée. Il présente un équilibre satisfaisant d'acides aminés essentiels pour l'alimentation humaine. En effet, il contient un pourcentage élevé de β-caséines facilement hydrolysées et ne contient pas de β-lactoglobuline allergisante. Aussi, il contient des teneurs élevées en vitamines et en minéraux, ainsi que de nombreuses protéines protectrices (immunoglobulines, lactoferrine, lysozyme et lactoperoxydase) qui ont des propriétés anticancéreuses, antibactériennes et antidiabétiques. En effet, la consommation du lait de la chamelle pour traiter le diabète est une ancienne tradition et une prévalence significativement plus faible du diabète a été constatée dans les communautés consommant ce dernier. La présente synthèse bibliographique décrit la composition et les caractéristiques physico-chimiques du lait de chamelle. Aussi, elle met en lumière ses bienfaits en tant que source naturelle de composants bioactifs pour la santé.

Mots clés : Chamelle, composition, lait, propriétés, thérapie.

Le lait de chamelle, une ressource sous-exploitée en Algérie : Stratégies de promotion et d'expansion

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Résumé

Le lait de chamelle, produit ayant des propriétés nutritionnelles exceptionnelles, est connu pour être une ressource très riche en vitamines C et B, contenant des protéines spécifiques, notamment les immunoglobulines et la lactoferrine, qui jouent un rôle essentiel pour renforcer le système immunitaire. En outre, le lait de chamelle contient des acides gras essentiels et une faible teneur en matières grasses et en graisses saturées par rapport au lait de vache. Il a la particularité d'être digest pour les personnes souffrantes d'intolérance au lactose, il possède des propriétés anti-oxydantes et anti-inflammatoires notables ainsi que son action contre certaines maladies chroniques, à l'image du diabète, car contenant de l'insuline. Au vu de toutes ces particularités, la production de lait de chamelle pourrait jouer un rôle majeur tant sur le développement socio-économique que pour la sécurité alimentaire, particulièrement dans les zones de distribution de cette espèce, en zones steppiques et sahariennes. Par ailleurs, force est de constater que ce produit reste une ressource sous-exploitée en Algérie. En effet, l'expansion de cette filière est confrontée à une multitude de facteurs limitant, parmi lesquels, le manque de sensibilisation des consommateurs, l'absence d'infrastructures adaptées pour la collecte et la transformation ainsi qu'un cadre réglementaire insuffisant. À cela s'ajoutent des difficultés liées à de faibles performances de production ainsi qu'à un accès limité aux marchés. C'est dans ce contexte général que s'inscrit la présente étude, préalablement, des données sur la production et sur la composition nutritionnelle de cette ressource seront exposées. En second lieu, l'aspect technique de la production laitière sera abordé afin d'optimiser les rendements laitiers par chamelle. En dernier, des plans d'actions seront proposés dans l'optique de vulgariser et de promouvoir la production de lait de chamelle en tant que ressource de haute qualité nutritionnelle et à faible impact environnemental.

Mots clés : Chamelle, lait, qualité nutritionnelle, stratégies.

Effects of Camel Milk on Diabetes

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Abstract

Camel milk is increasingly studied for its potential effects on diabetes management due to its unique nutritional composition, which includes insulin-mimicking proteins, vitamins, and antioxidants. The goal is to determine how camel milk affects blood glucose levels, insulin sensitivity, and hemoglobin A1c levels in diabetic patients.
A retrospective analysis of clinical studies was conducted to evaluate the impact of camel milk. The studies reviewed examined data on camel milk consumption and its effects on blood glucose, insulin sensitivity, and hemoglobin A1c levels. Results from a 2018 study showed a 22% reduction in blood glucose levels after 8 weeks of consumption in type 2 diabetic patients, a 2020 study revealed an 18% improvement in insulin sensitivity after 12 weeks of daily consumption, and a 2021 study observed a 15% decrease in hemoglobin A1c levels in people with type 1 diabetes after incorporating camel milk into their diet.
The retrospective results indicate that camel milk is associated with significant improvements in blood glucose regulation and insulin sensitivity.
In conclusion, retrospective data suggest that camel milk offers promising benefits for diabetes management, with notable improvements in glucose control and insulin sensitivity.

Keywords: Camel milk, Natural insulin, Blood glucose, Insulin sensitivity.

Sustainable Valorization of Camelid Slaughter By-products: An Innovative Approach for Resource Optimization in Arid Ecosystems

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Abstract

The dromedary camel plays a pivotal role in arid ecosystems, contributing significantly to both ecological balance and economic sustainability. While renowned for its production of milk and meat, the slaughter process generates substantial by-products that present both environmental challenges and potential opportunities.
This study examines the ecological impact of dromedary slaughter by-products in arid regions, focusing on their potential for sustainable valorization. We employ a dual methodological approach, combining a comprehensive literature review with field observations to provide a holistic perspective on this complex issue.
Our research explores innovative strategies for the recovery and exploitation of camel slaughter by-products, aiming to support sustainable development in arid regions. We analyze the potential environmental risks associated with improper disposal practices, as well as the public health implications. Simultaneously, we investigate the economic opportunities inherent in the efficient utilization of these materials.
Dromedaries, with only 58% of their mass typically utilized for human consumption, generate considerable volumes of slaughter by-products. These residual materials, if improperly managed, can lead to the formation of waste accumulations that threaten the fragile ecosystems of arid lands. Conversely, when viewed through the lens of circular economy principles, these by-products represent an underutilized bioresource with significant economic potential.
This study proposes a paradigm shift in the management of camel slaughter by-products, advocating for their recognition as a valuable, renewable resource for the contribution in the development of sustainable practices that balance ecological preservation with economic growth in arid ecosystems.

Keywords: *Camelus dromedarius*, Arid ecosystem, slaughter by-products, Waste management, sustainability.

16S rRNA gene sequencing identification of Probiotics isolated from Oued souf region camel milk

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Abstract

Raw camel milk and its fermented products can be a good source of potential probiotic strains. The present study aimed to isolate and identify lactic acid strains from Oued souf region camel milk using16S rRNA gene sequencing. After LAB isolation, microscopic and microscopic examinations were performed followed by biochemical and physiologica. tests including the catalase test, API 10s exhibit, growth at different temperatures (10°C and 45°C), and NaCl sensitivity (2%, 4% and 6.5%). Then 16S rRNA gene sequencing identification was done. The pre-identification results showed that 50% of the isolates were identified as *Streptococcus thermophiles* and these included SM45°C, 10^{-1}45°C. Fifty percent of the isolates belonged to *Lactococcus lactis* (10^{-1}37°C, 10^{-2}37°c). The analysis revealed that the 16S rDNA sequence of *Streptococcus thermophilus* exhibited the highest degree of identity with *Bacillus pumilus* (accession number: NZ_PTXV01000013.1, 99%), while *Lactococcus lactis* showed identity with *Bacillus safensis* (accession number: NZ_CP043404.1, 100%). This study discovered that raw camel's milk is very rich in probiotic bacteria, which makes it an important source for the food and pharmaceutical industries.

Keywords: Camel, milk, probiotics, 16S rRNA gene sequencing, Oued souf.

Effect of variation factors on the physicochemical quality of raw camel milk in Béchar region, Algeria

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Abstract

The aim of this study was to characterize the physicochemical properties of raw camel milk collected in the Béchar region and to investigate the influence of intrinsic and extrinsic factors. Milk samples were collected from 30 camels on five different farms. The factors considered included camel breed (Aftouh, Sahraoui, Ouled Sidi Cheikh, and Rguibi), parity (primiparous, multiparous, and grand multiparous), stage of lactation (plateau and decline), frequency of daily milking (once or twice), and breeding location (El-Hmar, Taghit). The physicochemical analysis showed the following results: pH (6.39 ± 0.31), acidity (16.85°D ± 0.92), density (1.03 ± 0.003), total dry extract (92.7 g/l ± 16), water content (90.73% ± 1.6), freezing point (-0.46°C ± 0.04), fat content (16.30 g/l ± 10.4), minerals (6.04 g/l ± 0.5), lactose (40.5 g/l ± 3.8), and proteins (26.7 g/l ± 2.7). Analysis of the variation factors shows that breed has a significant effect on density, protein and mineral content. Parity influences milk solids content. Lactation stages influences milk density, lactose, mineral, and protein content. In addition, farm location correlates with variations in milk density and freezing point. The frequency of daily milking also affects the milk density and freezing point. This study provides valuable insights into the dairy performance of camels in the Béchar region by investigating the physicochemical quality of their milk and identifying key influencing factors. Further research with a larger sample size and in additional areas of the Béchar region is recommended.

Keywords: Camel milk, quality, intrinsic and extrinsic factors, Béchar.

Camel milk consumption habits in the Béchar region, Algeria

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Abstract

This study, conducted in April 2024 in the Bechar region of southern Algeria, aimed to characterize camel milk consumption habits among 74 consumers identified at various points of sale. The results show that all participants consume camel milk, either individually (53%) or with their families (47%). In addition, 66% of the respondents also consume milk from other animal species (cow and goat), while 34% drink camel milk exclusively. The main reasons for consumption are therapeutic purposes (37%) and health benefits (34%). In terms of preferences, 62% of consumers prefer raw milk, while 38% prefer it boiled. Only 12% of respondents process camel milk into dairy products such as cheese, rayeb, or dhen. Most consumers (56%) store the milk for three days or less. The price of camel milk ranges from 150 DA to 1000 DA per liter. Moreover, 85% of the respondents reported that camel milk is available all year round, with a preference for consumption in winter. Notably, all purchases (100%) are informal. Consumers attribute therapeutic properties to camel milk, including antidiabetic, anticancer, and cardioprotective effects. In conclusion, this study highlights the important role that camel milk plays in the dietary habits of the Béchar region. Further research could deepen these findings and explore opportunities to optimize the camel milk value chain in the area.

Keywords: Camel milk, characterization, consumption, therapeutic benefits, artisanal processing, Béchar.

La production de viande cameline face aux défis des zones arides : perspectives pour un développement durable

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Résumé

Dans les zones semi-arides et arides, l'élevage des camélidés, particulièrement les dromadaires, se place comme un pilier de l'activité économique et de la sécurité alimentaire des populations. À cet effet, la viande cameline occupe une place prépondérante dans le système alimentaire où elle demeure une ressource précieuse, dans un environnement hostile, tant pour ses caractéristiques nutritionnelles que pour ses bienfaits uniques. Dans ce sens, la viande cameline est connue pour être riche en protéines de haute qualité, pauvres en matières grasse permettant ainsi une meilleure conservation. En outre, elle est une source importante de minéraux essentiels dont le fer et le zinc et renferme également des acides gras insaturés bénéfiques pour la santé cardiovasculaire. En somme, l'élevage camelin, à travers la production de viande, offre des solutions durables et des perspectives économiques intéressantes pour les éleveurs dans les zones marginalisées contribuant ainsi au développement local et à la lutte contre la pauvreté. Cependant, il convient de souligner que le développement de cette activité reste confronté à plusieurs défis, dont le principal est celui de la dégradation des pâturages, accentué par la sécheresse et la surexploitation, rendant la disponibilité alimentaire très limitée. Également, les contraintes liées à l'accès à l'eau ainsi que la piètre productivité des systèmes d'élevage traditionnels où les rendements en viande sont souvent insuffisants pour répondre à une demande croissante. En outre, le manque d'infrastructures adaptées pour l'abattage, la transformation et la commercialisation freine davantage le développement de ce secteur. Au vu de toutes ces considérations, le travail présenté donne, dans un premier temps, un aperçu sur la production de viande au niveau national ainsi que sur la composition nutritionnelle de cette ressource. Dans un deuxième temps, il propose des actions à entreprendre en vu de surmonter les obstacles et de présenter des solutions durables.

Mots clés : Élevage, camelins, viande, qualité, développement.

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