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"Main challenges and strategies for sustainable development »

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ABSTRACT BOOK

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PLENARY SESSION

The camel in Algeria: animal of the past, present and future: what is the scope of farming systems?

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ABSTRACT

In Algeria, while the camel is one of the greatest riches and resource reservoirs of the Saharan territory. Compared with other farm animals, this species was relegated to the background, despite a past that testifies to a preponderant role in a hostile environment. Due to its legendary sobriety, it is the emblematic animal of the merchant caravan and renowned for its versatility. It appears as an excellent means of locomotion, saddle, with interesting traction capacities in addition to being endowed with remarkable strength for ploughing and the use of *noria* or *delou*. Today, the increase in numbers has been accompanied by changes in production systems, while the notable increase in the demand for camel products revealed by the socio-economic changes in nomadic communities, in terms of education and health, have contributed to modifying animal husbandry practices. Indeed, the emergence of new specialized camel systems has changed the habits that now translate into an increased interest in both the systems adopted and the products related to them. The future of the dromedary would be projected according to a dimension of renewal, the camel industry, local products and camel services are as many assets to consider.

It is in this perspective that the present contribution, as a synthesis, attempts to highlight camel farming in the Algerian Northern Sahara.

Keywords*: Algeria; Dromedary; Livestock systems; Sectors; Sustainability.*

Current status and prospects of the cameline economy in the 21st Century

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ABSTRACT

Although difficult to assess, the economic importance of camel farming exceeds the volume of its productions (milk, meat, wool, leather) as large camelids provide many services (cultural, practical, environmental) to the populations from arid areas. With an estimated 40 million heads, the camel population remains marginal in the world of domestic animals. Its milk production would represent less than 0.50% of the milk consumed in the world and its meat production only 0.45% of the red meat. However, these proportions are constantly increasing and the population growth of the camel in the world has been undergoing a certain revival since the early 2000s, in line with the growing interest of the various stakeholders in the sector for its productions, especially camel milk. Passing from an "economy of the gift or of subsistence" to a market economy, the direct camel productions are representing an amount of around 8.2 billion euros. Thus, in this new context, camel farming looks an economic asset for people living on the margins of deserts.

Keywords: *Camel; Farming; Economy; Milk; Meat; Productions.*

Quality of camel meat and its potential for the development of sustainable food systems

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ABSTRACT

Camel (*Camelus dromedarius*) is the animal that can play a pivotal role in the future. First, for the healthy and nutritional benefits, camel meat can be a sustainable animal source protein for regional (and worldwide) supply. In fact, the knowledge about camels was traditionally restricted to limited geographical areas where it is reared/produced, particularly Middle East, Asia, and Africa. However, recently camel's products (milk and meat) are becoming well known worldwide. From an economic profitability point of view, camel meat has a competitive advantage over other meats due to low production costs. The camel meat, which is produced naturally and locally, would occupy important place on the global market. Though the scientific research achievements are modest, they open new up horizons for the development of the sector in order to improve the productive performances of camels in the desert and arid regions.

Future camel research should focus on exploiting its meat potential in the same way as dairy through interdisciplinary research: efficient production systems, improved meat technology and marketability. Suitable chilling and innovative packaging technologies are required to improve the safety of the products. This talk will summarize the current knowledge about camel meat production and the ways it can play a significant role in achieving the sustainable development goals.

Keywords: *Camelus dromedarius; Fresh meat and meat products; Alternative animal proteins; Perspectives; Resilience.*

Current and emerging tools to improve the quality of fresh camel meat: The potential of OMICs and artificial tenderization methods

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ABSTRACT

The decision to purchase meat by consumers is guided by a combination of interacting factors from which the main drivers are safety, nutrition, sustainability and perception of healthiness along with a variety of sensory properties. These aspects constitute the complexity of meat quality, known to be influenced, by both intrinsic and extrinsic traits that are related or not to the animal. In the last years, the quality of meat has become a more relevant topic and its control is very important for both the consumers and stakeholders. Therefore, several management strategies were proposed at the research and industry levels with the aim of better control and improvement of fresh meat quality traits. In this communication and among the tools developed in the field of camel meat research, the potential of foodomics approaches with a focus on proteomics for the discovery of biomarkers and the artificial tenderization of meat using proteolytic enzymes recovered with the Three Phase Partitioning system to enhance its texture, will be discussed. Both examples are in line with the 2030 Agenda for Sustainable Development Goals. The several methods developed or burgeoning aimed to advance further the research in the field of camel meat science and deliver sustainable meat products that meet consumers' expectations.

Keywords: *Quality of fresh and processed camel meat; High-throughput tools; Tenderization; Muscle proteome; Meat quality defects; Biomarkers; Meat quality evaluation; Plan proteases.*

What are the impacts of new camel skin and hair treatment processes on the future development of their sectors?

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ABSTRACT

The dromedary is adapted to the climatic conditions of arid and desert zones. Thanks to its specific feeding behavior, it succeeds to take advantage of the vegetation available on its range to better meet its food requirements (needs) compared to other domestic ruminants. It also has the advantage of being able to value halophyte ranges and thorny vegetation allowing it be a key element of the ecological balance of these fragile areas. The foreseeable and already felt climate changes in several regions of the globe, particularly in Africa and the Middle East, militate towards an extension of the geographic range of this fantastic animal specie as well as an increase in its numbers at the global level (Faye, 2012). In addition to its ecological role, the dromedary is also a production animal. This production is essentially limited, in several countries, to meat and, at a secondary level, to milk. The production of hair and skin is not negligible but it generally remains undervalued. The evolution of production systems, in several countries, from a purely extensive system to a semi-extensive or even intensive system for the production of milk or meat, to which is added more frequent drought seasons, have generated an increase in production costs and consequently a reduction in the profit margin of this breeding. The diversification of camel production could be a promising alternative to ensure the sustainability of its breeding by young generations of breeders.

In addition to its artisanal valuation, research work carried out in several countries on camel hair has shown good characteristics, in particular the hair of young camels, approaching those of cashmere and therefore a real textile potential of this natural fiber (Moslah et al. 2009; Harizi et al., 2007). Similarly, new processes for treating dromedary skin have been developed in Tunisia and in other countries and have led to good quality treated leathers (physical, grain, flexibility) allowing the manufacture typical footwear and leather goods highly sought after by tourists in particular (Moslah et al., 2009a; Mansouri et al., 2009; Moslah et al., 2009b; Khorchani et al., 2018). Work aimed at the production of gelatin from the skins of dromedaries has led to very encouraging results which would make it possible to meet the significant needs in the field of the food and cosmetics industry certified "Halal" (Al-Hasen, 2020; Ahmed et al 2020; Fawale et al 2021; Bessalah et al 2022)

This communication aims to discuss the impact of these new processes on the development of the sectors of these two products (skin and hair) with a view to diversifying camel production for a more sustainable breeding of this specie in difficult areas.

Keywords: *Camel; Skin; Hair; Development; Future.*

Camel genetics and biodiversity

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ABSTRACT

The dromedary, emblematic animal of the desert and, according to a large number of specialists, the key to the response to food spitting expected in 2030. Indeed, the dromedary is an animal that has proven itself in both hot and cold deserts. . As a result, many researchers around the world have been interested in this animal. In recent years geneticists have been investigating all aspects of this animal from the microbiota and the study of its immune system to the total analysis of its genome.
However, this animal, apparently the last in the list of animals that humans have successfully domesticated, does not show great breed diversity. This state of affairs, being a strong point for launching successful selection programs because it reflects the absence of abiotic selective pressure and therefore the presence of significant genetic variability.

Keywords: *Camel ; food spit ; climate change ; genetics and diversity.*

TOPIC 2
Dromedary productions and products
&
TOPIC 4
Dromedary economy and sustainability

CONFERENCES

Place of the dromedary in the ecological balance of its saharan ecosystem

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ABSTRACT

The dromedary is the only breeding species capable of adapting to the harshness of its desert environment. It manages to reproduce and produce, making the most of the very meagre floristic resources of the Saharan ecosystem. Moreover, thanks to these adaptive faculties and its particular feeding behaviour, it contributes largely to the preservation and proliferation of the floristic cover of its Saharan rangelands. Indeed, an overview of studies conducted by our research team has shown that this animal lives in perfect harmony with its environment. On the one hand, it adopts a mode of ambulatory grazing that respects the balance of floristic and vegetative diversity: 1- by being very selective with regard to the species and parts of the plant, 2- by moving from one plant to another without exhaustion and without uprooting, 3- by grazing the parts of the plant (stem leaves, seed flowers) according to availability, 4- by managing to cover its daily needs, whatever the variations in fodder supply (linked to seasonal climatic variations), 5- by travelling daily distances that can exceed 50 km/day, so as not to exhaust and overload restricted spaces. On the other hand, the dromedary, by endozoochory, contributes largely to the dissemination of seeds in the widest possible space. In addition, passage through the digestive diastases can potentially favour the germination of seeds with a hard integument and lift the dormancy of several species, not to mention their preservation in the droppings until favourable conditions (rainfall) for their germination occur.

Keywords: *Dromedary; Saharan ecosystem; Preservation; Flora; Endozoochory.*

Camel breeding in Algeria

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ABSTRACT

Camel breeding remains marginal in Algeria, but represents an invaluable animal resource for desert regions. The camel is one of the few domestic species that produces milk, meat, leather, wool, manure and work. The Algerian camel herd has experienced a significant increase in recent years, reaching a population of about 4165000 heads in 2019. This livestock is located in 17 Wilayates, including 8 Saharan and 9 Stepppiques. The main breeds raised in Algeria are: the Chaambi, Ouled Sidi Cheikh, Ait Khebbach, Steppe Camel, Saharaoui, Targui, Ajjer, Reguibi and Ftouh. The camel sector in Algeria is facing several constraints of sanitary, genetic, logistical and organizational nature. The management of land and common spaces, following the sedentarization of some breeders, is another difficulty that the sheep sector must face. Several favorable factors to the camel breeding in Algeria such as pedoclimatic diversity of the country, culture/religion, economic and genetic (diversity) can help to improve the Algerian red meat production. The objective of this paper is to present the current situation of camel farming in Algeria.

Keywords: *Dromedary; Algeria; Livestock system; Arid regions; Sahara.*

Use of Lactocorder® to evaluate milking performance in dairy camels

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ABSTRACT

Milkability can be evaluated by the analysis of milk flow curves. They are commonly recorded by Lactocorder® to evaluate the quality of the milking process and individual milking performance of dairy animals. The objectives of this work were to evaluate the feasibility of using lactocorder as a diagnostic tool for evaluating milk flow traits and to highlight possible flaws in milk ejection curves analysis of dairy camels. A total of 808 milk flow curve belonging to 32 Maghrebi she-camel were evaluated. The Lactocorder® apparatus (*WMB AG, Balgache, Switzerland*) was connected to a portable machine milking (48 kPa, 60 cpm and 60:40 pulsation ratio) and inserted between the milking unit and milk pipeline by milk hose. Milk flow data were processed using LactoPro 5.2.0 software (*Biomelktechnik, Swiss*) to evaluate more than 40 different measures including peak and average milk flow rate, milk yield, stripping yield, effective milking duration, lag-time and bimodality. Camel's milk flow curves were divided into 3 main phases based on milk flow rate. Bimodality was described and related to either need for udder stimulation or easiness of teat sphincter opening for this species. Occurrence of over milking, air entry, delayed milking cluster attachment or milk flow recording, lack of stimulation, disturbed milk ejection and oxytocin injection were described in this work. It could be concluded that among the parameters provided by the system, some seem more relevant than others for the analysis of milk ejection curves of she-camel. Thus, we consider that the Lactocorder® could provide useful information for enhancing milking efficiency and evaluation of milkability of dromedary camels.

Keywords: *Dairy camel; Lactocorder; Milk flow; Machine milking; Milkability.*

Measurement of teat tissue reaction to machine milking in dairy camels: preliminary results

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ABSTRACT

This work aims to investigate machine milking-induced short term changes in teat tissue condition measured with a spring-loaded caliper (cutimeter) and ultrasound scans. Six multiparous (from 2 to 4) Maghrebi she-camels (age: 7-14 years, weight: 460 ± 55 kg) well trained to machine milking were followed for 12 weeks. The teat-end tissue density (TD) was measured by cutimeter immediately before and after milking. Longitudinal ultrasound cross sections of the teat were performed by B-mode ultrasound before and immediately after milking using a linear 6 MHz probe to determine teat canal length (TCL), teat wall thickness (TWT), teat apex diameter (TAD) and teat cistern diameter (TCD). Post-milking diagnosis of udders showed that the most observed aggression on camel teats was compression rings that disappeared rapidly within 15 min after milking. TD decreased of - 2.27 mm immediately after milking, which represented a decrease of 15.9% in the thickness of the teat tip. Ultrasound scans showed an increase in TCL and TWT of 20.9% and 40%, respectively and a decrease in TCD and TAD of -40.2% and -19.9%, respectively immediately after milking. Significant interactions between TD and teat internal dimensions were registered. TD was negatively correlated to TWT and TCL (r= -0.22, P=0.02 and r= -0.36, P<0.001, respectively) and positively correlated to TCD and TAD (r= 0.31; P<0.01 and r= 0.41, P<0.001, respectively). The study showed that using of ultrasound techniques may be a useful tool to evaluate changes that occur in teat tissue due to machine milking in dairy camels.

Keywords: *Dairy camel; Machine milking; Teats; Cutimeter; Ultrasound.*

Improvement of the clotting ability of camel milk: use of enzymatic extract of the kaolin layer of the chicken gizzard

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ABSTRACT

The processing of camel milk into cheese is considered a very delicate operation due to the difficulties of coagulation of this milk. The objective of this research is to improve the coagulation abilities of camel milk by using an enzyme extract from the Kaolin Layer (ECK) of chicken gizzards. The characterization of the enzyme extract showed an extraction yield of 30.54 ± 3.26; optimal pH equal to 5; optimal temperature equal to 45 ° C; CaCl2 concentration equal to 0.09M. In addition, the enzyme showed a very high coagulant power mainly for camel milk: UP = 0.630 ± 0.04 against a coagulation frequency of 0.672 ± 0.05 for bovine milk with considerable proteolytic activity mainly on camel milk. Coagulation by ECK made it possible to obtain very considerable cheese yields: successively for bovine and camel milk.

Conclusion: Obtaining a firm curd - after incubation of camel milk with ECK - shows the usefulness of this enzymatic extract, as a substitute for bovine rennet. The study of the flocculation time confirmed the affinity of ECK for camel milk caseins.

Keywords*: Camel milk; Coagulation; Kaolin layer; Chicken gizzard.*

Camel milk cheese: optimization of processing condition using protease from pineapple fruit

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ABSTRACT

The transformation of camel milk into cheese is an operation considered very delicate because of several difficulties encountered in achieving coagulation. The present study aims to improve coagulation abilities of camel milk using enzyme extracts from pineapple in comparison with cow and goat milk. Our results concerning the characterization of the enzymatic extract showed a higher extraction yield (pineapple: 75.28% ± 4.59). The optimum coagulation conditions for pineapple were: pH=5, temperature = 45°C, and the physicochemical characteristics were: for pH= 3.58 ± 0.01, dry matter content was 85.15 ± 4.95g / l and protein content= 74.08 ±1.25 g / l. After manufacturing process, the cheese yield was determined for the 3 types of milk and the highest cheese yield was observed in goat milk cheese (27%), followed by cow milk cheese (11.08%) and camel milk cheese (19.74%). The physicochemical characteristics of camel's, cow's and goat cheese with pineapple showed that Camel milk cheese has higher protein content and the best texture was observed in cow milk cheese. A fresh cheese made from camel milk with a particular nutritional quality, consistency. The pineapple proteases displayed chymosin-like properties and thus hold the best potential for use as a milk coagulant in cheese production.

Keywords: *Camel milk; Coagulant activity; Proteolytic activity; Vegetable enzyme; Pineapple.*

Frequency of camel meat consumption in Kabylia region (Bejaia, Bouira & Tizi-Ouzou) in Algeria compared to goat, lamb, beef, horse and chicken: results of an online survey

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ABSTRACT

This study aimed to investigate using on an online survey, the frequency of meat consumption and preferences from several animal origins in the region of Kabylia in Algeria within 3 provinces (Tizi-Ouzou, Béjaia and Bouira). Thus, in this communication we examine more specifically the consumption of camel meat compared to goat, lamb, beef, horse and chicken through an exploratory survey on a homogenous gender consumer's population of different ages. The main objective is to obtain the first overview of meat consumption frequencies in Kabylia region and preferences of the targeted meat sources. The survey revealed that 95.5% of the respondents are consumers of meat and meat products (n = 497) *versus* 4.1% (n = 21) that never consumed meat. This study identified that the majority of the respondents never consumed both camel (54.3%, n = 270) and horse meat (44.7%, n = 22). From those consuming camel meat, only 8 of them eat it always (1.6%), and the others sometimes (35%) or rarely (9.1%). Chicken is the only meat that is eaten by all of the 497 respondents and 85.3% of them declared consume it always followed by beef (55.9%) and lamb (18.7%). Further, chicken is the most liked meat compared to the others. Camel and horse meats are the main disliked meats. Goat meat seemed to be intermediate compared to the other species, where it is never consumed by 27% of the respondents and it is mostly consumed sometimes (44.9%, n = 222) or rarely (21.3%, n = 106) and on average appreciated. This study is the first to highlight in the Kabylia region the trend of meat consumption from several species, revealing that the major consumed meat is from chicken followed by beef and lamb. Goat meat is weakly consumed, while camel and horse are never or rarely.

Keywords*: Meat consumption; Algeria; Consumer preference ; Livestoc;Online questionnaire.*

Social and economic advantages of camel hairvalorization. Case of the Ouabar Aiguiga in the Djelfa region

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ABSTRACT

In Algeria, few research studies have been carried out on traditional knowledge, particularly in relation to the preparation of local products made from camel hair. The purpose of this work is to shed light on the valorization of camel hair from the first fleece locally named *Aiguiga* and to report on the stakes and challenges facing the Tissage *Ouabri* sector in the Djelfa region. It is a leading territory in terms of production of "Ouabri" dromedary hair cloths of the "Aiguiga" type. This research is based on quantitative and qualitative survey data and a conceptual approach that puts ancestral income-generating knowledge at the centre of the analysis. The results have shown that this activity undoubtedly represents a source of resilience for pastoral and agro-pastoral societies subject to global changes. In fact, more than 66% of the production of the households surveyed is destined for commercialization. However, among many constraints, the lack of geographical recognition of the local product, income inequality (between women and men), the lack of good governance, the high price of *Aiguiga* hair and the ageing of the artisans would be important risk factors for the development of the *Ouabri Aiguiga* sector.

Keywords*: Knowledge; Artisan; Cloth; Income; Resilience; Chain.*

POSTERS

Breeding and nutrition of camels in Algeria

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ABSTRACT

Among the mammals domesticated by man for his needs, the dromedary, a versatile animal is used for the production of milk, meat, wool and skin, as well as for sport, tourism and transport. However, knowledge about the breeding and feeding of this animal is limited. The objective of this work is to synthesize the various works on the breeding and feeding of camels in Algeria. The results showed that the main farming systems are: transhumant, sedentary and nomadic. In addition, the diet of the dromedary is based on the different types of Saharan routes and constitutes the main element on which the extensive camel breeding system is based. Thus, for a better valorization of this species, other studies on the diet and breeding methods of camels are recommended.

***Keywords**: Camelids; Algeria; Breed; Nutrition; Sahara.*

Seasonal Variations of Intake in Males Camels on Sahara Rangelands of Algeria

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ABSTRACT

The goal of this study was to determine the seasonal and age effect on male camels' intake. Over the two seasons (wet and dry season) follow-ups were conducted at El Alia rangelands (south-east of Algeria). Eight males were selected to measure bite counts and dry matter intake (DMI) per season; they were distributed in two groups, adult males (AM) and young males (YM). The results showed that there was a significant difference ($p< 0.05$) in the number of bites according to the season and the age categories, with a maximum average of 80.33±18.206 for AM in dry season and a minimum average of 15.50±9.955 for YM in wet season. During the wet season, the highest amounts of dry matter intake (DMI) were recorded for *Traganum nudatum Delile.* with 2.01 kg DM for AM and 0.28 kg DM for YM, while the lowest intake concerns *Salsola longifolia Forssk*., and Salsola tetragona *(Delile) Moq.*, with 0.38 and 0.39DM Kg, respectively during the dry season in (YM).The season also influences camel selection, *Limoniastrum guyonianum Boiss*. exhibited high amounts of dry matter intake (DMI) in dry season with 1,10 and 0,22 kg DM respectively in AM and YM, but significantly decreased in AM and YM during wet season (0,03, 0,02 kg DM respectively). The season influences the feed intake of male camels on course.

Keywords: *Camel; Feed intake; Sahara rangeland; Season; Vegetation.*

Dairy camel farming systems in Algerian Northern Sahara, Mutations or development strategies

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ABSTRACT

Dairy camel farms are increasing in many regions of Northern Algerian Sahara, due to the nutritional and therapeutic role of camel milk, and its value as source of income. The purpose of this study is to highlight the typology of dairy camel production systems adopted by camel owners in the region of Ouargla, using a detailed survey. The present study was carried out on 9 dairy camel farms, in 3 areas, composed by 185 dromedaries, with 56 % of dairy she-camel. The surveyed dairy camel farms are located in peri-urban and peri- oasis areas, characterized by small herds. Three types of camel dairy farming were distinguished, 55.5 % of the camel drivers surveyed adopt a semi-intensive transhumant peri- oasis system, 33.3 % an intensive peri- oasis system and 11.1 % an intensive peri-urban system. She-camels produce daily, between 3 to 6 liters of milk, by *milking she-camels twice a day*. *Milked* product is marketed in situ or in urban shops, at a rate of 500 to 600 DA per liter. Lactation length ranges from 6 to 18 months, depending on marketing opportunities available for the camel drivers. Even if it is a temporal activity, but semi-intensive and intensive camel dairy farming become a reality in the region of Ouargla, and has shown promising results. These management strategies allow improving incomes for camel owners, and add value to camel products, especially in urban centers where there is a demand for camel milk.

Keywords*: Ouargla; Breeding camel system; Dromedary; Dairy production; Camel owners*.

Pathological constraints to camel breeding development; œstrosis and urolithiasis

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ABSTRACT

This study is conducted to reveal any unusual dromedary behavior mainly related to œstrosis and urolithiasis with its clinical course and associated risk factors. A survey was carried out in the Djanet region in the south-east of Algeria, from August 2013 to September 2014, on a herd of 58 castrated camels aged 8 to 11 years old. A prevalence of 27.58% of caseous lymphadenitis, 6.89% of œstrosis, and 10.34% of urolithiasis was found. The total mortality rate is 17.24%. No difference is found for age ($P<0.05$). The temporal evolution indicates an almost total attack by œstrosis in September and October (2013). Larvae of *Cephalopina titillator*, parasites of the camel's nasal sinuses, were identified after recovery. They can cause compressions on the brain, consequently, a change in behavior followed by an often fatal outcome. In the case of urolithiasis, urinary retention causing rupture of the bladder after uremic syndrome, dysuria then anuria, a remarkable impairment of general condition with the erasure of the bump have been reported (cachexia). Knowledge of the herd's health status is primordial to livestock development.

Keywords*: Camel breeding; Health; Cephalopina titillator; Urolithiasis; Algeria.*

Camel hides in the Algerian northern Sahara: Production, marketing and utilization

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ABSTRACT

Camel hides considered important and precious resources for Algeria and for other African countries. However, it has been observed that the full potential of camel hides has not been valued or exploited in Algeria. This has been attributed to the poor quality of the skins, which results in a low commercial value of this hide on the internal markets in the Algerian northern Sahara. This led to the need for Algeria to conduct this study, which aimed to assess the production, marketing and use of camel hides from northern Sahara. The study took place in two regions of northern Sahara namely Ouargla and El-Oued. Research methods included semi-structured questionnaires, key informants, direct observations and documentary information. The results showed that breeders never use camel hide with the exception of a few nomadic breeders who use it for domestic purposes. The study also revealed that the slaughterhouses discarding the hides entirely, except at the level of the abattoirs of the chief town of the commune of El-Oued and Ouargla where the hide is ceded free of charge to the Malians and Nigeriens. The study also indicated that camel hides were of poor quality due to poor methods of flaying and curing hides.

Keywords: *Camel hide; Production; Marketing; Utilization; Northern Sahara.*

Effect of pancreatic enzymes on tyrosinase inhibitory activity of camel αS-casein

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ABSTRACT

In recent years, several investigations have been undertaken to confirm or refute the health claims attributed to camel milk. In this context, we were interested in camel milk αS-casein. The aim of this study was to investigate the effect of pancreatic enzyme hydrolysis of camel αS-casein on their tyrosinase inhibitory activity. The αS-caseins were isolated and purified from the total caseins by using anion-exchange chromatography and then hydrolyzed, fractionated and assayed for the *in vitro* tyrosinase activity by using L-DOPA as a substrate. After enzymatic hydrolysis, the activity was significantly increased whereas chymotryptic hydrolysis released peptides with higher activity than trypsin. The obtained fraction with a low molecular weight (<10KDa) exhibited the highest activity. This study reveals that camel milk αS-casein may be a great candidate for incorporation into functional foods to help in preventing disorders caused by oxidative reactions in food and the human body**.**

Keywords: *Camel milk ; αS-casein ; Purification ; Pancreatic hydrolysis ; Tyrosinase inhibitory activity.*

The use of a natural product "camel milk" against hyperglycemia

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ABSTRACT

In many countries around the world, camel milk is a healthy food used to treat many health issues including diabetes. Thus, it has been demonstrated from several in vivo studies that the consumption of camel milk either fresh or fermented could have a positive effect on certain diseases and metabolic disorders such as hypercholesterolemia and hypertension. On the other hand, lactic cultures from camel milk have also been tested for their probiotic potential and have shown encouraging results. The objective of this work is to synthesize the data related to the benefits of camel milk and its effect on glycemia. Thus, more in-depth studies should be carried out on humans, in order to confirm the hypoglycemic effect of camel milk.

Keywords*: Milk; Camel; Diabetes; Probiotics; Health.*

The suitability of camel milk for cheese processing

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ABSTRACT

Due to its chemical composition, camel milk is difficult to process into cheese, indeed its low concentration of kappa casein is the main cause (3% against 13% in cow's milk). This is why since 1980 most research has focused on improving the suitability of this milk for cheese processing in order to obtain a coagulum.
With the advent of genetic engineering, the introduction of chymax-M1000 in the processing of camel milk is a real technological revolution making it possible to obtain a coagulum.

Keywords: *Camel Milk; Cheese; Suitability; Processing.*

Ability to process camel milk into cheese and butter

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ABSTRACT

First, a review of cheese and butter technologies is mentioned. Then after a brief outline of lactation, the authors discuss the ability of cheese and butter processing dromedary milk, in fact the milk of this animal is more difficult to be transformed than the milk of other domestic animal species. The difficulty in obtaining these products consists of a specific composition of the milk fat matter in this species which is characterized by a high content of short-chains fatty acid, a reduced total dry matter as well as casein content, a large diameter of casein micelles and a reduced kappa casein content, this latter is the same one that plays an essential role in enzymatic curdling. In addition, the cheese has low drip ability due to the extreme fragility of formed gels and lactic curdling, rich in antibacterial products; this milk has also a tendency to naturally inhibit lactic acidification by fermentation.

Keywords*: Milk; Camel; Capacity; Cheese; Butter.*

Valorisation of camel meat and meat products

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ABSTRACT

Camel meat is considered as good source of nutrition, its taste and texture are similar to that of cattle and has an amino acid content ten times higher than that of the latter. Moreover, its consumption is very low and the manufacture and marketing of camelina meat products are very neglected. The objective of this work is to promote camel's meat and the derived products from it. Thus, the industry sector should launch and invest in the production of large ranges of camel meat, in order to meet consumer demands.

***Keywords**: Camelids; Algeria; Meat; Meat products; Consumers.*

Dried camel (*Camelus dromedarius*) meat contributing to a food safety

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ABSTRACT

The work presented in this paper is an experimental study of the static drying effect on the physicochemical quality of camel (Camelus dromedarius) meat with the aim of contributing to a food safety. During the experiments, meat is cut into 0.8±0.2 cm thick slices, soaked in a saline solution during 30 minutes and then dried at 65 °C. An analysis of the physicochemical quality parameters is carried out before and after drying.
The physicochemical quality of dried camel meat obtained meets the requirements of the Codex Alimentarius Commission. Indeed, the results show that the moisture content of the dried camel meat slices decreases from 73.94 ± 0.51% to 13.33 ± 0.44 %. The dried food samples are characterised by increases: (i) from 19.72 ± 0.30% to 50.97 ± 0.65%, in protein content; (ii) from 1.115 ± 0.012% to 4.781 ± 0.047%, in ash content; (iii) from 260±11.7 mg to 1690±32 mg, in the sodium content with respect to 100 g of dry matter and (iv) from 5.956 ± 0.087 to 6. 203 ± 0.091, in pH value. However, the same samples are characterised by a stability of the mineral content (Ca, P, Mg, K, Zn, Fe, Cu, Mn). The results also show the mean values of the colorimetric parameters of brightness (L*), redness (a*) and yellowing (b*) are (37.13 ± 1.64, 22.02 ± 0.72, 7.73 ± 0.69) successively for the fresh meat and (25.57±1.56, 9.43±0.78, 3.74 ±0.21) for the dried meat.

Keywords*: Camelus dromadarius; Camel meat; Drying; Quality; Safety food.*

Technological aspects of lactic acid bacteria isolated from camel and goat kefir

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ABSTRACT

This work aimed to study the technological aspects of lactic acid bacteria isolated from camel and goat Kefir.
First, the physicochemical and microbiological compositions of the Kefirs (camel and goat) were determined in comparison to cow Kefir. In fact seven strains are isolated. This study revealed that these lactic acid bacteria have good technological potential: good acidifying and antibacterial activity.

Keywords*: Kefir camel; Kefir goat; Isolation; Lactic acid bacteria; Technological aspects.*

TOPIC 1
Dromedary biology
&
TOPIC 3
Dromedary and health

CONFERENCES

Comparative study of the phenotypic and molecular genetic diversity of "Tergui" Camel population in the Hoggar region (South Algeria)

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ABSTRACT

In the framework of the sustainable management of the genetic diversity (morphometric and molecular) on the "Tergui" camel population represented by the phenotypes (Abahou, Amelal, Alemlagh, Atelagh, Azerghaf) surveys in the Hoggar area about a total of 87 individuals from 11 localities in order to estimate the variability inter-intra-population. The morphological results give full information about the structure and demonstrate an important polymorphism. The results of genotyping of the DNA with 20 microsatellite markers made it possible to demonstrate inter and intra-population genetic variability characterized by a high rate of heterozygosity (Hnb) and effective alleles. The rate of heterozygosity in our phenotypes varied from 0.56 to 0.63, which is higher than that observed in foreign populations ranging from 0.537 to 0.629. A total of 169 alleles of 20 microsatellite loci were detected. The mean number of alleles per locus was 7.15, 6.15, 3.10, 4.45 and 3.25 for Abahou, Amelal, Alemlagh, Atelagh and Azerghaf, respectively. The loci evaluation showed higher PIC values greater than 0.5 which are considered very instructive. The heterozygous values observed for all the loci analyzed were lower than expected, which could be attributed to inbreeding in the population or by subdivision of the studied population into distinct breeds and phenotypes. On the other hand, the number of observed alleles is higher have shown a frequency that exceeds 7.3%. The genetic differentiation values between the phenotypes analyzed were much lower and the level of differences accounted for 1.1 % of the total genetic variation. All loci contributed to this differentiation with FST values being moderately low and similar but very significant ($P < 0.001$). The overall FST value was similar but slightly higher than that of 0.9%. The genetic similarity between the phenotypes and the classification methods (AFC and DACP) gave results similar to the phenotypic characteristics showed that they appear to be genetically very similar and support the decision to consider them little differentiated.

Keywords: *Dromedary; Genetic characterization; Genetic variability; Microsatellite; Camelus dromedarius; Tamanrasset.*

Teeth follow-up throughout the life of the dromedary: Zootechnical & veterinary importance

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ABSTRACT

The dromedary is the domestic animal of arid and desert regions; its oral cavity was developed to allow the ingestion of desert plants often not consumed by other species. In fact, the teeth of this species have specific anatomical particularities of pseudo-ruminant animal, by their shapes, their arrangements, their formula and their kinetics of eruption and wear. With a number of 22 milk teeth and 34 permanent teeth, including two incisors and two canines on the upper jaw and six incisors and two canines on the lower jaw, the age estimation of a dromedary remains difficult for most clinicians. This precise age determination is very important not only, for breeders and young promotors when purchasing animals, but also for the clinician during veterinary or zootechnical examinations. This work was carried out within a herd of 70 camels belonging to Arid Lands Institute (IRA Tunisia), and which based on monthly and annual monitoring and examination of the morphology of the teeth (eruptions, changes and wear) throughout the life of the dromedary.

***Keywords**: Teeth; Estimation age; Dromedary camel.*

Estimation of intake and digestibility of pastoral species palatable for dromedaries using near- infrared spectrometric NIRS feces analysis

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ABSTRACT

The estimation of the nnutritional value of forages depends on the measurement of the quantities ingested and the digestibility. However, these measurements are very heavy and expensive, and can hardly be made in field condition. Many studies have been conducted to try to use the near infrared spectroscopy (NIRS) as a method of estimation [1] on forage corn and more recently [2] on temperate green fodder. The present study explored the value of faecal NIRS in estimating the dry matter intake (DMI) and the *in vivo* DM digestibility (DMD) of 3 pastoral species supplemented with oat-hay and straw offered to 4 she-camels. Reference data and faecal spectra were measured from three trials of *in vivo* digestibility in which animals were fed 6 different diets. Individual faecal samples (n=12) were collected, dried, milled and scanned between 870 and 2500 nm using a BRUKER spectrometer (TANGO). Calibration equations were developed for predicting DMI and DMD. The coefficient of determination R_c^2 and the standard error of calibration SEC were used to evaluate accuracy of models. The calibration of DMD and the DMI present an acceptable accuracy with respectively (R_c^2=0.90; SEC=2.82) and (R_c^2=0.85; SEC=0.52). NIRS applied to faeces can predict simultaneously the digestibility and intake of pastoral species samples in south of Tunisia appeased by camels.

Keywords*: Intake; Digestibility; Camels; Calibration; NIRS.*

Cystic Echinococcosis in Algeria: The Role of Camels as Reservoirs in the Dynamics of Transmission of *Echinococcus granulosus* to Humans via Dogs

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ABSTRACT

Molecular typing of *Echinococcus granulosus* strains is essential to define a well-adapted cystic echinococcosis control strategy because the strains are differentiated by various factors: pathogenicity for humans, duration of the pre-patent period in definitive host, antigenicity, PCR amplification and sequencing of mitochondrial cytochrome oxidase 1 (Cox1) and dehydrogenase 1 (Nad1) genes were used to characterize 42 isolates of *E. granulosus*: 28 collected from cattle (4 sheep, 3 goats, 17 camels and 4 cattle) in various slaughterhouses and 14 collected from humans in hospital surgery departments in southern Algeria. The results demonstrated the presence of 2 distinct genotypes: 85.7% of the G1 genotype (sheep strain): and 14.3% of the G6 genotype (cameline strain). The G1 genotype found in 75% (3/4) of sheep, 100% (3/3) of goats, 100% (4/4) of cattle and 82.3% (14/17) of camels. The G6 genotype has been identified at 17.6% (3/17) in camels, 25% (1/4) in sheep and 14.3% (2/14) in humans. The high frequency of G1 in camels suggests that camels whose cysts are most often fertile may represent, in southern regions, a source of indirect transmission to humans of this zoonotic strain.

Keywords: *Echinococcus granulosus; Molecular typing; G1; G6; Algeria.*

Study of the hard tick *Hyalomma dromedarii* (Arthropoda, Ixodidae) in camels in southern Algeria

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ABSTRACT

Camels can have internal pathologies or be infested by external parasites such as hard ticks, these could constitute a real problem for breeders given the cost of the drugs used to eliminate them but also to possibly treat the dromedaries because the Ticks are vectors of various pathologies. In Algeria, work has shown the existence of several species infesting dromedaries, among them *Hyalomma dromedarii* which was once considered not to be a vector of germs but according to a recent study, (Perveen, N et al., 2020) Hyalomma dromedarii can have a rich and diverse microbiota with a potential to harbour pathogenic bacteria, which could pose a serious health risk to camels and humans (Perveen N et al., 2020), and as this species is common in southern Algeria, we are interested in identifying it and studying its presence at the same time as other species of ticks on camels, so a study was conducted between 2020 and 2022 in the region of ElOued, Ghardaia and M'sila, our results show the presence only of species of the genus *Hyalomma* correctly: *H. dromedarii* (7.14%), *H. impeltatum* (10.71%), *H. lusitanicum* (40.82%), *H. anatolicum excavatum* (31.12%), *H. anatolicum anatolicum* (4.08%), *H. detritum detritum* (3.06%), *H. marginatum turanicum* (0.51%), *H. marginatum marginatum* (2.55%).

Keywords*: Hyalomma dromedarii ; Algeria ; Dromedaries ; Association of ticks.*

Prevalence of *Trypanosomaiasis* in camels in the wilaya of Tamanrasset

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ABSTRACT

One of the most important diseases affecting the dromedary is trypanosomiasis, which is a parasitic disease transmitted by the bite of a hematophagous sandfly, this parasitosis does not have pathognomonic symptoms but only certain indicator symptoms on the infected territories such as anemia, hyperthermia, adenomegaly, asthenia, weight loss, more delayed hair loss, tearing, abortions in the female who may become less fertile, edema. This disease has different forms of development, acute, chronic and also inapparent, in the absence of treatment this disease is fatal.

This study was carried out in Tamanrasset in order to estimate the prevalence of trypanosomiasis in camels, as well as to evaluate their variation according to age and sex; blood samples on EDTA tube were taken between 15 August and 15 September 2020 at the public slaughterhouse of the willaya; *Trypanosoma evansi* were identified through its structural properties which were verified by observation of blood smear stained with GIEMSA under an optical microscope at 100 magnification. The results showed a prevalence of 4.9% in a total of 81 camels that were found positive. Females are significantly the most affected compared to males, and the most affected age group is those older than 10 years with a percentage of 16.7%.

Keywords: *Trypanosoma evansi; Dromedary; Prevalence; Tamanrasset.*

Some mosquito-borne virus infections in dromedary camels in Algeria: Akabane, Bluetongue and Schmallenberg viruses

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ABSTRACT

In Algeria, scare literature explored the mosquito-borne virus infections of domestic camels. In this study, blood samples collected from dromedary camels in the Algerian provinces of Laghouat and Ghardaia, were examined to detect antibodies to the Bluetongue (BT) and Akabane (AKA) viruses using enzyme linked immunosorbent assay and serum neutralization tests, respectively. Polymerase chain reaction (PCR) was used for Schmallenberg virus (SBV). Overall, 16 (14.4%) and 2 (1.8%) of 111 tested camel serum samples were seropositive for the BT virus (BTV) and the AKA virus (AKAV), respectively. Furthermore, no detection of Schmallenberg virus in this study is noted. The present study determined that BTV infection was prevalent in camels in Algeria, and antibodies to the AKAV were also detected for the first time in Algerian camels.

Keywords: *Akabane virus; Algeria; Bluetongue virus; Schmallenberg virus; Camel; Seroprevalence.*

Nasal carriage of *S. aureus* in dromedary camels in southern Algeria

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ABSTRACT

Staphylococcus aureus is a major human and animal commensal and opportunistic pathogenic bacterium. 47 camels were sampled and 23 strains were phenotypically identified then molecularly characterized using DNA microarray profiling. Nasal carriage rate was 53% and strains belonged to clonal complexes CC1, CC6, CC30, CC80, CC88, CC130 and CC152. Many of these strains carried a variety of virulence factors such as *icaA*, *icaC* and *icaD*, *clfA* and *clfB*, *fnbA*, *ebpS*, *hld*, *hlIII*, *edinA* and *edinC*, *sspB* and *sspP*, *sec/sel/tst*, *lukF/S*-PV, *lukF-PV(P83)/lukM* locus and *lukD/E*. In addition, some strains harbored the *mecA* gene and *SCCmec IV* as well as the *fusB* gene. These results prove unequivocally that camels in our country, may act as reservoirs for some highly pathogenic *S. aureus* clones.

Keywords: *Camels; Nasal carriage; S. aureus; Molecular characterization.*

Discovery of a prion disease in dromedary

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ABSTRACT

Prions are responsible for fatal and transmissible neurodegenerative diseases including Creutzfeldt-Jakob disease in humans, scrapie in small ruminants and bovine spongiform encephalopathy (BSE). Following the epidemic of BSE in the UK and the associated human infections, general concerns have been raised on animal prions. Here we report a new prion disease in dromedary camel (*Camelus dromedarius*) in Algeria. Symptoms suggestive of prion disease were observed in 3.1% dromedaries presented for slaughter at Ouargla abattoir in 2015-2016. Diagnosis was confirmed by the detection of pathognomonic neurodegeneration and disease-specific prion protein (PrPSc) in brain tissues from three symptomatic animals. Prion detection in lymphoid tissues is suggestive of the infectious nature of the disease. PrPSc biochemical characterization showed differences with BSE and scrapie. The identification of a new prion disease in a geographically widespread livestock species makes urgent to enforce its surveillance and to assess the potential risks for human and animal health.

Keywords: *Camel, Prion; Disease; Camelus dromedarius; Algeria.*

POSTERS

Biometrical and morphological measurement of dromedary of the Algerian Naili population or camel of the steppe (*Camelus dromedarius L 1758*)

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ABSTRACT

A study was carried out on live animals, dromedaries of the Algerian population Naili or the camel of the steppe in order to demonstrate the baraymetric performances of this population that has not been exploited and discussed with other population. And determine the index of slenderness according to biometric measurements on dromadaries (male and female) young adults and adult.
This study was carried out on a sample of 60 dromedaries. The animals are 30 males and 30 females, are adults over 5 years grazed on pastures in the semi-arid region.
Five measurements were made, then the index of slenderness and live weight were calculated. Equations of linear regression equations have been proposed in order to estimate the live weight of the animals and the height at the withers from correlated measurements. The average values of the male and female animals are respectively :for the live weights 551±59 kg and 483±60 kg , for a height at the withers 1.86±0.06 m and 0.83±0.08 m , for the substernal vacuum 0.92±0.05 m and 0.88±0.04 m , for the thoracic depth 0.92±0.05m and 0.88±0.04m, 1.02±0.09 m and 0.95±0.11 m for the sub-sternness index.
This study shows that the females are a little more slender than males. These populations are also associated with a set of eating practices, themselves linked to the quality of the routes, which influence the morphological development of animals has been widely observed.

Keywords*: Dromedary; Body measurement; Naili population; Camel of the steppe; Algeria.*

Osteometry of Dromedary Metapods: Case of the algerian population saharaoui (*Camelus Dromedarius* Line, 1758)

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ABSTRACT

This study was realized on a sample of 60 dromedaries of Sahraoui population, 30 males and 30 females, are adults over 6 years destined for slaughter. The canon bones or metapodials were taken (one left metacarpus and metatarsus of each animal), were weighed and measured after cooking and drying (16 variables per animal), gracility index of bones was calculated (6indexesperanimal).

The variability and correlations between variables were analyzed and allow while realizing a referential of archeozoology, to consider the ability to grasp certain parameters of live animal from bone measurements. A multivariate function (logistic regression) from seven linear parameters

of each metapodial was calculated, it permits to envisage sexing from an isolated bone. Sexual dimorphism appears clearly at the level of metapodial: the males have canon bones which are not only larger and stockier but also longer which is a remarkable difference in comparison to those encountered in other ruminants like cattle or sheep for which the great length of bone is not a dimorphic parameter.

Keywords: *Osteometry; Metacarpal bone; Metatarsal bone; Dromedary; Saharaoui population; Camelus dromedarius.*

Principal anatomy particularities in dromedary comparing to ox: Digestive and respiratory systems

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ABSTRACT

The dromedary also called the one-humped camel or ship of the desert, is able to live and adapt well to harsh and hot climate of the desert due to his exceptional functional anatomical adaptations. Both, the dromedary and ox are known as artiodactyls, anatomically, they have a few similarities but many differences. This paper aims to review the digestive and respiratory anatomy of both species and enumerate the principal particularities. Camel's mouth is thick and unique, it helps him to be selective when it comes to his food and to avoid any thorny plants. The nostrils of the dromedary are slit-like forms, with wings, they can close, in order to ensure a protection against the wind and the sand, they also have a role in the conservation of water. Contrary to the ox, the dromedary's lungs are not lobulated and the diaphragm has a unique structure. Unlike the bovids, camelids have only three distinct digestive chambers instead of four, there is no clear distinction between the third and fourth chambers. In addition, they have glandular sac areas called "water cells" instead of papillae in the rumen. Their liver is lobulated with no gall bladder.

Keywords*: Comparative anatomy; Dromedary; ox; Digestive; Respiratory.*

Approche ostéo-crâniométrique des mâles de dromadaire (*Camelus dromedarius*, L., 1758): cas de la region de Ouargla.

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ABSTRACT

This work proposes to carry out a first osteo-craniometric approach in the dromedary in the northern Algerian Sahara, which was done on a sample of 27 skulls of male dromedaries of the Sahraoui population belonging to two different age groups, namely 14 young adult males from 6 to 10 years old and 13 adult males over 10 years old intended for slaughter.
This craniometric study was carried out using the 50 linear measurements proposed by A. von den Driech (1976), 35 for the skull and 15 for the mandible partitioned into lengths, widths and heights of the skull.
In this part of our theme, we aim to identify whether there is a difference between the skulls of these two age groups by carrying out all the measurements mentioned above. To do this, a t-test analysis was used. The average value of the long C1 skull lengths for adult males is 513.26 ± 20.22 while for young adults is 515.17 ± 21.65. Regarding the large C25 width, an average value of 230.03 ± 7.42 is attributed to adult males and an average of 230.35 ± 9.02 for young adults. The most indicative measurement of a skull is M8B with a determination rate of 66% followed by M4 and C25 with a rate of 29% and 4% respectively.
In continuity with this theme, measurements on the skulls of the Targui population give promising results.

Keywords*: Skull; Saharaoui; Camelus dromedarius; Osteometry; Algeria.*

Diaphragm bone in dromedary (*Camelus dromedarius* L., 1758): anatomy and investigation by computer tomography imaging

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ABSTRACT

The aim of this previous work is to give some anatomical data by a non-invasive method. Nine entire diaphragms of adult dromedaries were collected randomly at the slaughterhouse and the bones prepared at the anatomy laboratory of Ouargla (Algeria). The CT examinations were performed on a 16-section CT made by Siemens (Sensation 16, dedicated to the environment and the veterinary industry by Image-Et (Mordelles, France). This bone is flat on one side and protruding on the other. The central part of the bone has an average HU value of -176 (-684 to 88) which clearly corresponds to the cancellous bone, and the external surface of the bone has an average HU value of 2320 (1979 to 2664) which corresponds to compact bone. This study allows us to have a better understanding of the variability and structure of the dromedary diaphragm bone.

Keywords*: Diaphragm; Bone; Dromedary; Anatomy; Scan.*

Reproductive troubles: cases report in camels

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ABSTRACT

The camel is a most valuable animal which contributes effectively to the welfare of people in difficult environments like Algerian Sahara. Reproduction in the camel is not as well understood as in more common species of domestic animals. The problems of reproduction in the camel are not researched as for example in the bovine and small ruminants. Our study demonstrates a clinical case in Ghardaïa district: caesarean section in female's camels.
The incidence of camel dystocia does not differ from that of bovines. The etiologies of dystocia includes: uterine torsion, carpal flexion, lateral deviation of the head and hock and hip flexion of foetus. However, the camel foetus survives dystocia better than the equine foetus and the camel is a good subject for caesarean section. Ceasarean section could be performed on the left flank using xylazine sedation and local regional or infiltration anaesthesia. A camel, 17 hours in dystocia, delivered a live foetus by caesarean section. The camel placenta is diffuse epitheliochorial type and placental retention subsequent to parturition is rare. The camel placenta is expelled within 49 minutes to 6 hours of calving.

Keywords*: Dromedary camel; Reproductive troubles; Caesarean section; Ghardaïa.*

Contribution to an évaluation of the status of reproductive performance in she female camels in southern Algeria

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ABSTRACT

The breeding performances of 110 female camels were monitored in the Oued Souf region (comfort) during the period from October 2012 to December 2014 (26 months). The monitoring allowed us to collect the following results. The duration of gestation is 377 ± 9.4 days, the duration of parturition is 37.7 ± 15 minutes, the duration of delivery is 37.9 ± 10 minutes, the rate of dystocia is 2.7% , the average duration of return to heat after parturition 30.3 ± 11.7 days, the average duration between parturition and fertilizing heat 216.6 ± 137.7 days, the average duration of heat 7.7 ± 1.4 days, the average duration of the covering is 25.7 ± 10 minutes, the number of covering per camel 1 to 3, the rate of return to heat after parturition 77.26%, the fertility rate at the first covering is 54%, the fertility rate is 65.4%, the abortion rate is 15%, the adult mortality rate is 7.3%, the chameleon mortality rate is 22%, the average weight of the chamelons at birth is 32.2 ± 6.2Kg and the GQM of the chamelons between the first and the eleventh week is 708g / days.

Keywords: *Female; Uterine endometrium; Histology; Postpartum.*

Ovarian cysts in camels and cattle in Algeria: Similarities and differences

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ABSTRACT

The aim of this work was to determine the frequency of OC in camels and cows in Algeria. A comparative study of the epidemiological and histopathological aspects of OC in the 2 species was performed. A total of 740 camel tracts and 800 cow tracts were collected from slaughterhouses and examined. Results showed that 5% of she-camels presented OCs while the frequency was 12.88% in slaughtered cows ($P < 0.001$). The camels showed 3 macroscopic aspects of OC: follicular cyst (FC), luteal cyst (LC) and hemorrhagic cyst (HC) with frequencies of 77.7%, 0.9% and 21.4% respectively. For cows, FC was found in 70.54% of cases and LC in 29.05% of cases, with the exception of a typical microcystic hemorrhagic ovary (0.41%) ($P<0.001$). Under the microscope, the histological appearance of FC and LC was identical for the 2 species. Unlike the camels, the right ovary was more affected by cystic pathology than the left ovary in cattle (70% vs 30%, respectively). Multiple FCs were noted in the 2 species with lower but different frequencies.

Keywords*: Camel; Cow; Ovarian cyst; Anatomo-histology; Epidemiology.*

Assessment of contamination of raw camel milk by *Listeria* spp. and *Staphylococcus* spp.

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ABSTRACT

Camel milk is a valuable food choice, representing a primary need in the diet of people in dry zones. Camel milk is rich in nutrients, which makes it a favourable environment for the development of microorganisms.
Staphylococcus and *Listeria* are significant opportunistic pathogens in humans, dairy cattle, and camels. The presence of these bacteria could present a potential public health issue. In the present study 20 milk samples collected from camel farms in M'sila have been investigated for the presence of *Staphylococcus* spp. and *Listeria* spp. Staphylococcus enumeration and the search for Listeria spp. were performed according to the recommendations of ISO Method 6888-1(2004) and ISO 11290-1(2017) respectively. The results showed a contamination prevalence of 62% of *staphylococcus* spp. with an estimated average bacterial load of $2.7.10^2$ cfu/mL. While for *Listeria* Spp., only three samples were positive with a prevalence of 14.28%. For the species, an identification using API *Listeria* strips confirmed the presence of *Listeria grayi*, *Listeria innocua*, and *Listeria seeligeri* species and no *Listeria monocytogenes* recovered in these samples. According to the current results, we could conclude that the percentage of contamination of the tested camel milk samples with *Staphylococcus* is relatively high compared to *Listeria*, there is no Algerian regulation for microbiological criteria for raw camel milk, however these results suggest that the hazard to the consumer cannot be excluded.

Keywords*: Camel's milk; Staphylococcus spp.; Listeria spp.; Prevalence; Foodborne pathogens.*

A preliminary study of mastitis pathogens in She-Camels (*Camelus dromedarius*)

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ABSTRACT

Camels are playing very important roles in the life of nomadic tribes rearing them. It is well known that play major roles in improving the socio-economic status and survival of the desert dwellers. Camel milk is an important source of protein and energy and some vitamins such as vitamin C for them who are unable to get it from other sources. Beside During the last few years, the awareness about nutritional and medicinal benefits of camel milk in the urban communities has rabidly increased. Consequently, the demand on 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 in order to study the incidence of mastitis with isolation and identification of bacterial organisms in the milk of infected quarters, as well as detection the susceptibility of isolated microorganism to the antimicrobial drugs. The clinical mastitis was detected in 3 out of 67 she camels at percentage rate of 4.47%. The positive samples revealed mixed infection of Gram-positive bacteria, including Streptococcus agalactiae, Staphylococcus aureus and Gram-negative bacteria which included 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.

Comparison of the CMT test results carried out on Camels and Bovines

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ABSTRACT

Subclinical Intramammary Infection (SII) is a very current disease in dairy farming, all species combined. Several tests exist for their early detection: CMT, electrical conductimetry of milk, pH indicator papers. In this study, the milk of 104 cows (416 quarters) was tested by CMT (Raidex®) to estimate the prevalence of the disease and to identify the effect of age, stage of lactation and position of neighborhoods in the first place then we looked for data on the camel for another study made on the camel in Algiers (ENVH) while starting with the hypothesis that the camel resists more. The prevalence rate (CMT> 1) is around 45% for cows and 15% for quarters. This study conducted in Algiers gave rise to rates respectively: 67% (for camels and 35% for quarters i.e. an increase of 130% for quarters and 50% for animals. Our study evokes the impact of: last stage of lactation compared to the first (35% vs 15%) in agreement with the other study, on the other hand the effect of: posterior position of the teats and age came in opposition. The differences between rates were not significant at $p<0.05$ between camels and cows neither for animals nor for quarters (Chi 2: 53.24 and 71.41).

Keywords: *Subclinical mastitis; Comparison; Prevalence; Cattles; Camels.*

Retrospective study on the reasons for seizures in camels in the slaughtering establishments of the wilaya of Adrar (2013-2017)

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ABSTRACT

In Algeria, camel breeding plays a key role in the food security of Saharan population. The present study was undertaken to determine the major causes and frequency of the various reasons for seizures of meat and offal in dromedary and identify possible preventive measures in breeding to reduce seizures and their economic impacts for the breeder. A total of 34,330 camel carcasses were subject to post-mortem inspection by the veterinarians of the Veterinary Inspection of the wilaya d'Adrar. The result indicated that those respiratory diseases represent the largest batch of the most common pathologies in cameline production, followed by larval echinococcosis and tuberculosis which may pose a risk to the health of consumers. This is why control measures based on prevention, early detection and effective treatment must be imposed and strongly encouraged in traditional livestock farming.

Keywords*: Adrar; Camel; Meat; Diseases.*

Main reasons for the seizure of meat and offal in slaughterhouses in the region of Adrar (Algeria)

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ABSTRACT

The main of this study is to determine the nature and frequency of the different reasons of seizure of meat and offal in the camel compared to the other ruminants, slaughtered under the same conditions. This study is a synthesis of the slaughterhouses records that are part of the activity of the veterinary inspection office of the agricultural services of the wilaya of Adrar during 2017.

Camels accounted for 10.4% of the total meat produced at the slaughterhouse in 2017, after the sheep with 77.8%.The percentage of seizure for meat in camelis3, 12%.The highest weight of seized meat is observed in sheep with 366,5 kg, then camel with 150 kg. Traumatized meat is the predominance reason of seizures with 3,12%(150kg) and 81,81% (115kg) for camel and sheep respectively.

The dromedary is in the 2nd class for seizure of red offal after the sheep with an estimated loss of 316.3Kg, wich 88,88% of seizures are represented by lung lesions. Pneumonia is the most raison of offal seizure with 1,1%follwed with pulmonary hydatidosis 0,36%. The dominant cases lead to considerable losses of animal protein. The loss of protein in a country that lacks it shows how worrying seizures are.

Keywords*: Camel; Slaughterhouse; Seizure; Meat; Offal.*

Bacteriological diagnosis of lesions suspected of camel tuberculosis in three slaughterhouses in the south of Algeria

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ABSTRACT

Camel Tuberculosis is an infectious, contagious, virulent and chronic disease described in many countries. The present study aims at investigating the occurrence of suspect cases of tuberculosis in dromedary camels at three slaughterhouses and at identifying the responsible agents. For this purpose, a survey was conducted on two steps: the first step was carried out on slaughterhouses of Ghardaia, Ouargla and Tamanrasset during fourteen months in order to search for suspicious tuberculosis lesions in dromedary camels. The second was conducted at the Mycobacterium laboratory of Pasteur Institute in Algeria, to–identify the responsible agents for theses lesions. Out of 1512 dromedary carcass were inspected in three slaughterhouses, 41 had suspect tuberculosis lesions (2.71%) with a high proportion at Tamanrasset slaughterhouse (5.01%). The results of the bacteriological diagnosis showed a positivity rate of 2.43% on microscopic examination and 04 cultures declared positive (9.75%) to the bacterial culture. Bacterial identification of the 04 positive cultures revealed a percentage of (50%) for *M. bovis* and (50%) of Mycocabteria other than tubercle bacilli. The isolation of *M. bovis* from dromedaries can be explained by their cohabitation with other animals namely cattle which contribute to the onset of tuberculosis. Consequently, the Algerian camel population is considered to be affected by tuberculosis due to *Mycobacterium bovis* as well as by other Mycobacteria in Algeria.

Keywords*: Algeria; Dromedary; Diagnosis; Slaughterhouse; Mycobacteria; Tuberculosis.*

Cytological and immunohistochemical study of the dromedary lymph nodes in Algeria

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ABSTRACT

In this research, including a research framework, a set of lymph nodes of the dromedary of the region of El Oued underwent a set of technique and staining as Azure II eosin staining, and immunohistochemical technique in order to highlight the cellular structure of these organs as well as an immunohistochemical study was very effective in highlighting the localization of T and B lymphocytes, with the use of mono and polyclonal antibodies has shown important information about the internal composition of these organs

Keywords*: Dromedary; Azure II eosin ; CD22; CD3; Immunohistochemistry ; Lymph node; Lymphocyte.*

Frequency of hydatid cyst cases in dromedary camel at the slaughterhouse of Tindouf, Southern Algeria.

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ABSTRACT

Cystic echinococcosis (CE) is a neglected zoonotic parasitic disease of worldwide occurrence, caused by the metacestodes (larval stage) 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 known. The present survey was conducted to estimate the infection rate of hydatid cyst in dromedary camel at the slaughterhouse of Tindouf, Southern Algeria. From January 2017 to January 2020, a total of 15772 carcasses were examined for cystic lesions by observation, palpation, and incision of internal organs. Overall, 31 (0.20%) were found to be parasitized by hydatid cysts. Infection rate according to the sex was 0.13% in males (19/14660) and 0.27% in females (3/1103). Regarding to 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 provides some data on the importance of cystic echinococcosis in dromedary camel at the Tindouf slaughterhouse and obtained results regarding the rate of fertility support the findings of the important role of camel in the epidemiological cycle maintenance of *E. granulosus*.

Keywords: *Camel; Hydatid cyst; Prevalence; Fertility; Sterility.*

Dromedary hydatidosis

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ABSTRACT

Cystic echinococcosis (CE) is a zoonotic parasitosis with a global distribution, it is also regarded as neglected parasitosis. Many studies have pointed out the epidemiology and the worldwide distribution of this disease.
Studies led in the Algerian south and Ethiopia were focused on the pathologies that touch the respiratory system of dromedaries, these studies results show a significant prevalence of the hydatidosis, which can be responsible for the decrease in the productivity of camel farms and therefore causing economic losses within a sector whose activity remains quite timid and limited.
The dromedary plays an important role in the parasite's life cycle and its zoonotic transmission, which constitutes a real risk for humans. This disease mainly affects the lungs and the liver and can be manifested in two forms: cystic echinococcosis and alveolar echinococcosis. The cystic form is the most widespread, whereas the alveolar form remains restricted to a few countries.

Keywords*: Hydatidosis; Dromedary; Prevalence; Zoonotic; Economic losses.*

Gastrointestinal parasites infestation of dromedary camel (*Camelus dromedarius*) in southern Algeria

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ABSTRACT

This study aims to investigate the prevalence and identification of gastrointestinal parasites in fecal samples of dromedary camels (*Camelus dromedarius*) in Algeria based on microscopic examination. A total of 46 fresh fecal samples were collected at sloutherhouse of Adrar, Tindouf, Ourgla, Ain salah, southern of Algeria and 9 from camel farms in Constantine. Samples were examinated with Flotation Technique. Results showed infestation rate of dromedaries of 32.6% (15/46), with seven different gastrointestinal species: 25.4 %protozoa (*Balantidium coli, Eimeria dromederi*), 16.3 % nematodes (*Nematodirus spp, Trichuris spp*, others strongles) and 3.6% cestodes (*Moniezia spp*).
Dromedaries are more infested with protozoa than with nematodes or cestodes ($p<0.05$). The type of sex has no significant influence on the rate of parasitic infestation. Sahraoui breed (70%) appears more infested compared to Tergui breed (31.42%), ($p<0.05$). Dromedaries originating from Ouargla region (73.68%) are the most infested compared to those originating from Adrar (18.18%), Ain Salah (10%) and Tindouf (33.33%) ($p<0.05$).
In conclusion, the detected parasites in camels are similar to counterparts in other ruminants, which can pose serious problems. Future studies should be carried out to better understand the epidemiology of these parasitic diseases and their economic and public health impact.

Keywords:*Dromedary camels; Gastrointestinal parasites; Southern Algeria; Flotation technique.*

Comparison of serological and molecular tests for detection of *Trypanosoma evansi* in camels from Ghardaïa district, South Algeria

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ABSTRACT

T.evansi is a hemoflagelated parasite. It affects a great range of animal hosts. Diagnosis of surra based on clinical symptoms is insuffissant; thus, different laboratory techniques are used to detect the infection. The aim of this study was to compare the diagnostic potential of TL, ELISA/VSG RoTat 1.2, ELISA/whole lysate, ITS1 PCR and 18S qPCR. Our study was carried out on 161 dromedaries, in Ghardaïa district. Cohen Kappa test was used to assess the concordance of results obtained by diagnosis tests. Serological and molecular tests were carried out at the OIE (international organization of epizootics) reference laboratory for the diagnosis of Surra. Latent class analysis LCA was carried to evaluate sensitivity and specificity of each diagnostic test. The prevalence of *Trypanosoma evansi* in camels was found to be 9.3% (15/161), 9.9% (16/161) and 13% (21/161) using CATT/*T.evansi*, ELISA /VSG RoTat 1.2 and 18SqPCR, respectively. Latent class analysis showed that all serological tests were 100 % sensitive, in contrast to the molecular tests with 47 % sensitivity. All tests, though, were highly specific (≥ 97 %).
It is recommend combining a serological and a molecular diagnostic test for accurate diagnosis of infection with *T. evansi* in domestic animals. Diagnosis preferably is confirmed as close as possible to the point-of-care (POC).

Keywords*: Trypanosoma evansi; PCR; qPCR, ELISA CATT Immune trypanolysis; Diagnostic accuracy.*

Trypanosomiasis caused by *Trypanosoma evansi* in camels in the Laghouat region

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ABSTRACT

Trypanosomoses have a particularly significant impact on animal health. These diseases are caused by flagellated protozoa, extracellular parasites of the blood or more rarely of the tissues. They represent a major obstacle to the development of camel breeding in the countries where they circulate. With the aim of looking for the presence of trypanosomes, this study was carried out in the region of Laghouat on 80 camels (*Camelus dromaderius*) from two herds. Microscopic examination of blood smears revealed the presence of *Trypanosoma evans*i with a rate of 3.75% (3/80). This investigation shows the importance of implementing preventive and offensive measures to limit the economic losses linked to this parasite and avoid possible human transmission.

Keywords: *Blood smears; Camel; Trypanosoma evansi; Trypanosomoses.*

Morphological identification of tick species infesting dromedary camel in the steppe region of Djelfa, Algeria

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ABSTRACT

Dromedary is frequently infested by ectoparasites mainly ticks that weaken it and make it susceptible to tick borne-diseases. The present study was conducted to investigate tick species infesting dromedary camel (*Camelus dromedarius*) in the steppe region of Djelfa, Algeria. For this purpose, during a period of three months (May-July 2017), 169 ticks were collected from 31 dromedaries in four farms located in four localities (Boughezoul, Djelfa, Messaad and El–Mesrane). Ticks were carefully obtained using sampling forceps, preserved in ethanol 70% and identified to species level by comparison with morphological characters in Walker et al. (2003) using a binocular magnifier. A total, one *Hyalomma* genus encompassing five species were identified in all examined farms. Tick species that have been identified are *H. dromedarii* (52.66%), *H .impeltatum* (39.05%), *H. lusitanicum (*5.32%), *H. marginatum* (1.77%) and *H. anatulicum* (1.18%). *H. marginatum* and *H. anatulicum* were harvested only in Boughazoul and El–Mesrane respectively. In addition, the anatomical regions which showed a preference for tick infestation were the abdomen (**26%)**, feet (**21%)** and the neck (20%).

Keywords*: Tick species*; *Dromedary Camel; Djelfa.*

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