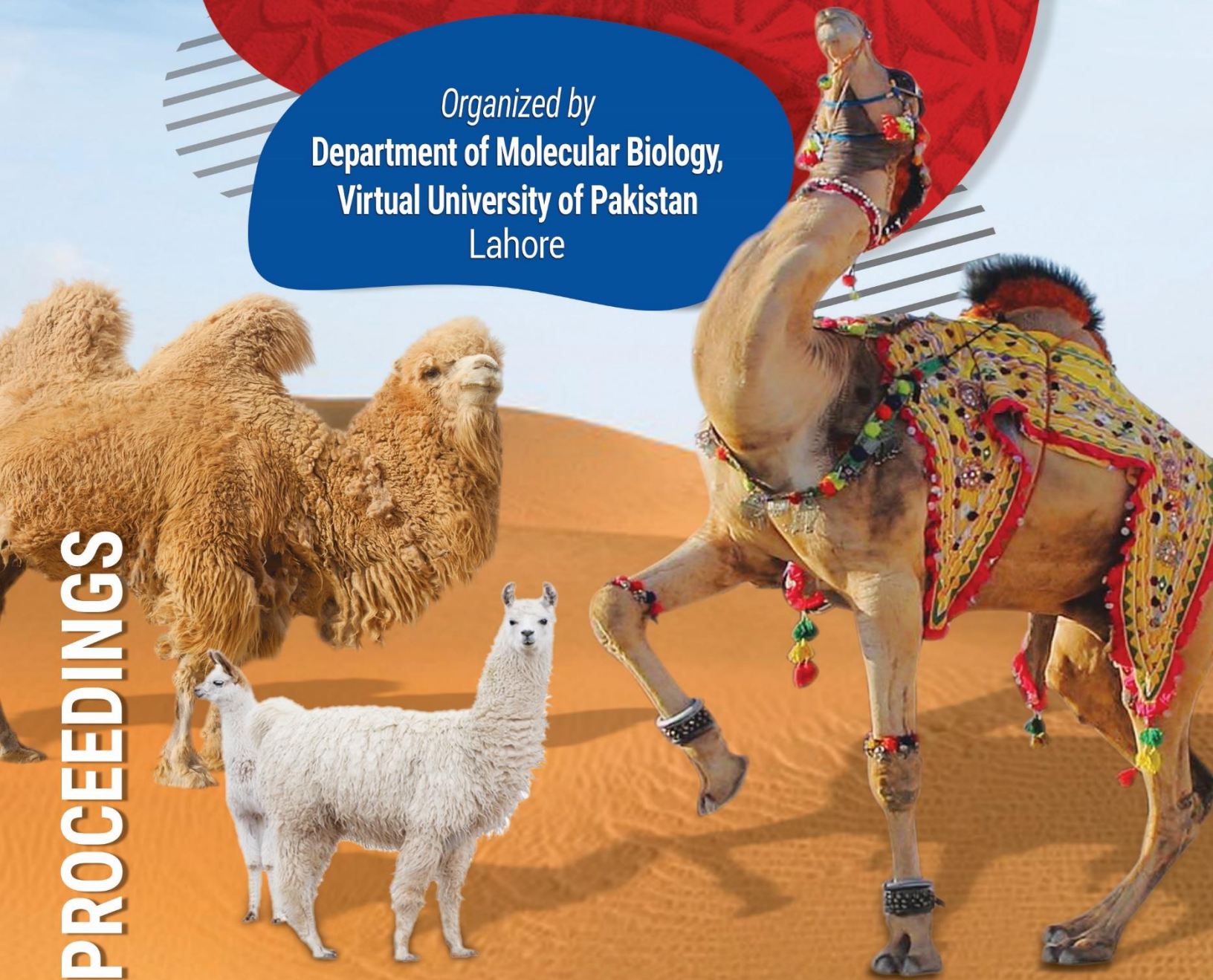


World Camel Day

3rd International Symposium
on
“Camel; an Amazing Species”
22nd June 2022

Organized by
Department of Molecular Biology,
Virtual University of Pakistan
Lahore

PROCEEDINGS



Virtual University of Pakistan
Federal Government University

World Camel Day
3rd International Symposium
on
"Camel; an Amazing Species"
22nd June 2022

Organized by
Department of Molecular Biology,
Virtual University of Pakistan
Venue: M.A. Jinnah campus, Lahore

COLLABORATORS

- Lasbela University of Agriculture, Water & Marine Sciences, Uthal, Balochistan, Pakistan
- Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan
- University of Agriculture, Faisalabad, Pakistan
- International Society of Camelid Research and Development (ISOCARD)
- Saudi Geographical Society, Kingdom of Saudi Arabia (SGS)
- Camel Associate of Pakistan
- Pakistan Camel Club
- Camel 4 Life International

<https://us02web.zoom.us/join/91111111111>

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Collaborators: Camel Association of Pakistan (CAP), Saudi Geographical Society (SGS), International Society of Camelid Research and Development (ISOCARD), Lasbela University of Agriculture, Water & Marine Sciences, Uthal, Balochistan, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan, University of Agriculture, Faisalabad, Pakistan, Pakistan Camel Club, Camel 4 Life International

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PROGRAM

22 nd June 2022 (Wednesday) (Pakistan Standard Time GMT+5)	
Inaugural Session	
10:00 a.m.	Holy Quran Recitation
10:05 a.m.	National Anthem of Pakistan
10:10 a.m.	Aims and Objectives of the Symposium by the Focal Person
10:15 a.m.	Welcome address by the Rector, Virtual University of Pakistan
10:25 a.m.	Address by the Chief Guest
10:35 a.m.	Tea Break
1st Technical Session	
11:00 a.m.	The Dromedary Camels are an Excellent Model for Investing the Desert in Iraq. Prof. Dr. Talal Anwer Abdulkareem , Department of Animal Production, University of Baghdad, Iraq
11:15 a.m.	Medical and Health Aspects of Camel Milk, Products and Camel-related Practices. Ms. Christina Adams , globally recognized expert in autism and camels, USA
11:30 a.m.	Camel Hump Oil; Composition and Advantages of its applications. Dr. Karima Al-Salihi , College of Veterinary Medicine, Al Muthanna University, Iraq
11:45 a.m.	The Best Time to Adore the Camels' Role in Ecosystem Management as the Climate Change is Hitting our Planet Badly. Dr. Abdul Raziq Kakar , Alain Farms for Livestock Production, Alain, UAE
12:00 p.m.	Camel Milk in Diabetes- A Synthesis on Pharmaceutical & Nutraceutical Properties. Dr. Artabandhu Sahoo , ICAR-National Research Centre on Camel, Bikaner, India
12:15 p.m.	Camel Milk; An Amazing Superfood for Future of the World. Prof. Dr. Tahereh Mohammadabadi , Faculty of Animal Sciences and Food Technology, The Agricultural Sciences and Natural Resources University of Khuzestan, Iran
12:30 p.m.	A review of Camel Dermatophilosis. Prof. Dr. Hamid Agab , Sudan University of Science & Technology, Khartoum, Sudan
12:45 p.m.	Prayer/ Lunch Break
2nd Technical Session	
01:45 p.m.	Importance of Camelids in the COVID-19 Pandemic and their immunogenetic Response to Coronavirus infection. Dr. Pamela Burger , Research Institute of Wildlife Ecology, Vetmeduni, Vienna, Austria
02:00 p.m.	To Cull or Cultivate: Dilemma of Neglected Australian Feral Camels. Dr. Zia ur Rehman , Department of Physiology, The Islamia University of Bahawalpur.
02:15 p.m.	Pastoral Lassi Camel Husbandry Practices, Milk Yield Potential, Product Development and Marketing at Community level. Prof. Dr. Illahi Bakhsh Marghazani , Department of Animal Nutrition, Lasbela University of Agriculture, Water and Marine Sciences, Uthal, Pakistan.
02:30 p.m.	Brucellosis in Camels in Pakistan. Prof. Dr. Ihtisham Khan , University of Veterinary and Animal Sciences, Jhang, Pakistan
02:45 p.m.	Camel Housing in Perspective of Camel Welfare. Dr. Syeda Maryam Hussain , Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi. Pakistan
Concluding Session	
03:00 p.m.	Brief Overview of the Day
03:05 p.m.	Vote of Thanks
03:10 p.m.	Address by the Chief Guest
03:20 p.m.	Closing Remarks by the Rector, Virtual University of Pakistan
03:30 p.m.	Tea/ Refreshment



VIRTUAL UNIVERSITY OF PAKISTAN

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The Virtual University, Pakistan’s first University based completely on modern Information and Communication Technologies, was established by the Government as a public sector, not-for-profit institution with a clear mission: to provide extremely affordable world class education to aspiring students all over the country. Using free-to-air satellite television broadcasts and the Internet, the Virtual University allows students to follow its rigorous programs regardless of their physical locations.

VU aspires to be a leading teaching and research university, recognized nationally and globally as a hub of academic excellence, producing highly skilled empowered professionals and leaders who would contribute positively to the socio-economic development of Pakistan.

AIMS AND OBJECTIVES

Camel is a desert animal with an amazing potential for milk, meat, draught power and can contribute a handsome share of the production of these commodities. Well-fed camel can yield 10-15L milk per day. The camel serves as a cheaper source of power for drawing water from wells, plowing and leveling land, working mini extraction mills, and pulling carts for the transportation of goods as well as people. The camel is at top of the list of future animals that can thrive under harsh environmental conditions.

The potential of this wonderful animal has never been truly realized. Increasing human population in the world has arisen the issue of food security. Cultivated areas are shrinking, thus reducing the fodder production area for buffalo and cattle. The environmental changes occurring on the earth and the water shortage in the region have also adversely affected the production potential of buffalo, cattle, goats and sheep. In order to combat with these issues, there is a need to explore a new world of resources.

Rearing camel is the best option to overcome these issues as it is linked with more milk production and the proper utilization of the vast unused lands of this country. Camel’s milk has immense nutritional values and is considered as superfood. Many studies are now underway worldwide to understand Camel Biology to explore its potential for sustainable utilization and conservation.

Keeping in view the importance of camels in future and the current challenges faced in their rearing, husbandry, nutrition, health, reproduction, breeding and genetics, the Department of Molecular Biology, Faculty of Science & Technology, Virtual University of Pakistan has organized this international symposium on the World Camel Day with a theme “Camel; an Amazing Species” in collaboration with our national collaborators Lasbela University of Agriculture, Water & Marine Sciences (LUAWMS), Pir Mehr Ali Shah Arid Agriculture University, University of Agriculture, Faisalabad, Camel Association of Pakistan (CAP), Pakistan Camel Club (PCC) and our very esteemed international collaborators including Camel 4 Life International, Saudi Geographical Society (SGS) and International Society of Camelid Research and Development (ISOCARD). Our Office of Research Innovation and Commercialization (ORIC) and our worthy Rector, VU, Prof. Dr. Arshad Saleem Bhatti has supported us generously to host this event. We are highly grateful to you.

Scientists and researchers from different parts of the world are joining us to share their knowledge to explore this wonderful genetic resource and to enhance awareness about its better utilization in future.

It is the third occasion when Virtual University has organized this event on World Camel Day. The first event was organized on same day in the year 2020 and the second in year 2021. Both turned out to be very successful and productive events. A large number of national and international

speakers, camel farmers, scientists and students from all parts of the world joined and shared their knowledge and expertise with us.

Again, this year forum will also provide us an opportunity to collaborate with each other in research on various aspects of camel biology in the days ahead.

Ladies and Gentlemen, Being the focal person of this event, I am really honored that our Collaborators Lasbela University of Agriculture, Water & Marine Sciences (LUAWMS), Pir Mehr Ali Shah Arid Agriculture University, University of Agriculture, Faisalabad, CAP, PCC, Camel 4 Life International, SGS and ISOCARD have joined hands with us to make this event internationally visible. High regards for our esteemed Speakers for joining us today despite being in different time zones.

We are delighted to host Prof. Dr. Anas Sarwar Qureshi, Acting Vice Chancellor, University of Agriculture, Faisalabad and President Camel Association, Pakistan as the Chief Guest of our event. We welcome you Sir, and are really honored to have you with us. Dr. Anas Sarwar has been with us since the beginning of our journey on creating awareness about camel’s potential of solving global challenges. We are also pleased to have Prof. Dr. Muhammad Younus, Founding Member and Former President, Camel Association of Pakistan as the Guest of Honor of our event. It’s a pleasure to have you with us.

I would also like thank you all for being a part of this event and hope that the sessions will bring us beneficial knowledge.

Thank you!

Dr. Tanveer Hussain

Focal Person,

Associate Professor, Department of Molecular Biology,

Virtual University of Pakistan, Rawalpindi

ABSTRACTS

THE DROMEDARY CAMELS ARE AN EXCELLENT MODEL FOR INVESTING THE DESERT IN IRAQ

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Abstract

Dromedary camels played a crucial role in human life, especially those who used the desert as a living environment. The dromedary camels have received increasing attention from researchers in many world countries. This interest has become a national necessity due to its economic significance represented by milk and meat production with enormous medicinal properties and hair of industrial importance. Camels can convert spiny plants that do not contain the minimum nutrients into high food product value. Dromedary camels can graze in poor desert areas with harsh climatic and living conditions. They eat their food in small quantities and do not graze in the same pasture for a long time as they do not need more than 6-8 hours of grazing per day with a small bite-size. These all preserve the deserts from deteriorating as a result of overgrazing. Camels graze on many naturally-occurring desert plants that other livestock animals (cows, goats, and sheep) do not graze on. These plants are fire brush or arta (*Calligonum comosum*), khimp (*Leptadenia pyrotechnica*), arfaj (*Rhanterium epapposum*), salt tree (*Haloxylon persicum*), camelthorn (*Alhagi camelorum*), desert grass (*Panicum turgidum*), Arabian boxthorn (*Lycium shawii*), aristida (*Aristida plumosa*), salam (*Acacia ehrenbergian*), Mediterranean saltwort (*Salsola vermiculata*), Liliium (*Hamada elegans*), rattlepods (*Crotalaria aegyptiaca*), fountain grass (*Pennisetum divisum*), Mediterranean needle-grass (*Stipa capenses*), Athel pine (*Tamarix aphylla*) and yarrow (*Achillea fragrantissima*). Moreover, camels can drink 103 liters of water at once within 10 minutes without diluting the concentration of body fluids and thus storing and metabolizing the water in the body for a long time. The low cost of feeding camels (compared with the other livestock animals), which is limited to grazing desert plants with preserving the desert from erosion, makes camels future projects for investment and revival of desert in Iraq.

Keywords: Dromedary camel, significance, desert, feeding

MEDICAL AND HEALTH ASPECTS OF CAMEL MILK, PRODUCTS AND CAMEL-RELATED PRACTICES

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Abstract

Camel milk, as well as other products including fat, meat, urine and organs, have traditionally been used for centuries in Arabian, African, and Asian cultures as a natural source of healing options. The milk has been given away to the sick for free as a humanitarian tradition, which continues in some areas to this day, although commercialization of milk is rising in response to demand among families with autistic members, along with greater awareness of its health and nutrition benefits by other disease communities and health-conscious consumers. There is also increased awareness of the milk as a valuable agricultural commodity in producing countries. Autism, or autism spectrum disorder (ASD), refers to a range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication. Motor skill impairment, food sensitivities and gastrointestinal issues are common in the population. While genetic abnormalities in autism spectrum disorders are increasingly explored, recent studies implicate physiological and metabolic abnormalities in autism spectrum disorders, particularly immune dysregulation or inflammation (maternal pre-birth, gut-linked post-birth), oxidative stress, mitochondrial dysfunction and environmental toxicant exposure. It is theorized that camel milk addresses allergic response and inflammation in ASD and other inflammatory diseases. Research-based evidence suggests that camel milk is rich in enzymes, antibodies, and vitamins that benefit autistic children. Parents who have fed their autistic children camel milk have reported benefits including better sleep, increased motor planning abilities, improved spatial awareness, more eye contact, better expressive language abilities, resolution of skin disorders and fewer gastrointestinal problems. The milk contains higher amounts of bioactive and antimicrobial substances than cow and buffalo milk. An insulin-like protein may contribute, as well as GABA and pre and probiotics along with other factors. Camel milk differs from cow milk in the beta casein distribution and other factors. The b-lactoglobulin levels are not measurable (similar to human breast milk); the most common serum protein is a-lactalbumin, and it offers greater digestibility than cow milk. Improved safe distribution of camel milk would benefit autistic, diabetic, failure to thrive, food-intolerant and other patients. Patients with autism often react poorly to plant-based, bovine, sheep and goat milks and are in need of non-reactive milks. Marked improvement has been noted from the addition of camel milk in many patients,

especially in the absence of problematic milks. Additionally, the small but growing camel industry can benefit from further data on the traditional uses of other camel products. Some research is emerging, but the lore can provide further direction for study. Future research is indicated to further identify and isolate the components of milk, milk-derived products like kefir and yogurt, urine, meat, fat and other products that may be responsible for health benefits, and more fully describe their mechanisms of action. Additionally, some pastoralist traditions may benefit today’s humans and animals to live more healthful lives, also meriting further study. The book *Camel Crazy: A Quest for Miracles in the Mysterious World of Camels* (2019, New World Library) covers the development of Adams’ initial hypothesis that camel milk would help her son’s autism symptoms by impacting his immune function. It outlines the development and present status of camel milk as a health supplement, cites emerging science, and investigates the knowledge of current camel-owning cultures. A user’s guide to camel milk with suggested serving sizes for various disorders and a list of global milk sellers is included in the book, along with insight from scientists and veterinarians.

Keywords: Autism, Camel Milk, Camel Meat, Camel Products, Constituents, Health, Case Study

CAMEL MILK: AN AMAZING SUPER FOOD FOR FUTURE OF THE WORLD

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Abstract

Currently, the importance of camel milk has been emphasized around the world base on its health properties. Consumers' interest in camel milk has been largely due to awareness of its unique health benefits. The camel is physiologically well adapted to live in hot and dry conditions thus, it is an important food security resource for arid and semi-arid environments. Camel produces milk in very high temperatures and climatic challenges; in the same environment other livestock species are hard to survive. Camel milk is a special source of nutrients and is considered as a super food with therapeutic values. Camel milk is rich in vitamins C, B3, Mn, iron, Cu and Zn rather than cow milk. It is a suitable substitute for human milk and great alternative for kids with allergy to cow milk due to lack of β -lacto globulin and low β -casein as allergic proteins. Also, camel milk has high amount of mono- and polyunsaturated fatty acids that have beneficial effects on the human health. Lactose of camel milk is more digestible than cow milk and make it proper for lactose intolerance cases. Smaller size of immunoglobulins or nobodies of camel milk enhances the immune system and anti-inflammatory responses. Also, higher amount of zinc in the camel milk has key role for maintenance of normal function of immune system. There is high amount of immunoglobulin's, insulin like protein and protective enzymes like lactoferrin, peptidoglycan recognition protein, lacto peroxidase and lysozyme in the camel milk. Camel milk has hypoglycemic effects which may be beneficial in the healing of diabetes of Type 1 and 2 and gestational diabetes. Camel milk contains insulin like proteins, which does not form coagulum in the acidic media of stomach that can be an effective alternative for insulin. It controls the blood glucose by some mechanisms including effect on insulin receptors activity, increasing of the signaling in the insulin-sensitive tissues and effect on the pancreatic beta-cells function. Furthermore, lactic acid bacteria of camel milk as strong probiotic are important for the gut health and function. Also, it has been proven that camel milk has beneficial application in disorders of stomach and intestinal, food allergy, cancer, autism, viral hepatitis and cardiovascular system. Therefore, camel milk is not only food, but also it is as amazing superfood for many health complications.

Keywords: Camel milk, superfood, health

CAMEL MILK IN DIABETES: A SYNTHESIS ON PHARMACOLOGICAL AND NUTRACEUTICAL PROPERTIES

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Abstract

Diabetes mellitus (DM) is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), and categorized in two forms, type 1 DM-an insulin-dependent diabetes, in which the pancreas produces little or no insulin by itself due to autoimmune destruction of insulin-producing β -cells of the pancreas, and type 2 DM-a metabolic disorder due to insulin resistance and relative insulin deficiency and is the most common form. About 422 million people worldwide have diabetes, and 1.5 million deaths each year are directly attributed to it. Based on empirical observations regarding the low prevalence of diabetes mellitus (DM) in population, regularly drinking camel milk, scientists have investigated and assessed the effect of camel milk consumption on glycaemic status of diabetic patients and animal models. There are some possible mechanisms hypothesized, i) high insulin supply through regular consumption of camel milk; ii) presence of insulin-like proteins that increases the activity of insulin receptors and other biomolecules (lactoferrin and lactoperoxidase) that decreases β -cell injuries; and iii) anti-diabetic effect of camel milk through its bioactive components targeting insulin receptor, either as intact proteins (i.e. lactoferrin) or peptides (whey hydrolysates). Thus, a continual direct supply of insulin through camel milk and its allosteric effect on insulin receptor conformation and activation with differential effects on its intracellular signaling would help to shed more light on the hypoglycemic activity of camel milk with potential therapeutic applications.

Keywords: Camel milk, Diabetes, Pharmacological, Nutraceutical applications

THE BEST TIME TO ADORE THE CAMELS’ ROLE IN ECOSYSTEM MANAGEMENT AS THE CLIMATE CHANGE IS HITTING OUR PLANET BADLY

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Abstract

It is not just the tip of the ice burg but we can see clearly the calamities of the climate change. Food security is becoming a real challenge and the very first reason is the climate change followed by political instabilities. Climate Changes causing variable and erratic precipitation, global warming, reduced grass foliage, creeping desertification and water shortage. Global policymakers are very concerned about further catastrophes to planet earth because of intensive farming under the pressure of heavy inputs. High input monoculture factory-farming systems are notorious for further losses and consequences (more emission). At the Cop26 of 2021 (United Nations Climate Change Conference), adaptation was suggested as one of the best options to ensure human survival under the climate change scenario. In such circumstances, the role of native genetic resources for food and agriculture is highly appreciated; the reason is their unique adaptability. The camel is one of the most important native livestock and champion of adaptation and survivability. The camel not only survives under conditions where most other livestock species are hard to survive. In such challenging climatic conditions, the camel thrives and produces health-nourishing milk, considered as a natural pharmacy. In majority of the cases, camel husbandry based on zero or very low input system that sustains biodiversity in the deserts and other arid lands, sustaining a grazing culture. Grazing land deterioration is partly due to climate change but also changing livestock grazing patterns. The livestock-grazing phenomenon is misunderstood and blamed under the term of overstocking/overgrazing. Nobody is appreciating or understand the livestock’s ecological role, especially the camel; playing a pivotal role in revitalization of the deserts and sustaining the flora diversity. In return, the camel produces unique and healthy milk because of the grazing on highly adapted and diversified flora of the desert. Such a delicate symbiotic connection is very poorly understood and rarely appreciated.

Under the conceptualization process of the Camel Life International, a team of livestock ecologist is emphasizing and uncovering the unique role of the camel. Restricting camel's access to the pastures will negatively affect the health and composition of soil microbiome, losing its role and soil will turn into a piece of dead land. To highlight the importance of dry lands, the Desert net International (a UNCCD Think tank), convincing the policymakers on the vital role of the dry lands and large herbivores especially the camels. As the competition on natural resources is increasing, the food for human is consumed by livestock in intensive farming systems. It is important to understand the role of herbivores such as the camel in maintaining the soil health by composting the foliage into a nutritious organic fertilizer, providing nutrients to the detritivores in the soil. As the human population mushrooms, some countries, like ours, the population will be doubled by 2050. There will be even more competition on the natural resources like arable lands and water for production of human food. Before such conditions happen we must prepare and give the camel its original role: producing food from the little nature that is left by all other players across far and wide regions. Revitalization of the pastures with shrubs/bushes and woody flora is critical to maintain a healthy and sustainable natural environment for humans and animals, especially camels. The camel is helpful in spreading the seeds, maintaining, and revitalizing the health of the grazing lands. In the countries like KSA and Pakistan, master reforestation plans are under way, and let us suggest to plant the native plants especially those who can support camel feeding to minimize the mono cropping and import of cultivated grasses from other parts of the world.

Keywords: Camel ecology, ecosystem management, grazing and pastures, camel milk, revitalization of desert, reforestation, Camel4Life International

A REVIEW OF CAMEL DERMATOPHILOSIS

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Abstract

Dermatophilosis is a skin disease caused by a bacterium called *Dermatophilus congolensis*. The disease affects many species of domestic and wild animals and occasionally, humans. It is most prevalent in the tropics. The lesions are characterized by an exudative dermatitis with scab formation. The disease causes severe skin matting resulting in hide depreciation, overall decrease in animal productivity and, in severe cases, mortality in susceptible weak animals may be as high as 50% in the absence of treatment. Although relatively recently described, camel dermatophilosis is recognized as widespread in several camel rearing countries in the tropics. Natural *D. congolensis* infection of camels was first reported in Kenya in semi-arid conditions. Camel dermatophilosis was found to be one of the most serious skin problems faced by camel herders in Butana area of Sudan and in several camel rearing areas in Saudi Arabia where *D. congolensis* and *Microsporum gypsum* infections have both been recorded as mixed infections in a camel dairy farm. Camel calves were more likely to be infected than adults. Lesions began as hair matting and later developed into hard crusts. Fatality ranged from 10 to 30%. The most effective control measure of this disease was thought to be through control of tick infestations. Several treatment regimes were tried in other animal species but with varying degrees of success. The only control method of this disease practiced in dromedary camels was the regular washing with 1% potassium Aluminium Sulphate solution. The review details some aspects of the clinical picture, epidemiology, culture, chemotherapy and control measures of the disease in camels.

Keywords: Dermatophilosis, Camelids, Aluminium Sulphate, control measure

CAMEL HUMP OIL: COMPOSITIONS AND ADVANTAGES OF ITS APPLICATIONS

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Abstract

A camel is an important domestic animal in arid and semi-arid areas. It is used as a source of meat, hair, hides, milk, and transport. Physiologically, the camels are amazing animals that are well adapted to the strict conditions of their desert habitat with several adaptation mechanisms. The camel has unique anatomy; it's the only animal having humps on the torso mainly made up of fat. The hump is considered one of the camel's adaptations mechanisms. There are great variations in the weight of the humps ranging from 8.5 kg to 44 kg, which accounts for 5% to 13% of body weight. The hump fats are mobilizable forms of energy to ensure the needs of the camels for maintenance, production, and adaptation to the harsh desert environment. Camel hump fat is composed of saturated and unsaturated fatty acids bound to other compounds to form fatty acid-containing lipids, e.g., triglycerides and phosphoglycerides. Camel hump fat has comprised a group of essential fatty acids (EFAs), such as omega-3 & omega-6 fatty acids and conjugated linoleic acid (CLA) isomers that meet the requirements of various human body organs such as skin. Therefore, a camel Hump oil is used for multiple medical purposes, such as treating a plurality of diseases, including dry skin, cracked, psoriasis, hyperkeratosis, and eczema. Moreover, it is used as anti-inflammatory, antioxidant, anti-itching, healing injuries, musculoskeletal diseases, and treatment of hair ailments, including preventing hair loss and provoking hair growth. The author recommends more studies on camel hump fat to approve its various medicinal properties.

Keywords: Camelids, camel Hump oil, psoriasis, hyperkeratosis.

IMPORTANCE OF CAMELIDS IN THE COVID-19 PANDEMIC AND THEIR IMMUNOGENETIC RESPONSE TO CORONAVIRUS INFECTION

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Abstract

Camelids are not only recognized for their remarkable production potential under harsh climate but also for their extraordinary immunology and important role in fighting infectious (zoonotic) diseases. This is due to the fact that camelids are the only mammals capable to produce homodimeric, heavy-chain-only antibodies (VHHs) in addition to conventional immunoglobulins. Four of these “nanobodies” (variable domains of VHHS) were identified to bind to the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) spike protein and prevent infection of cells, after immunization of alpaca/ llama with inactivated virus. Thus, nanobodies are excellent candidates for antiviral therapy. On the other side, camelids can act as intermediate source or vector for transmitting zoonotic viruses to humans, such as the Middle East respiratory syndrome coronavirus (MERS-CoV) or Crimean-Congo hemorrhagic fever virus (CCHFV). However, cross-

immunity between MERS and other respiratory coronavirus infections like COVID-19 in humans has been hypothesized. In view of the increasing importance of camelids and their products, we were interested in the immunogenetic response of Old World camels to coronavirus and other zoonotic virus infections, and investigated 100 immune response genes in dromedaries tested positive or negative for MERS-CoV or CHHFV. By univariate logistic regression analysis, we identified different candidate genes belonging to the adaptive and innate immune system associated to these zoonotic virus infections. The candidate genes have important functions in host defense against viral infections and in stimulating natural killer cells. Our results open doors for future research into immune defense mechanisms in an enzootic host against important zoonotic diseases.

Keywords: COVID-19 Pandemic, Immunogenetic response, Camel

TO CULL OR CULTIVATE: DILEMMA OF NEGLECTED AUSTRALIAN FERAL CAMELS

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Abstract

Australian feral camel refers to wild dromedary (*Camelus dromedarius*) population mainly inhabited in central and western Australia. Domestic dromedaries were imported from British India and Afghanistan during the 19th century for transport and construction during the colonisation of Australia. When motorized transport replaced the camels in the early 20th century, many were released in the wild. Due to their unique anatomical and physiological features, this beast survived in the hostile Australian rangelands and resulted in a fast-growing and one of the strongest and healthy feral population in the world. This strong new camel was however left unattended or rather forsaken and naturally resulted in a massive feral population (minimum population estimate is ~01 million). However, with the depleting water and food sources, this growing population turned to towns and cities which resulted in serious damages to the infrastructure (fences, water pipes and air conditioners), endangered residents and travelers, and polluted food/water supplies. Australian government was highly criticized globally when they decided to kill thousands of these animals to put a leash on the wild increase of population, while there were more humane ways of controlling the population and even benefitting from their biological adaptations i.e., tolerance to dehydration, heat stress, feed scarcity and ability to convert scanty vegetation into food products of high nutritional and nutraceutical value. However, in its National Feral Camel Action Plan (NFCAP), Australian government acknowledged this issue and decided to set following goals: support the humane management; mitigation of negative impacts; adoption of a platform for on-going humane management and developing partnerships and social capacity for humane feral camel management. We believe that this feral population is a biological resource of prime importance and by achieving NFCAP goals, welfare of this beautiful beast will be possible and export of its high value food products and live animals (for breeding and sports) will have a huge contribution towards Australian livestock industry and economy.

Keywords: Feral camel, Welfare, Biological Potential, Nutraceutical, NFCAP, Australia

PASTORAL LASSI CAMEL HUSBANDRY PRACTICES, MILK YIELD POTENTIAL PRODUCT DEVELOPMENT AND MARKETING AT COMMUNITY LEVEL IN BALOCHISTAN

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Abstract

Balochistan stands as Hub of camelids in Pakistan having 41% (0.42 m) camel population of the country. This animal species has remained part and parcel of the lives and culture of the inhabitants of the province. With gradual increase in mechanization, its conventional use has been squeezed and at present kept as part of cultural life and need base beef marketing. Camel research and development by the provincial government, non-government organizations and academia have been on negligible line. Considering this appalling scenario, Faculty of Veterinary and Animal Sciences initiated basic research work on camels. In this context Agricultural Linkages Program, Pakistan Agriculture Research Council (ALP-PARC) supported research work on camels. In this project (AS010) three areas were focused i.e., Lassi camel husbandry practices, feeding experiment on milk production under pastoral farming circumstances, and capacity building of pastoral farmers by conducting field school days. The major findings in pastoral camel husbandry practices showed that these farmers are main source of conserving camel breeds and camels. The feeding management is on natural grazing. Breeding practice is poor enough and usually get crop after 2.5-3 years. They do not sale camel milk and consider it as “forbidden tree” due to religious misconceptions. The half produced milk is fed to calves whilst remaining half yield were used for home and as free gifts. They do sale under one year age male camels as income source for their families. In feeding experiment under management circumstances, the project team fed different sources of energy and protein supplements along with grazing to record potential of milk yield. It was found that camels fed supplement with higher energy and high CP level (2.5

kcal/Kg M.E; CP 12%) along with high energy and low CP (2.5 kcal/Kg M.E; CP 10%) significantly increased production than control and other supplemented groups. In third phase capacity build of farmers were carried out in field schools along with initial experiments on development of camel milk products. In other small grant by the Government of Balochistan (GoB-LUAWMS CAM Project), pilot study experiments conducted on development and commercialization of camel milk ice cream and yoghurt. In this project, skim milk powder was replaced with fresh milk of other livestock species for making those camel milk products. Camel milk yoghurt was developed with inclusion of 40-50 % fresh milk from other livestock species whilst camel milk ice cream was successfully developed without use of skim milk powder and or fresh milk from other livestock species. Camel Hut (mobile sale unit) was prepared for community marketing of camel milk products. This initial and basic step led us market CAM ice cream for the first time in Pakistan at community level.

Keywords: Pastoral farmers, milk, feeding, sale, value addition, ice cream, yoghurt

CAMEL BRUCELLOSIS – A REEMERGING ZONOSIS IN PAKISTAN

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Background:

Brucellosis is one of the most important zoonoses in developing countries and was considered the most-widespread zoonosis in the world. Brucellosis was reported in camels and has been reported from all camel-keeping countries.

Method:

The present study was performed in three districts (Jhang, Chiniot and Bhakkar) of Punjab province of Pakistan. A total of 200 camel sera were collected using random and multistage cluster sampling from different areas. Fifty samples were collected from one organized governmental farm. The 150 samples were collected randomly from nomadic/pastoral production systems. All sera were tested with Rose Bengal plate agglutination test (RBPT) and confirmed by ELISA. Genomic DNA was extracted from all serum samples and tested by real time PCR. Various risk factors (season, rearing with other animals and abortion or orchitis history) recorded through questionnaires were statistically analyzed by Chi-square test.

Results:

In total 5% and 4% sera were positive by RBPT IDEXX (Pourquier, France) and VRI (Veterinary Research Institute, Pakistan) antigen, respectively. Only 2% camel sera were positive by cELISA which were confirmed with iELISA. *Brucella abortus* DNA was detected in 1.5% of the investigated animals. The disease was found to be mainly endemic in Jhang and Chiniot.

Season, rearing of camels with other ruminants, abortion and orchitis history were found to be statistically significant ($p < 0.05$) disease determinants.

Conclusion:

Camel brucellosis is endemic in the Pakistani Punjab with various risk factors maintaining and perpetuating its spread. It is reemerging zoonosis in Pakistan.

Keywords: Camel, Brucellosis, RBPT, cELISA, iELISA, PCR, risk factors, reemerging zoonosis

CAMEL – AN ANIMAL OF FUTURE, PROSPECT OF FOOD SECURITY AND SOVEREIGNTY IN CHANGING CLIMATE

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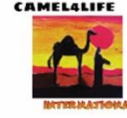
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Abstract

Definitely the major issue is food security and sovereignty at globe due to exploding human population. To match the situation, exploration of new resources is need of hour. When talk about camel, it seems wonderful addition in food chain, hence provides milk, meat and by-products of economic origin. Camel helps in subsistence of pastoral economy in diverse eco-zones covering India and Gobi desert in central Asia to Ethiopia and Somalia in the horn of Africa. Due to its peculiar potential of survival in harsh arid environments and to tolerate stresses like heat, scarcity of water and feed shortage, camel is fascinated mankind. It can consume dry matter and other nutrients especially of crude fiber better than domestic animals. It can manage to produce relatively at lower costs compared to other livestock species. It can thrive well on sandy deserts with poor vegetation and mainly consume those feed material that is unutilized by several other domestic animals because of its unique physiology and adaptation. Camels in Pakistan are very well adapted to their native environment and can sustain life in Thal, Thar and Cholistan deserts. Camel is very different regarding the anatomical structure i.e. head, eyes, mouth, pedestal, pads, body frame, legs and height, all these features are helpful to him regarding its survival in the deserts as it is miracles of Almighty provided especially to camel. Physiology of stomach, blood, kidneys and homeostatic mechanisms are also extra-ordinary features of camel which aid him to survive in harsh climates. Consequently, camel holds the principle chair in performance over the other domestic species in changing climate and provides a better source of milk and meat (of therapeutic worth) in the hostile environment hence plays a vital role in food security and sovereignty.

Keywords: Camel, food security, desert, pastoral, population



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