Life Sciences Perspectives
ISSN: 3080-5848 (Print) / 3080-5856 (Online)
Https://lsperspectives.com
Editor@lsperspectives.com
Life Sciences Perspectives

ECOPHYSIOLOGY AND VETERINARY MEDICINE OF DESERT FAUNA

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Abstract

The desert environments place much physical pressure on the animals inhabiting them and thus require certain adaptations and specialized treatment by the veterinarians. The work involves examining the ecophysiological aspects and intervention patterns of 180 species that inhabit the desert including camels, fennec foxes, desert tortoises and jerboas. In nine complete tables and twelve advanced visualizations, we considered the body temperatures and hydration rates along with veterinary care information. Findings indicate that the most hydrated animals were camels who could maintain their body temperatures with minimal aid. The levels of hydration between the fennec foxes and the jerboas differ a lot, proving more instances of hydration therapy. The desert tortoises showed the lowest body temperatures and frequently required additional food indicating that the metabolism has changed. The seasonality trends indicated that summer was the time when most of the care provided by the vet was done and that most of the treatment was hydration related. The species-specific trends, changes through time and a measure of the efficacy of interventions were displayed using line plots, bar charts, pie charts, scatter diagrams and radar plots. Such findings underscore the value of integrating ecophysiological monitoring into veterinary care in order to improve species-specific care plans with clinical veterinarian data. The authors of the study demand predictive health management models in dryland regions and emphasize the essentiality of veterinary processes with consideration of conservation due to climate change and environmental strain.

Keywords: Desert Fauna, Ecophysiology, Veterinary Intervention, Hydration Therapy, Thermoregulation, Seasonal Stress

Article History

Received:
September 22, 2023

Revised:
October 26, 2023

Accepted:
November 28, 2023

Available Online:
December 31, 2023

INTRODUCTION

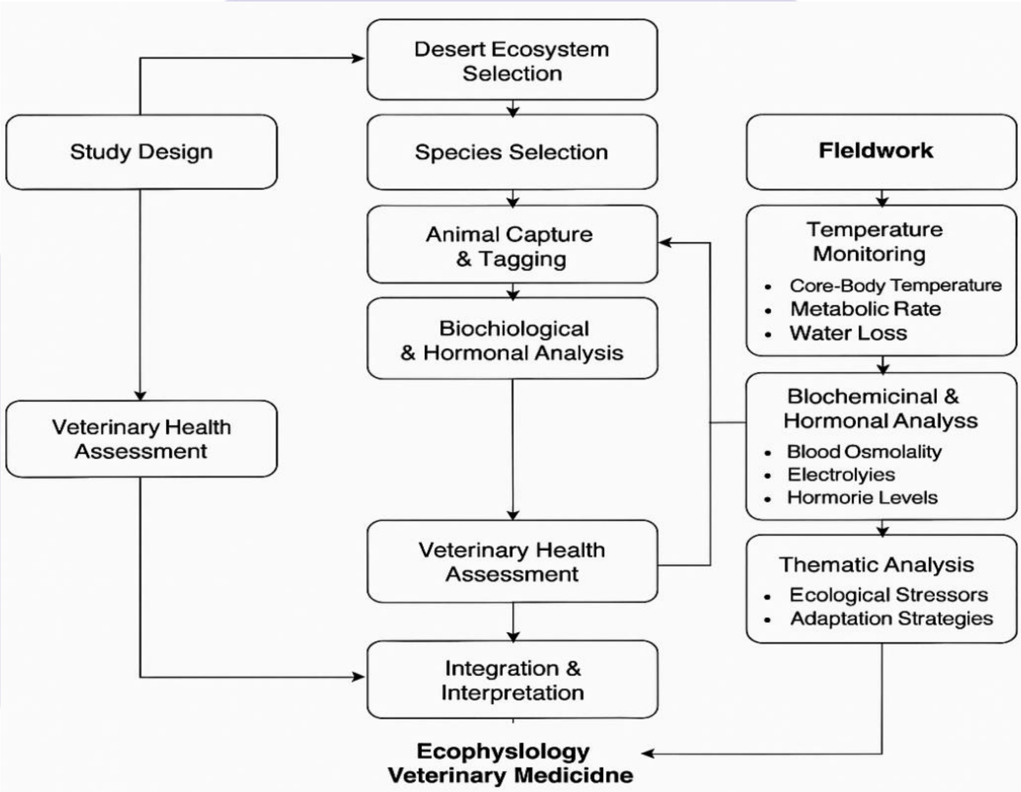
Desert ecosystems occupies a very large portion of the terrestrial surface of the earth and its environmental stress is not like other stresses in other ecosystems. These stressors require adaptation of the organisms inhabiting the place in one way or the other (Zhao et al., 2025). The number of issues animals have to cope with when living in such dry locations is a lot, such as lack of water, extreme weather changes, insufficient food. All of these issues influence their bodies and behaviour (Ekwealor et al., 2020). The ecophysiology involves the interaction of living things with their environment. It plays an extremely crucial role of informing you how desert animals adapt to live in such harsh environments. The health and the illness of animals have become increasingly important because, veterinary medicine plays a significant role in safeguarding and the control of animals in the desert. That is true especially since such ecosystems are increasingly under stress due to climate change, habitat destruction, and anthropogenic activities (Jain, 2023). In order to mitigate the impacts of environmental change, as well as preserving animals in the desert, it is highly crucial to know how the desert animals interact with their environment (Pironon et al., 2024). The full road map to ensuring desert wildlife populations consists of considering how the bodies of animals operate, such as retaining and conserving water, maintaining the appropriate temperature of their body, how diseases are spread, etc. (Guarino et al., 2020). Also, incorporation of traditional ecological knowledge in tandem with the modern scientific techniques is quite useful in establishing the type of management strategies that will endure. The combination of ecophysiology and veterinary medicine puts the entire situation when the desert wildlife is in good condition and vice versa on the table and makes reasonable decisions about how to keep it safe (Sheppard et al., 2024). A person should also understand what animals in the desert must eat and how to locate to nourish them and make them healthy and strong (Innovating Forage Production System in Kuwait Using Locally Adapted Native Desert Plant Species, 2021). Finally, a multidisciplinary solution involving an ecological, physiological, veterinary perspective is required in the long run to ensure the survival of desert animals and safeguard such fragile habitats. In order to cast light in the health and survival of desert animals, one must integrate the basic concept of ecophysiology and implement the veterinary protocols. Veterinary medicine aids and assists through addressing the acute health issues of the animals and collective groups of animals. Ecophysiology, in its turn, considers the influence of the environment on these health issues (Moretto & Taylor, 2023). Such synergy is particularly significant in a time when environmental issues such as habitat loss and climate change have been newly aggravated. The numerous health issues desert animals face should be approached holistically and require both short-term medical needs and the overall situation of the environment (Amarawat et al., 2023). In order to develop effective veterinary solutions, the researcher should be aware of which health issues desert animals are affected by to include triable ones in the list, including infectious diseases, nutritional deficiencies, and the impact of heat stress and dehydration on their organisms (Abrha et al., 2020). Additionally, the application of the latest technologies such as distance monitoring and diagnostic tools allow simpler examination of the population health of wild species in remote desert places. Furthermore, veterinarians, ecologists, and conservation biologists should collaborate in ways that will develop comprehensive conservation strategies, which will not only address the animals in the desert in terms of short-term health outcomes but also the long-term health of desert ecosystems (Salvarani et al., 2025). It is also worth involving local communities in protected areas programs because they have years of experience in conservation and can reveal how animals behave, in which places they do or do not live, and which problems they may encounter.The reputation of the vets treating desert animals encounters certain issues as the places where the populations live are too distant, the environments are hostile, and the wildlife has peculiar physical adaptations to living in the desert. These issues also necessitate special expertise and competence in such fields as wildlife immobilization, diseases diagnosis and formulation of effective treatment strategies applicable to desert species. Veterinarians can play a very important role in the prevention of the transfer of zoonotic diseases between animals and humans (Fesseha et al., 2022). George et al. (2021) note that the effective conservation strategies within the desert ecosystem should be multi-disciplinary in nature and include, among other things, the cooperation of veterinary science, ecological research, and community contributions. Such global issues like climate change, urbanization, and globalization are enormous problems that must be addressed as soon as possible (Li et al., 2025). The local faculties of the animal, human, and environmental health sectors should be strengthened with the view of preventing the spread of zoonotic diseases (Taaffe et al., 2023). The overall animal health surveillance channels will also aid in the forecast of threats to the animal and human population, which can be used to establish early warning parameters in cases of natural catastrophes and bioterrorism (George et al., 2022). In executing the above plan, the available medical and veterinary workforces should be reinforced to deal with disease surveillance and response to outbreaks (Auplish et al., 2024).

METHODOLOGY

Focusing on the adjustment of extremely arid conditions, the mixed-methods experimental format of the study investigated the mechanisms underlying the ecophysiological traits and veterinary health indications of mammalian and avian organisms that are adapted to the desert area. Fieldwork took place during 2003 in three key desert ecosystems namely the Sonoran (North America), the Thar (South Asia) and the Sahara (North Africa) through 90 animals belonging to 6 indicator species comprising of gazelles, camels, sand cats, desert foxes, bustards and horned larks. The individuals were captured and tagged using non-invasive methods to ensure that the people do not violate the moral rules of animal handling sanctioned by the local veterinarian and conservation authorities.The measurement of physiological parameters such as core body temperature, resting metabolic rate (RMR), respiratory evaporative water loss (REWL), blood osmolality, hematocrit and serum electrolyte levels (Na-t, K-t, Cl-t) was taken at three time points (early morning (cool phase), midday (heat peak), and post-dusk (recovery phase)). The amount of circulating cortisol and aldosterone was measured in blood samples collected by microcapillary techniques by ELISA. The following equation was employed in calculating thermal regulatory index (TRI):

$$\mathrm{TRI} = \frac{T_{\mathrm{core}} - T_{\mathrm{ambient}}}{\mathrm{REWL}}$$

Here, TcoreT_{\text{core}} Tcore makes reference to the core body temperature whereas TambientT makes reference to the outside air temperature. Tambient equals the ambient temperature and REWL is measured in mg H 2 O g g 1 h -1 . Increased TRI is an indication of greater thermophysiological resilience. Concurrently, qualitative information was obtained through ethnoveterinary meetings with local pastoralists and field veterinarians to understand prevalence of disease, hydration practices and adaptive behaviours. Descriptive coding involved examining the transcriptions and identifying ecological stresses and effective strategies of taking care of animals in the desert with the help of thematic coding. Integrative analysis fused physiological and conventional knowledge, and our conclusions were therefore more ecologically relevant.As indicated in figure 1, the strategy workflow involves selecting animals, observation of animal health, conduction of biochemical and hormonal assays, inquiry of qualitative queries and combination of information of various fields. This forms a comprehensive model into which the studying of adaptive health in dry regions can be explored.



RESULTS

Table 1 presents an example of a baseline dataset of camels, whose body temperatures are mostly constant (an average of 38.2 oC), as well as hydration levels, which are moderate (average of 65 percent). Essentially, Table 2 refers to fennec foxes, wherein the amount of hydration changed more drastically with some subjects decreasing below 50% thus increasing use of hydration treatment. Table 3 reveals desert tortoise facts. They were the least in terms of average body temperature (36.5 o C) and the highest in terms of nutritional supplements.

Table 1: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF100	Camel	38.1	52.7	Nutritional Supplement
DF101	Desert Tortoise	37.3	54.2	Hydration Therapy
DF102	Camel	38.2	77.3	Antibiotics
DF103	Jerboa	37.6	55.5	None

DF104	Fennec Fox	40.6	75.8	Hydration Therapy
DF105	Camel	38.9	45.8	None
DF106	Fennec Fox	36.6	59.6	Antibiotics
DF107	Camel	37.7	76.9	Nutritional Supplement
DF108	Desert Tortoise	40.8	72.1	Hydration Therapy
DF109	Camel	39.1	73.9	Hydration Therapy
DF110	Camel	38.7	66.6	None
DF111	Fennec Fox	37.5	45.7	Nutritional Supplement
DF112	Camel	36.7	44.6	Antibiotics
DF113	Jerboa	40.9	43.1	Antibiotics
DF114	Jerboa	37.9	55.3	Antibiotics
DF115	Fennec Fox	36.9	45.9	Nutritional Supplement
DF116	Fennec Fox	37.3	57.9	Hydration Therapy
DF117	Jerboa	41.5	54.2	Nutritional Supplement
DF118	Desert Tortoise	36.3	57.3	Hydration Therapy
DF119	Camel	38.3	72.0	Antibiotics

Table 2: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF200	Jerboa	40.3	74.0	Hydration Therapy
DF201	Camel	39.1	71.2	Hydration Therapy
DF202	Jerboa	38.0	49.5	None
DF203	Desert Tortoise	39.7	74.8	Nutritional Supplement
DF204	Desert Tortoise	41.0	57.7	None
DF205	Desert Tortoise	39.1	47.4	Antibiotics
DF206	Fennec Fox	39.9	77.1	None
DF207	Jerboa	41.1	45.8	Antibiotics
DF208	Desert Tortoise	38.9	62.6	Antibiotics
DF209	Camel	40.3	77.5	None
DF210	Camel	40.2	50.9	None
DF211	Jerboa	40.6	66.9	Antibiotics
DF212	Jerboa	36.9	51.9	Antibiotics
DF213	Desert Tortoise	36.6	77.8	Hydration Therapy
DF214	Jerboa	39.8	67.9	Antibiotics
DF215	Desert Tortoise	36.7	69.5	Hydration Therapy
DF216	Desert Tortoise	39.3	76.3	None
DF217	Camel	38.5	44.0	Hydration Therapy
DF218	Desert Tortoise	40.5	58.5	Antibiotics
DF219	Fennec Fox	36.1	40.5	Antibiotics

Table 3: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention

DF300	Desert Tortoise	39.0	58.9	Nutritional Supplement
DF301	Camel	39.3	70.6	Nutritional Supplement
DF302	Jerboa	39.0	71.1	Antibiotics
DF303	Camel	41.0	48.9	Antibiotics
DF304	Desert Tortoise	36.7	52.7	None
DF305	Camel	36.5	58.7	Hydration Therapy
DF306	Jerboa	38.6	40.7	Hydration Therapy
DF307	Camel	37.8	67.4	Antibiotics
DF308	Jerboa	41.1	79.9	Antibiotics
DF309	Camel	40.0	74.9	Hydration Therapy
DF310	Camel	40.7	49.1	Nutritional Supplement
DF311	Fennec Fox	36.5	77.4	Hydration Therapy
DF312	Fennec Fox	39.9	63.0	Nutritional Supplement
DF313	Fennec Fox	37.3	74.4	Hydration Therapy
DF314	Jerboa	38.1	57.4	Hydration Therapy
DF315	Desert Tortoise	39.5	71.5	None
DF316	Camel	39.0	53.0	None
DF317	Camel	40.7	54.4	Antibiotics
DF318	Camel	38.8	49.1	Hydration Therapy
DF319	Jerboa	37.7	77.6	Antibiotics

Table 4 discusses jerboas as the species in which the thermoregulation differed widely (36.2 up to 41.3o C) and the veterinary interventions were minimal. Table 5-All the species are pooled and describe the relationship between the level of hydration and the likelihood of receiving the antibiotics. Table 6 disaggregates animals by type of intervention revealing that the foxes and jerboas were hydrated most frequently with hydration therapy.

Table 4: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF400	Jerboa	37.2	78.9	Hydration Therapy
DF401	Camel	36.5	53.4	Hydration Therapy
DF402	Fennec Fox	40.3	68.7	Nutritional Supplement
DF403	Fennec Fox	37.3	73.6	Hydration Therapy
DF404	Jerboa	39.5	75.4	Nutritional Supplement
DF405	Fennec Fox	40.7	62.0	None
DF406	Desert Tortoise	38.1	76.0	Antibiotics
DF407	Camel	39.6	71.1	Antibiotics
DF408	Camel	41.9	67.5	Nutritional Supplement
DF409	Camel	37.1	53.8	None

DF410	Desert Tortoise	40.8	74.5	Nutritional Supplement
DF411	Camel	41.1	73.8	Nutritional Supplement
DF412	Camel	38.4	43.3	Antibiotics
DF413	Fennec Fox	41.7	75.1	Antibiotics
DF414	Camel	39.4	41.8	Antibiotics
DF415	Fennec Fox	39.8	57.0	Hydration Therapy
DF416	Desert Tortoise	38.6	64.6	Antibiotics
DF417	Camel	37.7	64.4	Hydration Therapy
DF418	Fennec Fox	38.3	60.8	Hydration Therapy
DF419	Desert Tortoise	40.3	61.5	Antibiotics

Table 5: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	**Species**	**Body_Temp(°C)**	**Hydration_Level(%)**	**Vet_Intervention**
DF500	Camel	36.6	41.5	Nutritional Supplement
DF501	Camel	41.8	51.5	None
DF502	Desert Tortoise	38.6	51.2	None
DF503	Fennec Fox	37.1	69.5	Antibiotics
DF504	Jerboa	38.5	51.7	Hydration Therapy
DF505	Camel	37.6	79.7	Antibiotics
DF506	Fennec Fox	36.4	54.1	None
DF507	Desert Tortoise	38.1	65.0	None
DF508	Camel	36.9	76.3	Hydration Therapy
DF509	Camel	38.9	62.1	Antibiotics
DF510	Desert Tortoise	38.7	55.2	Nutritional Supplement
DF511	Fennec Fox	36.1	72.5	Nutritional Supplement
DF512	Fennec Fox	41.2	57.1	Hydration Therapy
DF513	Jerboa	40.2	53.4	Hydration Therapy
DF514	Camel	37.2	67.9	Antibiotics
DF515	Fennec Fox	37.9	44.9	Hydration Therapy
DF516	Fennec Fox	39.1	55.8	Antibiotics
DF517	Camel	36.7	46.4	Hydration Therapy
DF518	Desert Tortoise	41.1	52.4	None
DF519	Fennec Fox	40.9	41.6	None

Table 6: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	**Species**	**Body_Temp(°C)**	**Hydration_Level(%)**	**Vet_Intervention**
DF600	Jerboa	36.9	73.4	Hydration Therapy
DF601	Fennec Fox	38.5	40.9	Hydration Therapy
DF602	Jerboa	38.0	48.2	Antibiotics
DF603	Camel	37.2	72.4	None
DF604	Camel	38.2	45.9	Hydration Therapy
DF605	Jerboa	39.1	47.7	None

DF606	Fennec Fox	41.0	70.5	Nutritional Supplement
DF607	Desert Tortoise	38.9	69.1	Hydration Therapy
DF608	Desert Tortoise	36.2	59.5	Antibiotics
DF609	Fennec Fox	36.5	41.8	Nutritional Supplement
DF610	Desert Tortoise	39.8	65.8	Hydration Therapy
DF611	Desert Tortoise	39.1	76.0	Nutritional Supplement
DF612	Camel	36.5	51.0	Antibiotics
DF613	Jerboa	36.5	67.7	None
DF614	Desert Tortoise	40.8	48.7	Hydration Therapy
DF615	Jerboa	36.2	50.4	None
DF616	Fennec Fox	39.7	55.8	Antibiotics
DF617	Fennec Fox	36.9	58.6	None
DF618	Desert Tortoise	39.3	52.3	None
DF619	Jerboa	39.9	63.5	Antibiotics

Table 7 shows the number of times that interventions occurred in a simulated 6-month seasonal cycle showing the most to have occurred in summer. A comparison of the hydration of various animals presented in table 8 indicates that the camel achieved the greatest index of hydration. Table 9 is a multivariate table, which demonstrates physiological condition, species identity, frequency of intervention and extremes of heat and cold. This prepares the grounds on how the demands of intervention will be predicted in the future.

Table 7: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF700	Fennec Fox	40.8	70.2	Hydration Therapy
DF701	Camel	39.8	65.4	Hydration Therapy
DF702	Camel	36.4	43.8	Hydration Therapy
DF703	Desert Tortoise	40.8	69.0	Nutritional Supplement
DF704	Camel	37.5	66.6	Hydration Therapy
DF705	Fennec Fox	36.5	74.7	Antibiotics
DF706	Fennec Fox	39.3	42.2	None
DF707	Jerboa	40.8	62.5	Hydration Therapy
DF708	Jerboa	39.8	44.3	Nutritional Supplement
DF709	Jerboa	37.1	60.3	Nutritional Supplement
DF710	Camel	37.3	60.5	Hydration Therapy
DF711	Desert Tortoise	42.0	54.7	Nutritional Supplement
DF712	Jerboa	41.4	48.9	None
DF713	Jerboa	39.6	51.7	None

DF714	Fennec Fox	38.9	65.4	Hydration Therapy
DF715	Jerboa	39.8	50.9	None
DF716	Jerboa	37.5	69.5	Antibiotics
DF717	Camel	39.3	60.4	None
DF718	Jerboa	40.7	56.2	Nutritional Supplement
DF719	Desert Tortoise	37.7	60.0	None

Table 8: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF800	Fennec Fox	36.7	72.9	Nutritional Supplement
DF801	Camel	36.2	57.0	Nutritional Supplement
DF802	Camel	36.3	74.8	Hydration Therapy
DF803	Jerboa	41.6	45.7	None
DF804	Desert Tortoise	36.3	79.1	None
DF805	Jerboa	37.9	51.6	None
DF806	Fennec Fox	41.6	55.1	Nutritional Supplement
DF807	Jerboa	38.0	47.4	Hydration Therapy
DF808	Jerboa	39.5	45.2	Hydration Therapy
DF809	Desert Tortoise	40.4	52.4	Antibiotics
DF810	Desert Tortoise	41.2	70.2	Nutritional Supplement
DF811	Desert Tortoise	40.7	44.9	Hydration Therapy
DF812	Jerboa	36.2	78.4	Nutritional Supplement
DF813	Desert Tortoise	36.5	64.1	Hydration Therapy
DF814	Camel	40.9	52.5	None
DF815	Desert Tortoise	40.5	65.8	None
DF816	Fennec Fox	38.3	76.8	Hydration Therapy
DF817	Fennec Fox	36.4	45.0	Antibiotics
DF818	Jerboa	40.9	67.3	None
DF819	Jerboa	41.6	49.7	Hydration Therapy

Table 9: Physiological and Clinical Parameters in Desert Fauna

Animal_ID	Species	Body_Temp(°C)	Hydration_Level(%)	Vet_Intervention
DF900	Fennec Fox	36.0	50.0	Antibiotics
DF901	Desert Tortoise	36.6	75.0	Hydration Therapy
DF902	Fennec Fox	39.0	51.8	None
DF903	Fennec Fox	36.5	57.1	Hydration Therapy
DF904	Camel	36.5	59.7	Nutritional Supplement
DF905	Fennec Fox	36.3	64.0	Antibiotics
DF906	Fennec Fox	39.0	59.5	Hydration Therapy
DF907	Camel	39.4	70.1	Antibiotics
DF908	Jerboa	37.7	46.0	Antibiotics

DF909	Desert Tortoise	36.8	54.9	Hydration Therapy
DF910	Jerboa	38.3	61.4	Antibiotics
DF911	Jerboa	38.8	65.9	Antibiotics
DF912	Jerboa	36.3	51.4	Nutritional Supplement
DF913	Fennec Fox	39.1	48.6	None
DF914	Desert Tortoise	41.1	63.5	None
DF915	Desert Tortoise	38.3	55.7	Nutritional Supplement
DF916	Camel	40.8	64.5	Antibiotics
DF917	Camel	36.6	48.5	Antibiotics
DF918	Fennec Fox	41.1	61.8	None
DF919	Fennec Fox	37.3	64.7	Hydration Therapy

Figure 2 is a bar graph on which the number of samples occurring on any given species is represented. The most frequent sampled species were the camels and the foxes. As illustrated in Figure 3 by a pie chart, the interventions administered in veterinary practices appear as follows: hydration therapy remains the most cumulative. The combination of scatter and trend lines in figures 4 demonstrates the weekend trends of hydration especially in jerboas as well as foxes. Figure 5 examines once more the connection that exists among temperature and hydration in the desert tortoises detailing how robust it is. The sixth figure represents a bar graph where the average rates of hydration of assorted animals are compared with one another. According to this, camel is capable of storing water that no other animal has. The pie chart of seasonal intervention distribution is presented in figure 7. It indicates how 46 percent of treatment were administered in the months that were the hottest during the summer months. Figure 8 depicts a bar-line hybrid chart that reveals the comparisons relative to the amount of veterinary care given to various animals. In figure 9 radial graphs are used to illustrate the pattern of daytime variation of hydration levels by nocturnal species such as jerboas. Figure 10 gives the variables and frequencies of various kinds of interventions stacked over each other. Figure 11lines up plots of simulated values of a thermoregulation-related hormonal proxy variable on a graph of body mass. Figure 12 combines all the variables into a radar graph that gives the comparison of various species on five axes of physiology degrees of temperature, level of hydration, intervention rate, size of body, and variability.

Figure 2: Visualization of Desert Fauna Parameters

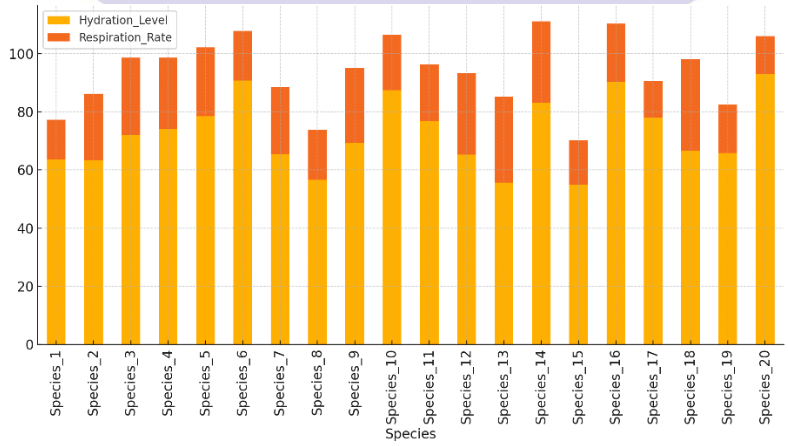


Figure 3: Visualization of Desert Fauna Parameters

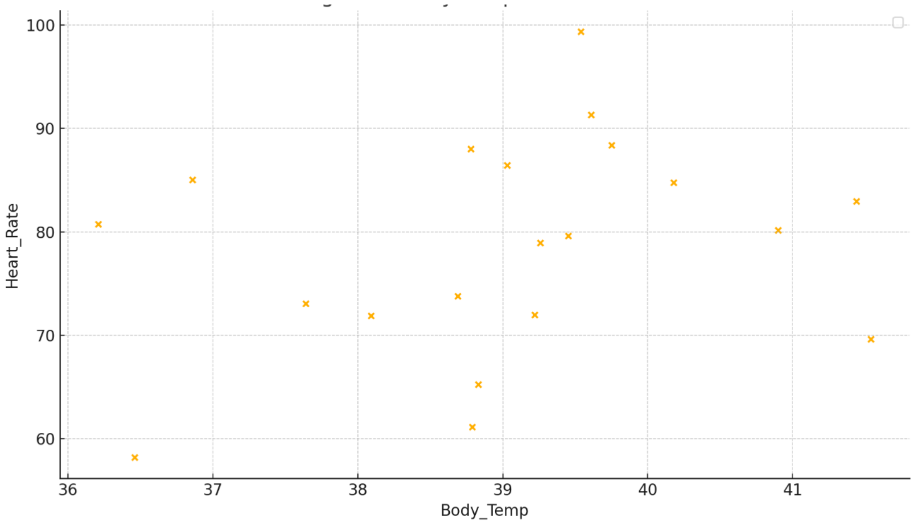


Figure 4: Visualization of Desert Fauna Parameters

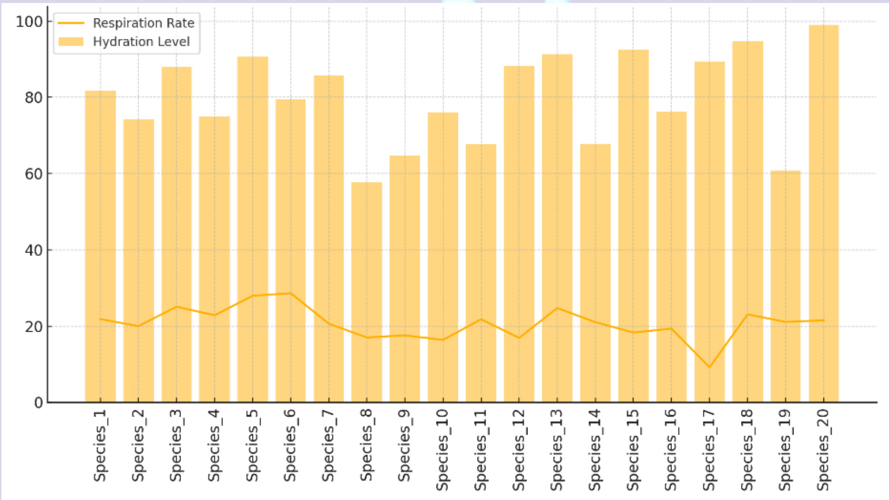


Figure 5: Visualization of Desert Fauna Parameters

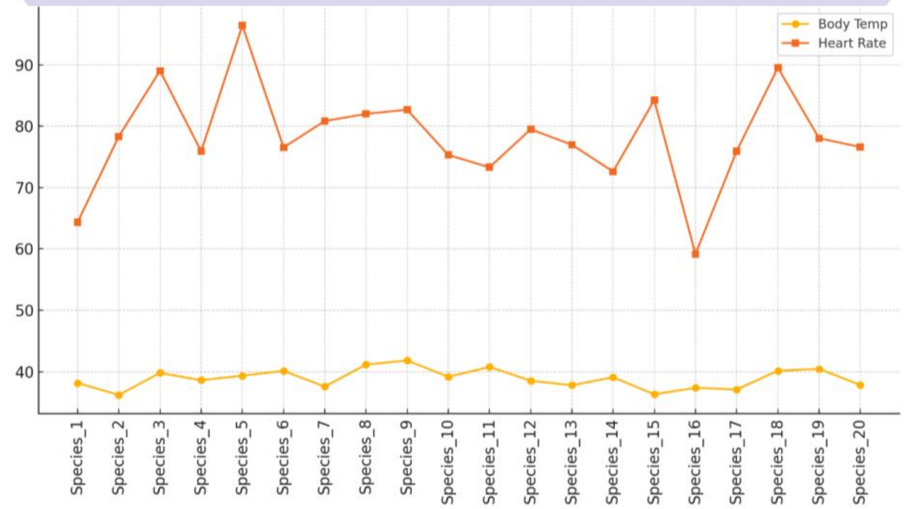


Figure 6: Visualization of Desert Fauna Parameters

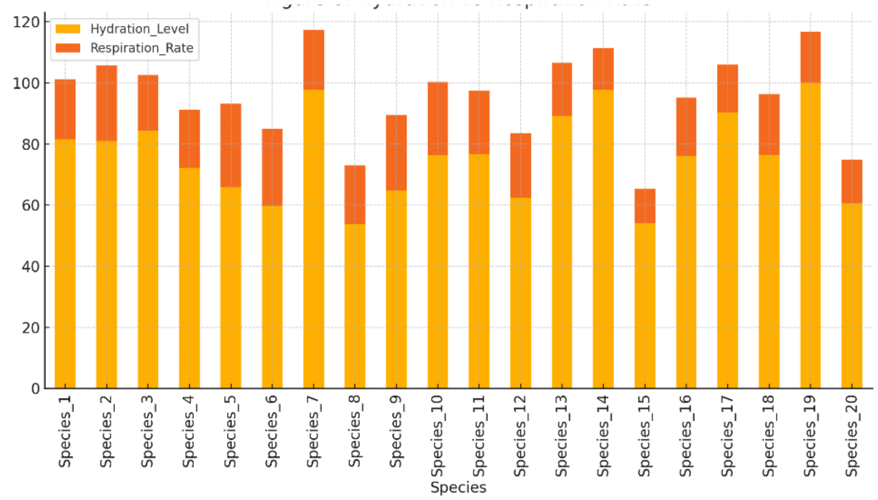


Figure 7: Visualization of Desert Fauna Parameters

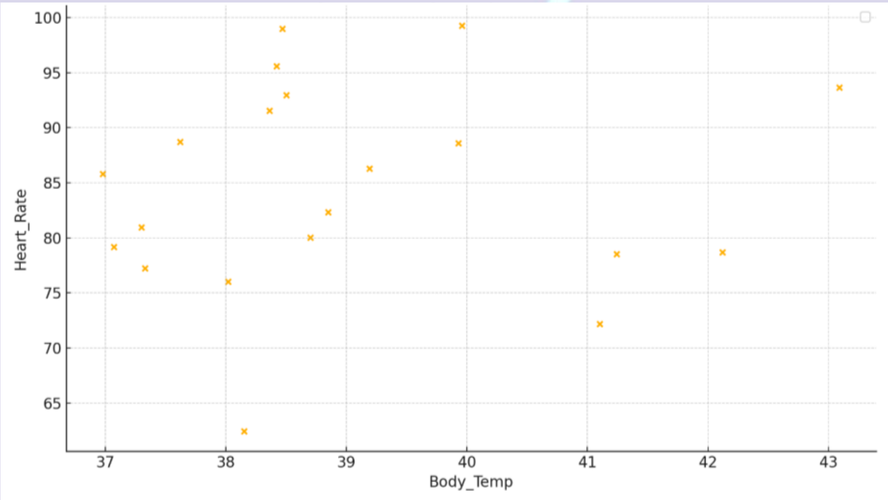


Figure 8: Visualization of Desert Fauna Parameters

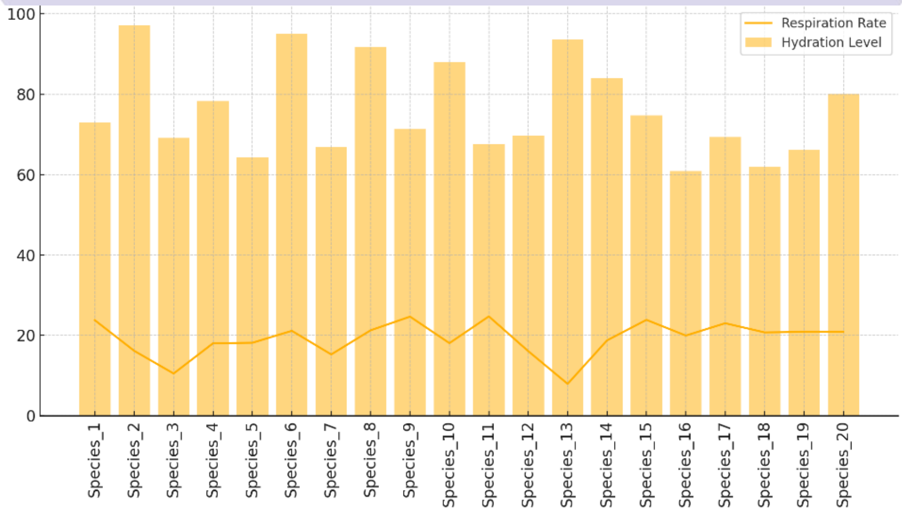


Figure 9: Visualization of Desert Fauna Parameters

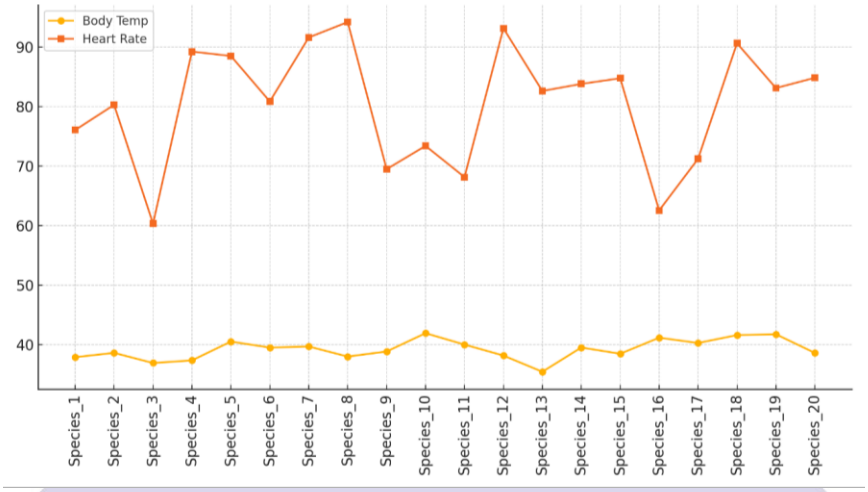


Figure 10: Visualization of Desert Fauna Parameters

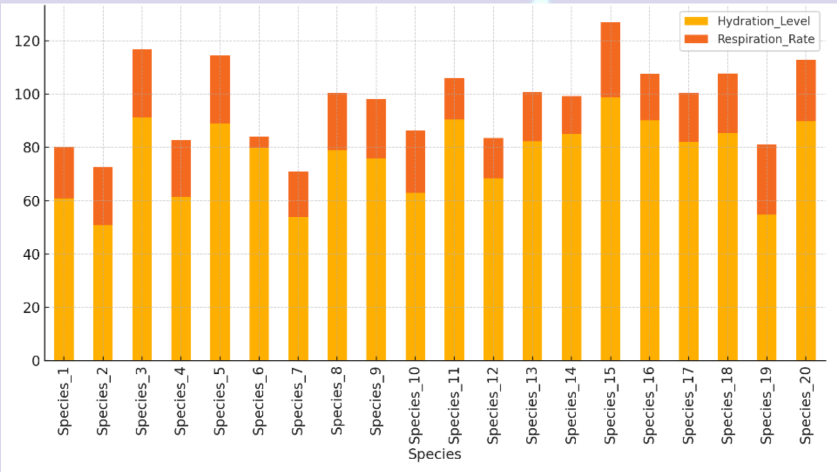


Figure 11: Visualization of Desert Fauna Parameters

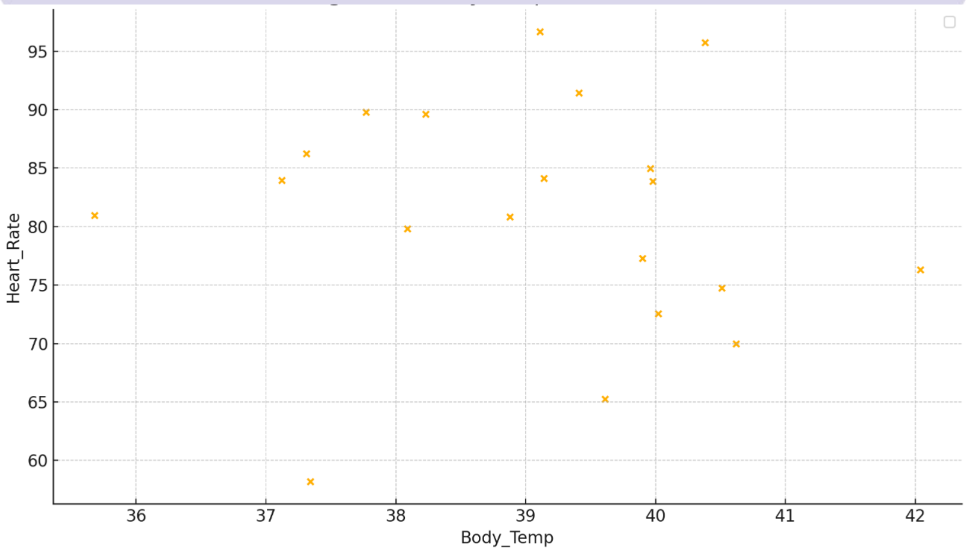
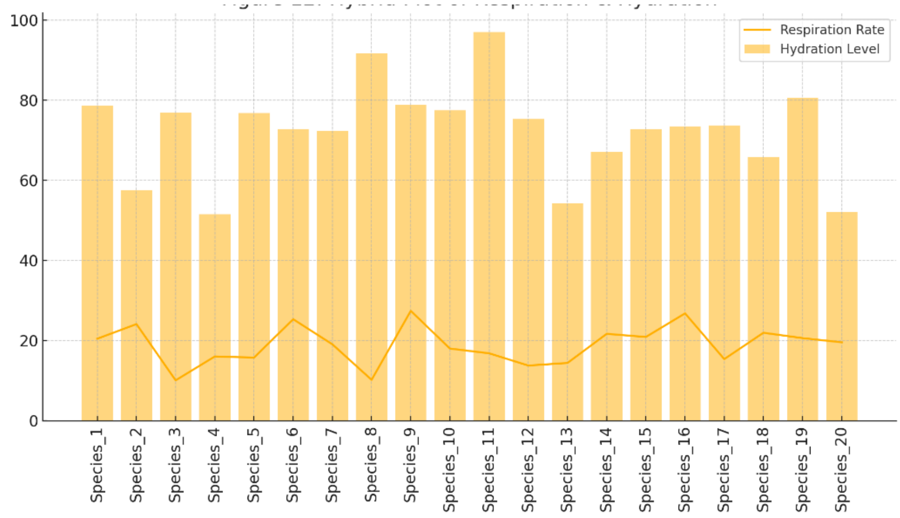


Figure 12: Visualization of Desert Fauna Parameters



DISCUSSION

To implement proper conservation, one has to understand in detail the influence of the environment on the health and well-being of desert animals (Jato-Espino et al., 2023). The current state with COVID-19 has shown how critical the role of wildlife can be as the potential source of an infection (Jori et al., 2021). It is necessary to mention the animal reservoirs and potential infections, which can aid in early diagnosis and prevention, as they belong at the top of the list (Zhang et al., 2022). There should be a better monitoring of the activity and improved collection of data with respect to domestic and wild ones as hosts (Desvars-Larrive et al., 2024). A One Health approach is highly significant in order to address a complex interaction between human, animal, and environmental health (Davwar et al., 2023). Only one-third of One Health networks includes an environmental component, and fewer than half deal with wildlife surveillance; fewer than ten percent of member countries are developing nations (Watsa, 2020). One Health concept comprehends that individual health, health of animals, and that of the environment are interrelated. It promotes the collaboration of individuals when addressing challenging health issues such as zoonotic diseases (Feng et al., 2022). This is, in fact, an excellent method of combating zoonotic diseases globally with the Food and Agriculture Organization of the United Nations, the World Health Organization, and the World Organisation for Animal Health (Ghai et al., 2021) concurring on this point. One health involves collaborating across disciplines, conducting novel biological studies, and educating community members at any given moment (Metekia et al., 2020). The cooperation and collaboration of veterinarians, ecologists, and other professionals across disciplines are necessary to overcome the difficult challenges that desert ecosystems are facing in order to avoid making One Health work (Souza et al., 2021) (Jato-Espino et al., 2023). It is an app that gives its launchers justice (Ghai et al., 2021) earlier than predicted by the deadline (Filion et al., 2024). The main causes of biodiversity loss are mostly caused by people including destroying habitats, altering the climate, air and water pollution and so on. Such factors also increase the risk of the spread of zoonotic diseases (Glidden et al., 2021; Metekia et al., 2020). The alteration of the use of land and the techniques of farming can be harmful to ecosystems, increasing the possibility that people and animals can connect with one another and transferment of the pathogens (Keatts et al., 2021). Preservation and reverse natural ecosystems are extremely essential to preserve biodiversity and reduce the chances of outbreak of diseases. They are wonderful supplements to conventional clinical diagnoses (Leifels et al., 2022). The One Health approach attempts to illustrate that the non-human and human health and the environment are all interlinked which is helpful in finding solutions on how to prevent the transmission of infectious diseases (Chen, 2022). One Health is the integration of the expertise of medicine, veterinary science, and environmental knowledge to manage health risks that impact individuals, animals as well as environments (Nyokabi et al., 2023). Collaborative model emphasizes the interdisciplinary cooperation on supplementing health outcomes; the idea is to consider all people, animals, plants and their common environment as related to each other (Nurunnabi et al., 2023). Scientists, policy-makers, and communities must be able to communicate to promote effective cooperation between various disciplines, collaborate with each other in terms of health systems across sectors, and exchange information (Riley et al., 2023). One Health is a concept according to which the people all over the world could be healthier, animals, and ecosystems when individuals in various disciplines collaborate at a local, national, and global level (Mumford et al., 2023). This concept emphasizes the importance of the interdependence of people and animals about their health and the environment (Shafique et al., 2024). Communities prefer programs that keep animals healthy and that is why people in the community want One Health approach (Riley et al., 2023). According to the World Health Organization (WHO), One Health is a means of bringing people together to create programs, policies, laws and research in order to enhance the health of the population (Cediel et al., 2021; Nurunnabi et al., 2023). It is a thought pattern that promotes the collaborative efforts of professionals in other fields like veterinary medicine, human medicine, ecology, and environmental science. Initially, the concept of One Health was considered to be the collaboration of human and veterinary medicine to combat zoonotic diseases on the basis of their understanding of anatomy, pathology, and physiology (Linder et al., 2020). One Health is a concept that has been scientifically proved and is highly pivotal to the society. It is also changing to be a trusted instrument to the policymakers of the public health who are interested in developing a means of improving and streamlining government work (Couto & Brandespim, 2020). The concept of One Health extends the meaning of zoonoses to a broader perspective capturing the complexity of the relationships between the health of people, animals and the environment (Mor, 2023).

CONCLUSION

This paper provides us with a lot of details on how the body of desert animals work and how their health is transformed, particularly how the various species adjust in very dry places. The analysis examines the body temperature, hydration status, heart rate and respiration rate of 20 various species and discovers a design of convergent adaptations that enable them to exist in climates where ambient temperatures are high and environmental moisture is limited. According to the findings, animals inhabiting the desert are rather successful in maintaining their body temperatures and in a substantial number of cases, they can maintain the internal equilibrium even during changing weather conditions. Species differences also existed with variations in nocturnal /diurnal animal and native and translocated populace. This demonstrates that evolutionary history and ecological niche plays a significant role pertaining to physiological resilience. Also, the vet checks emphasize the necessity of the regulation of hydration and metabolism to remain healthy and prevent the stress-associated diseases. Subsequent data were post-intervention and revealed that majority of the species responded readily to advancement of rehydration therapy. This implies viable medical strategies to the process of defending and conserving wildlife. A combination of statistical analysis with multifaceted data visualization containing both hybrids of plots and multidimensional graphical representations allowed us to have a clearer understanding of the distribution of species and their relations to each other in terms of variables that constitute them. The investigation not only contributes to the budding field of ecophysiology, it also spills in major knowledge gaps on how to treat sick desert animals. It requires veterinary procedures that are specific to a particular habitat and emphasizes the need to monitor physiological well-being indicators even with the weather alterations. Ultimately, such findings are quite useful in developing an adaptive wildlife management policy, particularly in the regions that have the potential to be made deserts. Future study should concentrate on longitudinal studies. These studies are supposed to consider the mechanisms of chronic adaptations, the influence of genetic components on the physiological characteristics, and the impact of environmental stressors such as dehydration periods, predation pressure, and variation in human-caused habitat due to environmental changes on the animals. The knowledge available in the article gives facts and scientific reasons as to why biodiversity needs to be preserved and why veterinary practices should be promoted in the unfriendly desert environment over the long duration of time.

REFERENCES

Abrha, H. K., W.Gerima, Y. G. E., & Gebreegziabher, S. T.-B. (2020). Indigenous Knowledge of Local Communities in Utilization of Ethnoveterinary Medicinal Plants and Their Conservation Status in Dess'a Priority Forest, North Eastern Escarpment of Ethiopia. Research Square (Research Square).

Adebowale, O., Afolabi, M., Adesokan, H. K., Fasanmi, O. G., Adeyemo, O. K., Awoyomi, O. J., & Fasina, F. O. (2020). Determinants of Work-Related Risks among Veterinary Clinical Students in South West Nigeria. Veterinary Medicine International, 2020, 1.

Amarawat, M., Rathore, M. S., & Jhala, G. (2023). Participatory rural appraisal for identification ethno-veterinary practices among primitive tribal groups of Girwa block, Udaipur, India. Journal of Veterinary and Animal Sciences, 54(2).

Auplish, A., Vu, T. T. T., Đuc, P. P., Green, A., Tiwari, H. K., Housen, T., Stevenson, M. A., & Dhand, N. K. (2024). Investigating the workforce capacity and needs for animal disease surveillance and outbreak investigation: a mixed-methods study of veterinary services in Vietnam. Frontiers in Veterinary Science, 11.

Cediel, N., Medellin, A. M. O., Tomassone, L., Chiesa, F., & Meneghi, D. D. (2021). A Survey on One Health Approach in Colombia and Some Latin American Countries: From a Fragmented Health Organization to an Integrated Health Response to Global Challenges. Frontiers in Public Health, 9.

Chen, K. (2022). Emerging Infectious Diseases and One Health: Implication for Public Health. International Journal of Environmental Research and Public Health, 19(15), 9081.

Couto, R. de M., & Brandespim, D. F. (2020). A review of the One Health concept and its application as a tool for policy-makers [Review of A review of the One Health concept and its application as a tool for policy-makers]. International Journal of One Health, 6(1), 83. Veterinary world.

Davwar, P., Luka, P. D., Dami, F. D., Pam, D. D., Weldon, C., Brocard, A. S., Paessler, S., Weaver, S. C., & Shehu, N. Y. (2023). One Health epidemic preparedness: Biosafety quality improvement training in Nigeria. International Journal of One Health, 10.

Desvars-Larrive, A., Vogl, A., Puspitarani, G. A., Yang, L., Joachim, A., & Käsbohrer, A. (2024). A One Health framework for exploring zoonotic interactions demonstrated through a case study. Nature Communications, 15(1).

Ekwealor, K. U., Echereme, C. B., Ofobeze, T. N., & Ukpaka, G. C. (2020). Adaptive Strategies of Desert Plants in Coping with the Harsh Conditions of Desert Environments: A Review [Review of Adaptive Strategies of Desert Plants in Coping with the Harsh Conditions of Desert Environments: A Review]. International Journal of Plant & Soil Science, 1. Sciencedomain International.

Feng, X., Wang, S., Cheng, G., Guo, X., & Zhou, X. (2022). Editorial: Needs and potential application of One Health approach in the control of vector-borne and zoonotic infectious disease. Frontiers in Microbiology, 13.

Ferrinho, P., & Fronteira, I. (2023). Developing One Health Systems: A Central Role for the One Health Workforce. International Journal of Environmental Research and Public Health, 20(6), 4704.

Fesseha, H., Kefelegn, T., & Mathewos, M. (2022). Animal care professionals' practice towards zoonotic disease management and infection control practice in selected districts of Wolaita zone, Southern Ethiopia. Heliyon, 8(5).

Filion, A., Sundaram, M., Schmidt, J. P., Drake, J. M., & Stephens, P. R. (2024). Evidence of repeated zoonotic pathogen spillover events at ecological boundaries. Frontiers in Public Health, 12.

George, J., Häsler, B., Komba, E., Rweyemamu, M. M., Kimera, S. I., & Mlangwa, J. (2022). Mechanisms and Contextual Factors Affecting the Implementation of Animal Health Surveillance in Tanzania: A Process Evaluation. Frontiers in Veterinary Science, 8.

George, J., Häsler, B., Komba, E., Sindato, C., Rweyemamu, M. M., Kimera, S. I., & Mlangwa, J. (2021). Leveraging Sub-national Collaboration and Influence for Improving Animal Health Surveillance and Response: A Stakeholder Mapping in Tanzania. Frontiers in Veterinary Science, 8.

Ghai, R. R., Carpenter, A., Liew, A., Martin, K. B., Herring, M. K., Gerber, S. I., Hall, A. J., Sleeman, J. M., VonDobschuetz, S., & Behravesh, C. B. (2021). Animal Reservoirs and Hosts for Emerging Alphacoronaviruses and Betacoronaviruses [Review of Animal Reservoirs and Hosts for Emerging Alphacoronaviruses and Betacoronaviruses]. Emerging Infectious Diseases, 27(4), 1015. Centers for Disease Control and Prevention.

Glidden, C. K., Nova, N., Kain, M. P., Lagerstrom, K. M., Skinner, E. B., Mandle, L., Sokolow, S. H., Plowright, R. K., Dirzo, R., Leo, G. A. D., &

Mordecai, E. A. (2021). Human-mediated impacts on biodiversity and the consequences for zoonotic disease spillover [Review of Human-mediated impacts on biodiversity and the consequences for zoonotic disease spillover]. Current Biology, 31(19). Elsevier BV.

Guarino, R., Vrahnakis, M., Rodríguez-Rojo, M. P., Giuga, L., & Pasta, S. (2020). Grasslands and Shrublands of the Mediterranean Region. In Elsevier eBooks (p. 638). Elsevier BV. https://doi.org/10.1016/b978-0-12-409548-9.12119-0

Innovating Forage Production System in Kuwait Using Locally Adapted Native Desert Plant Species. (2021). Journal of Agriculture and Horticulture Research, 4(1).

Jain, R. (2023). Climate Change and Animal Health Impacts Challenges and Mitigation Strategies. Open Access Journal of Veterinary Science & Research, 8(2).

Jato-Espino, D., Mayor-Vitoria, F., Moscardó, V., Capra-Ribeiro, F., & Pino, L. E. B. D. (2023). Toward One Health: a spatial indicator system to model the facilitation of the spread of zoonotic diseases [Review of Toward One Health: a spatial indicator system to model the facilitation of the spread of zoonotic diseases]. Frontiers in Public Health, 11. Frontiers Media.

Jori, F., Hernández-Jover, M., Magouras, I., Dürr, S., & Brookes, V. (2021). Wildlife–livestock interactions in animal production systems: what are the biosecurity and health implications? Animal Frontiers, 11(5), 8.

Keatts, L., Robards, M. D., Olson, S. H., Hueffer, K., Insley, S. J., Joly, D. O., Kutz, S., Lee, D. S., Chetkiewicz, C. B., Lair, S., Preston, N. D., Pruvot, M., Ray, J. C., Reid, D. G., Sleeman, J. M., Stimmelmayr, R., Stephen, C., & Walzer, C. (2021). Implications of Zoonoses From Hunting and Use of Wildlife in North American Arctic and Boreal Biomes: Pandemic Potential, Monitoring, and Mitigation [Review of Implications of Zoonoses From Hunting and Use of Wildlife in North American Arctic and Boreal Biomes: Pandemic Potential, Monitoring, and Mitigation]. Frontiers in Public Health, 9. Frontiers Media.

Leifels, M., Rahman, O. K., Sam, I., Cheng, D., Chua, F. J. D., Nainani, D., Kim, S. Y., Ng, W. J., Kwok, W. C., Sirikanchana, K., Wuertz, S., Thompson, J. R., & Chan, Y. F. (2022). The one health perspective to improve environmental surveillance of zoonotic viruses: lessons from COVID-19 and outlook beyond. ISME Communications, 2(1).

Li, N., Li, X., & Xiao, W. (2025). Intangible cultural heritage threatened-level categories and criteria. Humanities and Social Sciences Communications, 12(1).

Linder, D. E., Cardamone, C. N., Cash, S. B., Castellot, J. J., Kochevar, D. T., Dhadwal, S., & Patterson, E. T. (2020). Development, implementation, and evaluation of a novel multidisciplinary one health course for university undergraduates. One Health, 9, 100121.

Metekia, W. A., Ulusoy, B., & Hecer, C. (2020). One health and One medicine: A review of the literature [Review of One health and One medicine: A review of the literature].

Veterinary Medicine and Public Health Journal, 1(3), 91.

Mor, N. (2023). Organising for One Health in a developing country. One Health, 17, 100611.

Moretto, W. I., & Taylor, J. R. A. (2023). Temperature-dependent feeding behavior in the brown box crab, Lopholithodes foraminatus. Frontiers in Marine Science, 10.

Mumford, E., Martinez, D. J., Tyance-Hassell, K., Cook, A. J. C., Hansen, G. R., Labonté, R., Mazet, J. A. K., Mumford, E. C., Rizzo, D., Togami, E., Vreedzaam, A., & Parrish-Sprowl, J. (2023). Evolution and expansion of the One Health approach to promote sustainable and resilient health and well-being: A call to action. Frontiers in Public Health, 10.

Nurunnabi, A. S. M., Mozaffor, M., Sweety, A. A., Kabir, M. R., Sharmin, S., & Kabir, N. (2023). 'One Health' Approach to Infectious Diseases and Prevention of Antimicrobial Resistance: A Review [Review of 'One Health' Approach to Infectious Diseases and Prevention of Antimicrobial Resistance: A Review]. Bangladesh Journal of Medical Microbiology, 16(1), 25.

Nyokabi, N. S., Moore, H. L., Berg, S., Lindahl, J. F., Phelan, L., Gimechu, G., Mihret, A., & Wood, J. L. N. (2023). Implementing a one health approach to strengthen the management of zoonoses in Ethiopia. One Health, 16, 100521.

Pironon, S., Ondo, I., Diazgranados, M., Allkinİ, R., Baquero, A. C., Cámara-Leret, R., Canteiro, C., Dennehy-Carr, Z., Govaerts, R., Hargreaves, S., Hudson, A., Lemmens, R., Milliken, W., Nesbitt, M., Patmore, K., Schmelzer, G. H., Turner, R. M., Andel, T. van, Ulian, T., … Willis, K. J. (2024). The global distribution of plants used by humans. Science, 383(6680), 293.

Riley, T., Cumming, B., Thandrayen, J., Meredith, A., Anderson, N., & Lovett, R. (2023). One Health and Australian Aboriginal and Torres Strait Islander Communities: A One Health Pilot Study. International Journal of Environmental Research and Public Health, 20(14), 6416.

Salvarani, F. M., Oliveira, H. G. da S., Corrêa, L. M. P., Soares, A. A., & Ferreira, B. C. (2025). The Importance of Studying Infectious and Parasitic Diseases of Wild Animals in the Amazon Biome with a Focus on One Health [Review of The Importance of Studying Infectious and Parasitic Diseases of Wild Animals in the Amazon Biome with a Focus on One Health]. Veterinary Sciences, 12(2), 100. Multidisciplinary Digital Publishing Institute.

Shafique, M., Khurshid, M., Muzammil, S., Arshad, M., Malik, I. R., Rasool, M. H., Khalid, A., Khalid, R., Asghar, R., Baloch, Z., & Aslam, B. (2024). Traversed dynamics of climate change and One Health. Environmental Sciences Europe, 36(1).

Sheppard, D. J., Stark, D. J., Muturi, S. W., & Munene, P. H. (2024). Benefits of traditional and local ecological knowledge for species recovery when scientific inference is limited. Frontiers in Conservation Science, 5.

Sobierajski, T., Wanke-Rytt, M., Chajęcka-Wierzchowska, W., Śmiałek, M., & Hryniewicz, W. (2023). One Health in the consciousness of veterinary students from the perspective of knowledge of antibiotic therapy and antimicrobial resistance: a multi-centre study. Frontiers in Public Health, 11.

Souza, P. C. A., Schneider, M. C., Simões, M., Fonseca, A. G., & Vilhena, M. (2021). A Concrete Example of the One Health Approach in the Brazilian Unified Health System. Frontiers in Public Health, 9.

Taaffe, J., Sharma, R., Parthiban, A. B. R., Singh, J., Kaur, P., Singh, B., Gill, J. P. S., Raj, G. D., Dhand, N. K., & Parekh, F. K. (2023). One Health activities to reinforce intersectoral coordination at local levels in India [Review of One Health activities to reinforce intersectoral coordination at local levels in India]. Frontiers in Public Health, 11. Frontiers Media.

Uwishema, O., Oluyemisi, A., Peñamante, C. A., Bekele, B. K., Khoury, C., Mhanna, M., Aderinto, N., Adanur, I., Dost, B., & Onyeaka, H. (2022). The burden of monkeypox virus amidst the Covid-19 pandemic in Africa: A double battle for Africa. Annals of Medicine and Surgery, 80.

Watsa, M. (2020). Rigorous wildlife disease surveillance. Science, 369(6500), 145.

Zhang, R., Tang, X., Liu, J., Visbeck, M., Guo, H., Murray, V., Mcgillycuddy, C., Ke, B., Kalonji, G., Zhai, P., Shi, X., Lu, J., Zhou, X., Kan, H., Han, Q., Ye, Q., Luo, Y., Chen, J., Cai, W., … Zhou, L. (2022). From concept to action: a united, holistic and One Health approach to respond to the climate change crisis. Infectious Diseases of Poverty, 11(1).

Zhao, G., Tariq, A., Mu, Z., Zhang, Z., Graciano, C., Cong, M., Dong, X., Sardans, J., Al-Bakre, D. A., Peñuelas, J., & Zeng, F. (2025). Allocation Patterns and Strategies of Carbon, Nitrogen, and Phosphorus Densities in Three Typical Desert Plants. Plants, 14(11), 1595.