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Current status of basic husbandry practices adopted for cockatiels in different areas of Gujarat

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Abstract

Agricultural and animal husbandry extension has played a significant role in sustainable development and improved livelihoods of rural people in India and many other countries. Extension activities in these sectors connect science and community to facilitate information exchange and innovations. Such activities are regularly carried out in scientific manner for livestock animal owners; however, species other than livestock animals such as birds, pet reptiles, dogs, cats etc. are also important to their owners. Their health status and impact on public health depend on basic husbandry and healthcare practices adopted by owners or caretakers. Pet birds kept in rural and urban areas are subject to thorough investigations by researchers which is possible by conducting field level surveys and extension activities. So far, there is a paucity in available published literature on basic care and management of many pet birds in different states of India. Cockatiel is one such exotic pet bird commonly kept in rural and urban households in different states. The present investigation was planned to observe current trends in basic husbandry practices adopted by different owners and sellers of Cockatiels in different areas of Gujarat. A total of 124 Cockatiels including 48 kept by 07 different sellers and 76 kept by 14 different owners were screened during the period of study. A proforma was developed to record different management practices by directly interviewing the owners and sellers. The findings of the study were correlated with possible impacts on health status of Cockatiels. The observations recorded in the present study will provide strong baseline data on existing management practices and create awareness among owners, sellers and budding veterinarians to manage many managemental health issues in Cockatiels.

Keywords: Cockatiel, extension, husbandry practices, Gujarat

Introduction

India is blessed with a wide variety of animal species which increase the responsibilities on country's veterinary manpower to provide standard healthcare services on regular basis. Out of all animal species, animals which are kept as livestock (e.g., cattle, buffalo, sheep, goat etc.) are backbone of rural economy. Many households thrive on animal husbandry practices and various investigations have been carried out to observe status of healthcare and

different areas ^[1-5]. However, it is perceived that attempts are being made on frequent basis to correlate husbandry practices for dogs and cats but, a similar investigation frequency or policy is not existing for pet birds ^[6-10]. The most common pet species include dogs, cats and birds

The most common pet species include dogs, cats and birds and they are found/kept at different places. For example, pet dogs at cattle farms, pet dogs in sheep farms, pet cats at goat farms, caged pet birds at farms, pets in house etc. Among

management practices adopted by livestock owners in

these, a wide variety of birds are also found as household pets or companion in rural and urban localities. People often purchase such birds considering their appearance and other special characteristics; however, they might be facing difficulties to get proper information on husbandry aspects of such birds. Owners of birds can use findings of surveys conducted on husbandry practices, social media resources, expert lectures, training etc. but management practices might differ in different regions and affect general healthcare and wellbeing of the birds ^[11]. A lack of available database on such aspects can be fulfilled by conducting surveys at different places on regular intervals. Hence, a study was planned to observe status of basic husbandry practices adopted by owners and sellers of Cockatiels (an exotic pet bird) in different areas of Guiarat.

Materials and Methods

The present study was carried out at the Postgraduate Institute of Veterinary Education & Research (PGIVER), College of Veterinary Science & Animal Husbandry, Kamdhenu University, Rajpur (Nava), Himmatnagar-383010 in collaboration with Polytechnic in Animal Husbandry, Kamdhenu University, Himmatnagar and private sellers as well as owners of Cockatiels in different areas of Gujarat, India from September-2021 to March-2022.

The information on various aspects such as feeding, husbandry practice, housing, deworming etc. was collected in a proforma by interviewing a total of 21 respondents comprising of 07 sellers (having 48 Cockatiels) and 14 owners (having 76 Cockatiels) in different areas of Gujarat (*viz.*, Ahmedabad, Gandhinagar, Visnagar, Chiloda, Himmatnagar, Kankrol and Nava) [Picture-1 & Picture-2].



Picture 1: Extension interview - Collection of information from an owner of Cockatiel



Picture 2: Extension interview – Collection of information from a seller of Cockatiel

Results and Discussion

In the present study, a total of 124 Cockatiels were screened which comprised of 48 Cockatiels kept by 07 different sellers and 76 Cockatiels kept by 14 different owners in different areas of Gujarat state. Information pertaining to managemental aspects related with Cockatiels was collected from all respondents [N=21; 07 sellers + 14 owners]. Managemental practices adopted by different sellers (n=07) and owners (n=14) of Cockatiels are shown in Table-1.

Particulars		No. of Sellers		No. of Owners		Overall Respondents					
		(n=7)	(n=14)		(N=21)					
	No.	%	No.	%	No.	%					
No. of Cockatiel(s)											
1 bird	2	28.57	3	21.43	5	23.81					
2 birds (1 pair)	0	0.00	4	28.57	4	19.05					
>2 birds	5	71.43	7	50.00	12	57.14					
Type of birds in a cage											
Only cockatiels in a cage	5	71.43	10	71.43	15	71.43					
Cockatiels with other birds	2	28.57	4	28.57	6	28.57					
Use of breeding box inside the cage											
Uses breeding box	0	0.00	9	64.29	9	42.86					
Does not use breeding box	7	100.00	5	35.71	12	57.14					
Beak trimming, Feather clipping and Nail trimming											
Performs Beak trimming, Feather clipping and Nail trimming	0	0.00	2	14.29	2	9.52					
Does not perform Beak trimming, Feather clipping and Nail trimming	7	100.00	12	85.71	19	90.48					
Preference of food											
Only commercial diet/seeds	7	100.00	1	7.14	8	38.10					
Only vegetables, leaves, fruits	0	0.00	0	0.00	0	0.00					
Homemade diet	0	0.00	0	0.00	0	0.00					
Mixed diet	0	0.00	13	92.86	13	61.90					
Use of media resources											
Does not use resources	5	71.43	0	0.00	5	23.81					
Uses one or more than one social media	2	28.57	13	92.86	15	71.43					
Uses scientific reports only	0	0.00	0	0.00	0	0.00					
Uses social media and scientific reports	0	0.00	1	7.14	1	4.76					
Direct or Indirect contact with other birds											
Direct contact of cockatiel(s) with other bird inside a cage	2	28.57	4	28.57	6	28.57					
Cage-to-cage contact of cockatiel(s) with other birds	5	71.43	7	50.00	12	57.14					
No direct or indirect contact with other birds	0	0.00	3	21.43	3	14.29					
Deworming					•						
Performs deworming	2	28.57	5	35.71	7	33.33					
Does not perform deworming	5	71.43	9	64.29	14	66.67					
Vaccination											
Vaccinates cockatiel(s)	0	0.00	0	0.00	0	0.00					
Does not vaccinate cockatiel(s)	7	100.00	14	100.00	21	100.00					
Use of supportive tonics											
Uses supportive tonics	2	28.57	9	64.29	11	52.38					
Does not use supportive tonics	5	71.43	5	35.71	10	47.62					
Provision of food											
Provides food once in a day	2	28.57	6	42.86	8	38.10					
Provides food twice a day	5	71.43	8	57.14	13	61.90					
Provides food once a week	0	0.00	0	0.00	0	0.00					
Water supply/replacement											
Provides water once in a day	3	42.86	7	50.00	10	47.62					
Provides water twice a day	4	57.14	7	50.00	11	52.38					
Provides water once a week	0	0.00	0	0.00	0	0.00					
Cleaning of cages											
Cleans the cage by use of water only	5	71.43	5	35.71	10	47.62					
Cleans the cage by use of disinfectants	0	0.00	1	7.14	1	4.76					
Cleans only the tray beneath cage (collection tray)	2	28.57	8	57.14	10	47.62					

I abic-1. Managemental practices adopted by seners and owners of Cockat	able-1: Managementa	practices ad	opted by seller	s and owners	of Cockatiel
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(A) No. of Cockatiels in a cage

No. of Cockatiels kept in a single cage is an important aspect to understand while investigating healthcare issues in the captive population. One or more numbers of Cockatiel(s) kept in a cage at different places are shown in Picture-3. Out of 21 respondents, a greater number of respondents kept >2 birds in a cage (57.14%) followed by respondents keeping only 1 bird (23.81%) and respondents keeping 2 birds (19.05%). The number of sellers keeping >2 birds was higher (71.43%) as compared to those keeping

only 1 bird (28.57). None of the sellers kept 2 Cockatiels (*i.e.*, only 1 pair). The number of owners keeping >2 birds was higher (50.00%) followed by those keeping 2 birds (28.57%) and only 1 bird (21.43%).

Generally, Cockatiels have sociable nature and do not tend to disrespect their cage-mates in most cases. Most of the Cockatiels find ways to socialize with other Cockatiel cagemates within a few days when kept in a newer environment. Individual behavior may vary according to loopholes in the management practices or underlying diseases.



Picture 3: One or more numbers of Cockatiels in a cage at different places

Keeping only one Cockatiel or a pair of Cockatiel inside a cage generally do not invite any serious healthcare complications. Keeping a male and a female Cockatiel together inside a cage would be an ideal scenario for owners. Sellers keep Cockatiels for short period (*i.e.*, until they are sold), hence, they keep more numbers of birds in a single cage for economic reasons. The size, shape and material of cage should also be considered; however, the exotic bird market has a wide range of cages making it difficult to correlate healthcare related observations.

Under ideal conditions, care should be taken to avoid overcrowding inside a cage as it may invite behavioral changes, injuries, vices, deficiencies, feather loss, stress, destruction of eggs laid by cage-mates, competition for food/water etc. Overcrowding also facilitates easy and rapid spread of infectious diseases such as bacterial diseases, viral diseases, fungal diseases and parasitic diseases. Aerosol transmission, direct contact and orofecal transmission are the major modes of disease transmission in overcrowded cages. The frequency of contamination of food and water is also higher in overcrowded cages which can be a source of infection to healthy cage-mates or handlers (*i.e.*, zoonosis).

Excessive use of enrichment materials/items (e.g., swings, boxes etc.) in overcrowded cages will lead to traumatic injuries in many cases when cages are occupied by dominant birds. Recessive birds often seek shelter or corner or a place to hide inside a cage after being attacked by dominant cage-mate. Recently-painted materials, pointy/thorny items, small/chewable plastic items etc. should be avoided in cages. Breeding boxes of suitable size in enough numbers can be placed to promote breeding and parental behavior in cages having a greater number of birds.

(B) Types of birds in a cage

Types of birds kept inside a cage is important to understand transmission and occurrence of diseases in Cockatiels or any other type of captive birds. Out of 21 respondents, number of respondents keeping only Cockatiels in a cage was higher (71.43%) as compared to those who kept Cockatiels with other birds in a cage (28.57%). The number of sellers keeping only Cockatiels in a cage was higher (71.43%) as compared to those who kept Cockatiels with other birds in a cage (28.57%). Similarly, the number of owners keeping only Cockatiels in a cage was also higher (71.43%) as compared to those who kept Cockatiels with other birds in a cage (28.57%) [Picture-4, 5, 6, 7].

Presence of variety of birds inside a single cage often provides a platform for disease transmission where direct contact, aerosol and orofecal route are the main modes of transmission. Other birds in a cage of Cockatiels may or may not have undergone disease prevention protocols such as deworming against common helminths and protozoa. Hence, they can act as source of infection to Cockatiels when introduced inside the same cage. Similarly, carrier birds often release pathogen inside the cage environment when allowed to stay in the same cage. For examples, faecal droppings, leftovers, shredded feathers having ectoparasites, viruses, fungus, and bacteria etc.

Moreover, there is also a possibility of developing behavioral changes which can affect the health of cage-mate Cockatiel. Size, strength, and level of activity may also differ amongst birds. Larger birds often act as competitors for smaller birds (in terms of food consumption, space occupancy, water intake etc.); however, small sized birds can also affect healthcare and well-being of larger sized birds. Competition for food and water may render recessive birds deprived of proper nutrition and hydration. Dominant birds may also break eggs of recessive cage-mates or cause infant mortality. Dominant birds or more aggressive smaller birds may affect feather quality in cage-mate Cockatiels.

Thus, disease occurrence (either infectious or non-infectious or both) is imminent in Cockatiels under all such circumstances when different types of birds are kept in a single cage. Hence, care should be taken to evaluate the health, behavior, and requirement of other birds before introducing them in the cages of Cockatiels.



Picture 4: Direct contact of Cockatiel with an indigenous/native Indian bird inside a single cage: Indigenous bird is bigger in size than the Cockatiel



Picture 5: Direct contact of Cockatiel with only one type of exotic bird in a single cage: Budgerigar is smaller in size than the Cockatiel



Picture 6: Direct contact of Cockatiels with two other types of exotic birds (Budgerigars and Lovebirds) in a single cage



Picture 7: Direct contact of Cockatiel with two other types of exotic birds [Budgerigars and Bourke's Parakeet] and an indigenous bird in a single cage

Out of 21 respondents, a greater number of respondents did not keep breeding box in cages of Cockatiels (57.14%) while rest of the respondents (42.86%) kept breeding boxes inside the cages. All the sellers (100.00%) kept breeding boxes inside the cages of Cockatiels. The number of owners keeping breeding boxes inside the cage of Cockatiels was higher (64.29%) as compared to those who did not keep breeding box (35.71%).

Breeders, sellers, and owners keep breeding boxes of different sizes and different material (e.g., wooden, earthen, other natural materials, stick etc.). Cockatiels have excellent breeding and parenting behavior. Keeping a breeding box inside a cage is very useful as it promotes natural parental care and provides a platform for appropriate incubation and successful hatching. On the other hand, absence of suitable breeding boxes may lead to loss of an entire clutch which eventually affects breeders economically. Hence, all sellers were found to use breeding boxes inside the cages of Cockatiels.

A small number of owners included in the study were not observed to keep breeding boxes inside the cage. Lack of awareness on breeding behavior, number of bird(s) in a cage, unknown gender of bird(s) in a cage, purpose of keeping etc. could have been the reason behind not using such boxes.

Improper breeding management may invite certain health Egg-binding condition complications. and other reproductive disorders in female Cockatiels [12-14] can occur due to deficiencies, infectious diseases, and improper breeding management. Managemental aspects such as provision of ample nutrition, supplementation of multivitamins, minerals, ample water supply, ventilation, sunlight, humidity, warmth, prevention against cold climate, management during extreme summer period, prevention of hypothermia during winter and monsoon etc. should also be considered for breeding population of captive Cockatiels.

(D) Beak trimming, feather clipping and nail trimming

Out of 21 respondents, majority of respondents (90.48%) did not perform beak trimming, feather clipping and nail trimming. These practices were observed among smaller number of respondents (09.52%). None of the sellers performed beak trimming, feather clipping and nail trimming in Cockatiels. The number of owners who did not perform beak trimming, feather clipping and nail trimming in their Cockatiels was higher (85.71%) as compared to those who performed beak trimming, feather clipping and nail trimming in their Cockatiels.

Beak of the birds play crucial role in maintenance of general health and behavior of birds such as breaking of eggshells, water intake, feed intake, express behavior, nibbling, communicating, grooming/preening, feeding, catching, fetching, playing, climbing etc. Any structural abnormality of beaks (e.g., injuries, avulsion, overgrowth, deformities etc.) lead to change in behavior and other health complications ^[15]. Nails are important for grasping the objects, hold the grip while sitting, landing, scratching, removing debris etc. Trauma, inappropriate cage enrichment

materials, deficiencies (e.g., vitamin-D, calcium, phosphorus, zinc, vitamin-A), Beak and Feather Disease Virus (BFDV), infestation by *Knemidocoptes* spp. etc. have been described to cause beak and/or nail abnormalities in Cockatiels. Evidently, beak and nails grow on regular basis which require trimming at frequent intervals. Trimming is comparatively easy with proper physical restraint and is accomplished by common hand tools or minor surgical instruments ^[15].

On the other hand, feather clipping on wings is practiced to prevent birds from flying. Some owners have a philosophical aversion to restrict flight of their Cockatiels. This is common for birds which are partly captive (in cages) and are also allowed to roam freely in house environments. Birds with properly clipped wing feathers are also easy to train and socialize as per owners' perception. Wing clipping is believed to change pecking order in Cockatiel-owner relationship by preventing the Cockatiel's dominance. Improperly clipped wing feathers lead to hazards such as trauma, birds hitting the ground with a thud, no control over flying, no control over landing, higher chances of impact injuries in rough and hard floors/walls, split-keel injury etc. Feather clipping was not a found as a common practice among respondents as Cockatiels spent most of their lives inside the cage. Proper scientific methodology of feather clipping, and expertise of personnel are important since improperly clipped feathers will lead to unsupervised free flight in house environment. A house can act as a 'death trap' due to numerous household hazards (e.g., doors, open windows, ceiling fan in motion etc.) while the bird is flying. Such hazards can be prevented by proper wing feather clipping practices. Thus, retrieval of information on beak trimming, feather clipping, and nail trimming is an important facet of healthcare investigations in Cockatiels.

(E) Preference of food

Out of 21 respondents, a greater number of respondents provided mixed diet to Cockatiels (61.90%) as compared to those who provided only commercial diet/seeds (38.10%). None of the respondents provided only vegetables, leaves, fruits or only homemade diet to their Cockatiels. All sellers (100.00%) provided only commercial diet/seeds to their Cockatiels while number of owners providing mixed diet was higher (92.86%) as compared to those who provided only commercial diet/seeds (07.14%).

Diet is an important facet of Cockatiel rearing and management. A proper diet available *ad lib*. and with ample amount of nutrition is crucial for maintenance. Seeds (e.g., sunflower seeds) are natural feed material, but they are commercially available in packets. Hence, they were considered as commercial diets/seeds. Mixed diet comprised of seeds/commercial diet along with household food materials (e.g., corn, fruits, vegetables, leaves etc.).

Sellers generally keep Cockatiels for shorter period (*i.e.*, until sold) which could have been the reason behind more use of commercial diet/seeds. Picture-8. shows a Cockatiel provided with mixed diet containing corn, spinach, and coriander while Picture-9 shows Cockatiels standing on and eating a commercially available seed diet.



Picture 8: A Cockatiel provided with mixed diet: Corn, spinach and coriander are visible in feeding tray while floor of the cage shows leftovers of commercially available seeds eaten by the Cockatiel



Picture 9: A pair of Cockatiels standing on and eating commercial seeds

The cost of commercially available seeds is generally higher as compared to fresh vegetables and fruits available in markets because of cost of production, cleaning, separating and packaging. This could have been one of the reasons behind increased provision of mixed diet by owners. Besides cost, reasons such as availability in shop, availability of vegetables at home, passion of owner, curiosity of owners to try new food regimen to make changes in routine provisions etc. could have resulted in increased use of mixed diet for Cockatiels. Improperly packed or stored seeds may also facilitate growth of fungus and insects causing health effects on Cockatiels when given without consideration. Therefore, diet offered to Cockatiels should be fresh, clean, balanced, palatable and of good quality.

Furthermore, provision of food always depends on number of Cockatiels in a cage and feeding area/places inside the cage. A cage having one or two Cockatiels can be provided with a common feeding pan/bowl while multiple feeding bowls are needed in cages having a greater number of birds to avoid competition and wastage. Feeding pan/bowls should not be kept beneath perching spots to prevent contamination by droppings of Cockatiel.

(F) Use of media resources

Out of all respondents, a greater portion of respondents used one or more than one type of social media (71.43%) regarding Cockatiel keeping followed by those who did not use any resources (23.81%) and those who used social media and scientific reports (04.76%). None of the respondents used only scientific reports as media resources to know about Cockatiel rearing. A greater portion of sellers (71.43%) did not use any media resources to upgrade knowledge on Cockatiel keeping while lesser number of sellers used one or more than one type of social media (28.57%). Among owners, a greater portion of respondents used one or more than one type of social media (92.86%) as compared to those who used social media and scientific reports (07.14%).

Lack of awareness on impact of management practices on health of Cockatiels among sellers and owners may invite different health complications. For example, keeping unsuitable material (e.g., sharp/thorny tree branches) inside a cage for enrichment without referring to resources lead to health hazards such as ingestion of small parts (foreign body syndrome), scratching, laceration, and injuries. Therefore, used of media resources is important.

Undoubtedly, birds of the Psittaciformes order (e.g., Cockatiels, Budgerigars, Lovebirds, African Grey Parrot, Bourke's Parakeet etc.) are more preferred in the trade of exotic pets. Basic physiological aspects, cage enrichment, food preference, husbandry practices, training, common vices, common health issues etc. remain similar to some extent among these Psittaciformes pets. Moreover, these birds are traded in almost all major states of India which could be the reason behind availability of online resources on management aspects in different languages. A greater number of respondents used one or more type of social media which is a good indicator of management; however, any misinformation available media resources without scientific background could also result in devastating effects.

Additionally, scientific reports are very important documents containing some evidence-based literature on Cockatiel management. In the present study, an attempt was made to observe respondents who had interest in referring scientific reports on Cockatiels keeping. None of the respondents referred only scientific reports for Cockatiel rearing while respondents using scientific reports along with social media were observed during the period of study. Undoubtedly, use of scientific reports has direct correlation with educational status of respondents, but the present study did not aim to evaluate socio-economic aspects; hence, observations could not be correlated with their educational status.

Observations on this aspect indicates that evidence-based ready-reckoner educational/training/learning resources in different languages are required to improve knowledge of keepers and to encourage adoption of better husbandry practices for Cockatiels.

(G) Direct or indirect contact with other birds

Out of all respondents, a greater portion of respondents kept Cockatiels having cage-to-cage contact with other birds (57.14%) followed by those which had direct contact of Cockatiels with other birds inside a cage (28.57%) and those with no direct or indirect contact of Cockatiels with other birds (14.29%). Cage-to-cage contact with other birds was more commonly observed (71.43%) as compared to Cockatiels with direct contact of other birds inside the cage (28.57%) at seller's place. Cage-to-cage contact with other birds was more commonly observed (50.00%) at owners' place followed by direct contact of Cockatiels with other birds inside the cage (28.57%) and no direct or indirect contact of Cockatiels with other birds (21.43%).

Examples of direct contact of Cockatiels with other types of birds inside a cage are shown in Picture-4 to Picture-7. Indirect cage-to-cage contact of Cockatiels with other type of bird (Budgerigars) in cages placed side-by-side is shown in Picture-10 while Picture-11 shows placement of cage of Cockatiels above the cage of Budgerigars.



Picture-10: Cage-to-cage contact of Cockatiels with other type of exotic birds (Budgerigars): Cages are placed side-by-side (parallel placement)



Picture 11: Cage-to-cage contact of Cockatiels with other type of exotic birds (Budgerigars): Cage of Cockatiels is placed above the cage of Budgerigars

Cockatiels come in direct contact with other types of birds under different scenario. Mostly, direct contact involved presence of other types of bird inside the same cage. Indirect contact with other birds involved contact of captive Cockatiels with other free-living birds (e.g., pigeons, sparrows, crows, hawks etc.) when cages were kept outdoors. This type of indirect contact can lead to aerosol or orofecal transmission of diseases from free-living birds to captive Cockatiels.

A cage-to-cage contact (horizontal and/or vertical) was another type of indirect contact of Cockatiels with other types of birds. Such cage-to-cage contact was commonly observed at sellers' place. Cage-to-cage contact facilitates a rapid disease transmission. Aerosol transmission is more common than direct contact when cages are placed side-byside (Picture-10) while orofecal transmission is more common by droppings when cages are kept in a vertical manner (Picture-11).

(H) Deworming

Out of all respondents, majority of respondents did not perform deworming (66.67%) while small number of respondents performed deworming in Cockatiels (33.33%). A greater portion of sellers (71.43%) did not perform deworming as compared to those who performed deworming (28.57%). The number of owners who did not perform deworming was also higher (64.29%) as compared to those who performed deworming (35.71%).

The observations emphasized that there was a lack of enough deworming practices adopted by respondents for captive Cockatiels screened during the study. Transmission of endoparasites is possible under different circumstances. Newly arrived/procured birds may harbor various types of endoparasites. Captive Cockatiels kept in outdoor areas may catch infestation from fee-living birds by orofecal transmission (e.g., droppings of pigeons falling inside the cage of Cockatiels placed in outdoor areas). Keeping Cockatiels along with other types of bird inside a cage can also promote orofecal transmission of endoparasites. Hence, it is crucial to screen faecal samples of captive Cockatiels and perform deworming on regular basis.

In the present study, a greater portion of respondents were reported not to perform deworming which is a negative indicator of healthcare practices; hence, awareness is needed on common endoparasites of Cockatiels, their significance, need for periodic screening, use of anthelmintic agent, dose, and importance of consulting a veterinary practitioner before deworming.

(I) Vaccination

None of the respondents vaccinated their Cockatiels against diseases. So far, there is no published technical reports on requirement of regular vaccination of Cockatiels. Common poultry birds are vaccinated against viral diseases such as Marek's Disease (MD), Ranikhet Disease (RD) etc. On the other hand, free-living birds (such as pigeons) are also observed to have symptoms of RD which may act as a possible source of infection to captive Cockatiels kept in outdoor areas. Important aspects such as requirement to vaccinate, availability of vaccine, its safety, requirement, suitability, and cost of vaccination in pet Cockatiel are yet to be explored. However, the observation of the study indicates that vaccination is not carried out in study population of Cockatiels in different areas at present.

(J) Use of supportive tonics

Out of all respondents, a greater number or respondents used supportive tonics (52.38%) as compared to those who did not use any supportive tonics (47.62%). Among sellers, the number of respondents who did not provide supportive tonics to Cockatiels was higher (71.43%) as compared to those who provided supportive tonics (28.57%). On the other hand, number of owners providing supportive tonics to their Cockatiels was higher (64.29%) as compared to those who did not provide supportive tonics (35.71%).

Supportive tonics containing vitamins, minerals and antistressors are important for captive birds to prevent certain clinical affections (e.g., deficiencies, feather issues) and are also important to maintain general health of the birds (e.g., feather quality, alertness, general behavior). In the present study, majority of respondents (owners and sellers) used supplements for their Cockatiels which is a good indicator of improved husbandry practices. Sellers might be using supportive products to promote healthy growth of Cockatiels resulting in appropriate market value.

(K) Frequency of provision of food

Among all respondents, number of respondents providing food to their Cockatiels twice in a day was higher (61.90%) as compared to those who provided food once in a day (38.10%). None of the respondents provided food only once in a week to their Cockatiels. The number of sellers providing food to their Cockatiels twice in a day was higher (71.43%) as compared to those who provided food once in a day (28.57%). Similarly, the number of owners providing food to their Cockatiels twice in a day was also higher (57.14%) as compared to those who provided food once in a day (42.86%).

This aspect is important to understand because proper availability of food is curial for Cockatiels. Generally, Cockatiels would eat all types of palatable diet which has been provided to them on continuous basis. Cockatiels do not cause much food wastage; however, they tended to stand and defaecate in feeding area, drop leftovers on floors and in water bowls. Hence, it is important to decide a suitable frequency of food provision to Cockatiels.

Most of the respondents in the present study provided food twice a day in sufficient quantities. Provision of food once in a day may facilitate contamination by excreta when the bowl is empty. Hence, timely replacement is important.

On the other hand, none of the respondents provided food once in a week which is a good indicator of proper husbandry practices. Provision of food once in a week often leads to competition between dominant and recessive birds eventually resulting in vices, behavior issues, stress, debility, and deficiency symptoms. Feed can also be mixed with supportive tonics and frequent replacement of food ensures proper supplementation. Thus, frequency of provision of food is an important aspect for rearing of Cockatiels.

(L) Frequency of water supply/replacement

Among all respondents, number of respondents providing water to their Cockatiels twice in a day was higher (52.38%)

as compared to those who provided water once in a week (47.62%). None of the respondents provided water only once in a week to their Cockatiels. Most sellers provided water to their Cockatiels twice in a day (57.14%) followed by those who provided water once in a day (42.86%). Equal number of owners (50.00%, each) were observed to provide water to their Cockatiels once in a day and twice in a day.

The timely provision of clean and drinkable fresh water is important to maintain hydration status in Cockatiels. Most of the respondents provided water twice in a day which is a good indicator of proper husbandry practices.

Cockatiels may also contaminate water pan/bowl which can act as a platform for growth of gastrointestinal bacteria, fungus and can lead to transmission of diseases in other cage-mates. Picture-12 shows a water bowl contaminated by seeds, feathers, and droppings of Cockatiels requiring replacement of water.

Clean water can also be used as a media to provide water soluble supplements and some medicines. Single or multiple sources of water can be placed in a cage depending on numbers of birds to avoid competition because dominant birds may render recessive birds devoid of proper hydration. Thus, frequency of water supply/replacement is important for rearing Cockatiels in a better manner.



Picture 12: Water bowl with water contaminated by seeds, feathers and droppings in a cage of Cockatiel

(M) Cleaning of cages

Out of all respondents, equal number of respondents (47.62%, each) cleaned cages of Cockatiels by use of water and cleaned only the collection tray beneath the cage. On the other hand, only one respondent (04.76%) cleaned the cages of Cockatiels by use of disinfectants. The number of sellers who used only water to clean the cages was higher (71.43%) as compared to those who cleaned the collection tray beneath the cage (28.57%). Among owners, the number of respondents cleaning only the collection tray beneath the cage was higher (57.14%) followed by those cleaning cages by use of water (35.71%) and those who cleaned the cages by use of disinfectants (07.14%).

Cleaning of cages of Cockatiels is an important aspect for effective healthcare and management. Cleaning of cages by

use of water is effective since remnants of detergents may act as toxic material if residues are left inside the cage after usage. Additionally, care should also be taken while using water because it can cause soiling of feathers and whole body leading to possibility of hypothermia (because most of the keepers clean the cage while birds are inside the cage). Direct use of sprays or water flow inside the cage can also

Direct use of sprays or water flow inside the cage can also lead to possibility of aspiration pneumonia and accidental ear infections. Some of the respondents only cleaned the tray beneath the cage (*i.e.*, debris collection tray) which is not suitable as a routine practice for Cockatiels. Owners and sellers must clean the entire cage of Cockatiels to remove presence of contaminants and insects (e.g., insects which can grow and thrive in seeds, spider webs created by spiders in cages left untouched for a longer period, droppings of free-living birds in cages kept outdoors etc.). Thus, cleaning of cages is an important aspect to understand disease transmission and prevention in captive Cockatiel populations.

Conclusions

The present study revealed that basic husbandry practices for cockatiels adopted by owners and sellers of different areas in Gujarat remarkably differed which could impact their health status and lead to economic losses. Similar investigations are encouraged by involving a greater number of respondents in different regions. The baseline information generated from the study will be helpful for veterinarians, veterinary students, owners, sellers, caretakers, handlers, breeders etc. to understand correlation of certain managemental practices and health status of Cockatiels.

Conflict of Interest

Authors declare no conflicts of interest with special regards to fundings. No birds were harmed during the period of study. The present paper is a part of research project approved by Director of Research & Dean PG Studies, KU, Gandhinagar.

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