

HEALTH PROBLEMS AND THEIR MANAGEMENT IN CAMEL HERDS OF SOUTHERN RAJASTHAN

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ABSTRACT

The present study highlights the disease pattern among camel herds of Raika camel herders in southern Rajasthan. A total of 75 Raika families owning camels were randomly selected from Udaipur, Banswara, Chittorgarh and Dungarpur districts of Rajasthan. The quantitative and qualitative data were collected through structured interview schedule, observation and discussion. The average age of camel herders was 48.4 years, all belonged to Other Backward Caste category, majority was literate /educated with average family size of 5.8 members having camel breeding as main occupation. The average camel herd size was 21 with small size holdings. Trypanosomiasis (Surra), abortion, camel pox (Mata), ectoparasites (Ticks), mange, maggot wound, enteritis, lantana poisoning, eye laceration, pica(sand licking) and impaction of first compartment were frequently occurring health problems among camel herds during triennium period of 2008, 2009 and 2010.

Key words: Camel, disease pattern, raika pastoralists, Rajasthan

Frequent epidemics of camel diseases inflicted major economic impact on camel herding pastoral communities. The exact causes of many of these illnesses remain unknown. The recent outbreak of camel disease in Afar region of Ethiopia had mortality up to 500 camels (Yemenu, 2005). The Southern region of the Rajasthan also has large camel herders' population. These herders not only move in different parts of this region for grazing but also visit adjoining area of Gujarat every year in search of better fodder resources. Hence, present study was conducted in southern part of Rajasthan to know the incidences of various health problems in camel herds.

Materials and Methods

The present study was conducted in Udaipur, Banswara, Chittorgarh and Dungarpur districts of Rajasthan, selected on the basis of existing camel population and 75 camel herders were selected randomly from these villages. Quantitative and Qualitative data were collected using structured interview schedule by personal interview method along with participatory observation, interaction and discussion with key informants and all sample households. Data thus generated were analysed by calculating simple frequencies, percentages and ranks using MS Excel 2010 statistical tools. To understand whether there was a trend for incidence

of various diseases in camel herds of southern Rajasthan during the three years (2008, 2009, 2010) for which information collected, Kendall's Coefficient of Concordance (W) among ranks of diseases was calculated (Kothari, 1999). The 'W' was calculated as follows –

$$W = \frac{s}{\frac{1}{12} k^2 (N^3 - N) - k \sum T}$$

Where, $s = \sum (R_j - \bar{R}_j)^2$;

k = No. of sets of rankings i.e.,
the number of judges;

N = Number of objects ranked;

$\frac{1}{12} k^2 (N^3 - N)$ = Maximum possible sum of the squared deviations i.e. the sum s which would occur with perfect agreement among k rankings

$\sum T$ = Sum of the correction factors

Correction factor was calculated as

$$T = \frac{\sum (t^3 - t)}{12}$$

Where, t = Number of observations in a group tied for given rank

$$\chi^2 = k(N-1).W$$

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Results and Discussion

Demography of camel herders

The average age of the sampled (n=75) camel herders of southern Rajasthan was found to be 48.4 years. All the camel breeders (100%) belonged to Other Backward Caste (OBC) category. More than one third (37.3%) were illiterate; however, majority (62.7%) was literate to educated. Average family size was found to be of 5.8 members with majority (51.2%) of male members. For almost all (98.7%), camel breeding was main occupation and agriculture was secondary occupation. The average camel herd size was of 21 animals, constituted by 80% female and 20% male animals. In addition to the camel herd, on an average they had 4.4 units of other livestock, constituted mainly by buffalo (65.3%) and cattle (32.4%). The average size of land holdings was 1.2 ha (small size holdings) and majority (65.3%) had irrigation facility. The cropping pattern included maize, fodder, cluster bean and sesame in *kharif* and wheat, mustard, pulses in *rabi* season.

Prevalence of health problems

The health problems reported in camels are many and varied from region to region and country to country. The incidences/ prevalence of 22 health problems grouped into eight categories in camel herds of southern Rajasthan have been found under this investigation

1. Diseases affecting integument (skin) systems of camels
2. Surgical ailments
3. Infectious diseases
4. Reproductive problems
5. Parasitic diseases
6. Digestive problems
7. Poisoning
8. Locomotor disease (Musculo-skeletal)

1. Diseases affecting integument (skin) systems of camels

The camel herders of southern Rajasthan reported mainly three health problems in this category, viz. mange, ring worm and tail Gangrene.

a. Mange: Mange infection was one of the most commonly encountered camel diseases in southern Rajasthan (62.2% herders reported the incidence, ranked 5th, table 1). Mange had highest incidence in three years but prevalence was more during 2010. Among the three diseases under this category it was more prominently infecting the camel herds. It was more prevalent and severe during the dry periods. Mange infection is a highly contagious disease which can spread to animal associated with infected animals. It tends to spread more quickly during the cold weather when the hair coats usually grow and animals huddle together. Disease was treated by ivermectin. Tandon *et al* (1997) reported mange as an acute problem among camel herd in Bikaner district. Rajput and Tripathi (2009) reported that mange was second important disease infecting 26.98% camel herds.

b. Ring worm: It was observed in young camels during the wet season. The incidence was recorded highest during summer. The occurrence of this ailment was reported by 36.4 per cent camel herders and overall ranked 12th (Table 1), indicating medium severity of problem. Abbas and Omar (2005) also reported incidence of disease in camel herds.

c. Tail gangrene: Constant tying of the tail with nose rope/saddle rope compresses blood vessels which results in necrosis and gangrene of the tail tip. The occurrence of this was found least among camel herds of southern Rajasthan and ranked the last (22nd) among the health problems and reported by only 10.7 per cent herders. The camel breeders were treating gangrene of the tail by deepening the affected part in hot sesame or mustard oil mixed with turmeric (*Curcuma longa*) powder.

Table 1. Occurrence of diseases affecting integument (skin) systems of camels in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Mange	47	62.7	6.5	33	44.0	7	60	80.0	4	140	62.2	5	1
2.	Ring worm	36	48.0	8.5	19	25.3	13	27	36.0	14	82	36.4	12	2
3.	Tail gangrene	9	12.0	17.5	2	2.7	21.5	13	17.3	19.5	24	10.7	22	3
Average		-	-	10.8	-	-	13.8	-	-	12.5	-	-	13	-

Note: f = Frequency, R = Overall Rank of incidence during the year, cf= Cumulative Frequency, OR= Overall Rank of incidence during three years, RC= Rank within category.

The overall average ranking of this category of health problems was 13, (Table 1) indicating comparatively less severity of these problems in camel herds of southern Rajasthan.

2. Surgical ailments

Maggot wound, eye laceration, puncture foot/ saddle sore and mandible fracture were the main surgical ailments reported by the camel herders of southern Rajasthan.

a. Maggot wound: Maggot wound were among the common health problems affecting the surveyed camel herds in southern Rajasthan. Wounds are commonly inflicted by any sharp edged objects, bites thorny bushes and gets worse due to fly larvae or bacterial infections. The problem was ranked 7th in overall ranking and reported by 54.2 per cent camel herders (Table 2); within category it was the most prevalent surgical ailment (ranked 1st). The prevalence was more during the year 2008, compared to the other two.

b. Eye laceration/eye infections: It was more common during the rainy season. Eye infection to be more common in camel than other ruminants. Sometimes, camels may lose vision in one or both eyes. The major cause was traumatic origin including thorn shrubs on the browse. The incidence of this problem was reported by 44.0% herders (Table 2). Excessive rubbing due to irritation by flies, ticks, mange and contagious ecthyma led to eye injuries which get further complicated by bacterial infections. Sometimes, these wounds cause blindness. The incidences of eye laceration and corneal ulcer (5.13%) in camel were also reported by Gahlot *et al* (2007), however, incidence reported in our case is quite high.

c. Chest pad abscess or saddle sore: The chest pad of a camel touches the ground when the animal is sitting. So it can be injured easily by sharp objects on the ground. Saddle sore affects the camels used

for carrying loads. For the treatment, camel breeder used turmeric (*Curcuma longa*). The incidences of this ailment were reported 28.9% (Table 2).

d. Mandible Fracture: Incidence of mandible fracture reported by the camel herders of southern Rajasthan was low (12.0%) (Table 2). The occurrence was higher during breeding season. Sometimes, it is so complicated that its repair becomes difficult. Gahlot *et al* (2007) reported comparatively high incidences (26.88%) of mandible fracture in camel herds. In majority of cases it occurred due to biting or fighting during rut season but it also occurred due to external violence caused by a lathi (stick) blow or automobile accident or by an accidental fall on the ground.

The overall average ranking of this category of health problems was 12.1 (Table 2), indicating comparatively more severity than the diseases of integument systems in camel herds of southern Rajasthan.

d. Injury of soft palate: This problem affects only male camels during result season. Only 11.1% camel breeders reported this problem and ranked at 21st i.e. second last (Table 4). This occurs when excited male camel balloons out its soft palate to make a gurgling sound and injury is inflicted by the teeth or other external trauma. The injured soft palates is either trapped inside the mouth or else hangs outside the mouth.

3. Infectious diseases

Mastitis and camel pox were the major infectious diseases reported by the camel herders of southern Rajasthan.

a. Mastitis: It is an important camel disease due to its economic and public health significance. Mammary gland disease is known to have negative effects on milk production, health and growth of new-born's and can pose public health hazards for

Table 2. Occurrence of surgical ailments in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Maggot Wound	51	68.0	3	31	41.3	8	40	53.3	9.5	122	54.2	6.5	1
2.	Eye laceration	25	33.3	10	26	34.7	10	48	64.0	5	99	44.0	9	2
3.	Puncture Foot/ Saddle Sore	9	12.0	17.5	16	21.3	14.5	40	53.3	9.5	65	28.9	13	3
4.	Mandible Fracture	5	6.7	21	4	5.3	20.0	18	24.0	17.5	27	12.0	20	4
Average		-	-	12.9	-	-	13.1	-	-	10.4	-	-	12.1	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

population consuming camel milk. Camel owners usually treat mastitis using ethnoveterinary treatment by a combination of cauterisation and certain herbs. These treatments are usually ineffective and results into fibrosis. However, the incidence of mastitis in camel herds of southern Rajasthan was reported by only 13.3% camel herders and ranked 19 in the overall ranking (Table 3). In contrast, Tuteja *et al* (2003) found 34.40% camel quarter having subclinical mastitis.

b. Camel pox: Among viral infections its pox, rabies, contagious ecthyma, papillomatosis, influenza and rota virus in young ones are common (Wernery and Kaaden, 2002) in camels. Among these, pox is the commonest viral disease of camels. The pox was major health problem in camel herds of southern Rajasthan as it was reported by 70.2% camel herders (Table 3) and ranked 3rd in overall ranking of diseases. It affected more commonly young animal and lesions were mostly found on belly, face, neck and limbs. Mostly, animals recovered within two - four weeks and some animals developed long lasting corneal opacity. It was observed during the winter season in the form of outbreaks. It was more severe compared to the camel contagious ecthyma. There is no effective treatment for the disease. However, camel herders in southern Rajasthan take pox lesion scab from the infected animal and put it in the incision made in the upper lip of healthy animals, as immunity measure. Some camel breeders collect pox lesion scabs from affected animals and crush them with water and alcohol and inject the solution subcutaneously to healthy animals to develop immunity against camel pox. Camel has a low susceptibility to disease and suffers comparatively lesser with infections.

The overall average ranking of this category of health problems was 11 (Table 3) indicating comparatively more severity than the surgical ailments in camel herds of southern Rajasthan.

4. Reproductive problems

Abortion, anoestrus, retained placenta were the major disorders reported by the camel herders of southern Rajasthan.

a. Abortion: Abortion was found quite common in camel herds of southern Rajasthan. Majority of camel herders (76.0%) reported this problem in their herds and it was ranked 2nd (Table 4) among various health problems of camel herds in southern Rajasthan, depicting the severity of the problem. The severity of the problem caused big economic losses to the camel herders of southern Rajasthan, owing to long reproductive cycles and socio-economic status. The abortion occurred due to infectious diseases like camel pox, acute respiratory infections and trypanosomiasis. Trypanosomiasis is one of the major diseases reported to cause abortion due to endocrine dysfunction. The similar findings were also reported by Enwezor and Sachey (2005).

b. Anoestrus: The incidence of anoestrus was reported by almost 1/5th (19.6%) camel herders of southern Rajasthan and in overall ranking it was ranked at 16.5 (Table 4), indicating that problem was not much severe. The anoestrus condition prevailed sometimes because of presence of congenital defect in animal and other reasons which included malnutrition. Camel breeders feed additional feed like daliya (crushed wheat) and gur (molasses) to affected animal to cure the malnutrition.

c. Retention of placenta: The severity of the problem was equal to that of anoestrus, i.e. reported by 19.6% camel herders ranked at 16.5 (Table 4). Usually the camels drop the placenta within two hours of parturition. The incidence was found more in abortion cases.

5. Parasitic disease

Among the parasitic diseases trypanosomiasis and ecto-parasites were the major problems reported by the camel herders of southern Rajasthan.

a. Trypanosomiasis (Surra): Surra is the most prevailed disease of camel herds in southern Rajasthan as most of the herders (84.9%) reported incidence in the years under study. In overall ranking of the diseases, it was ranked at 1st (Table 5). In the year 2008 it was more severely affected

Table 3. Occurrence of various infectious diseases in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Camel Pox (Mata)	57	76.0	2	57	76.0	1	44	58.7	6.5	158	70.2	3	1
2.	Mastitis	7	9.3	19	13	17.3	17.5	10	13.3	21	30	13.3	19	2
Average		-	-	10.5	-	-	9.3	-	-	13.8	-	-	11	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

the camel herds of southern Rajasthan as almost 95% herders reported the incidence. The prevalence was relatively higher during the monsoon compared to summer. Trypanosomiasis was common in herds that have been moved to other areas where green fodder existed. In this disease anorexia, lethargy and emaciation may lead to low milk yield, infertility and death, which make it a serious disease of most high economic importance among camels of this area. Early researchers also reported incidence and importance of surra in camels. Tandon *et al* (1997) reported surra (Trypanosomiasis) as one of the prevalent diseases spread in camel herd of villages of Bikaner district. Bhakat and Sahani (1999) reported surra as second most important disease prevalent among camels of Bikaner district. Rajput and Tripathi (2009) reported that maximum of camels (43.65%) affected from surra in Bikaner district of Rajasthan. The present findings was in agreement with previous reports of Richard (1979). Tekle and Abebe (2001) reported prevalence of trypanosomiasis in 10.9% camel population in Ethiopia.

b. Ecto-parasites: The incidence of ecto-parasites mainly included tick infestation and it was reported by more than 2/3rd (66.7%) camel herders of southern Rajasthan and overall it was ranked quite high i.e. 4th (Table 5). However, it was not considered as a serious health problem by the herders as camel herds are not kept in enclosures and remain mostly on move, which are not favourable conditions for tick infestation. But

it is well known that tick control has vital importance in reducing the protozoan diseases.

The overall average ranking of this category of health problems was 2.5 (Table 5) indicating maximum severity of these diseases in camel herds of southern Rajasthan.

6. Digestive problems

Among the digestive problems enteritis, pica (Sand licking), rumen impaction and abdominal pain were the major problems reported by the camel herders of southern Rajasthan.

a. Enteritis (Chera): Diarrhoea was a common manifestation in young camels (calves). In adult animals, it occurred mainly during the onset of rainy seasons due to feed change and ingestion of toxic plants or parasitic infections. The occurrence of enteritis was reported by 54.2% camel herders of southern Rajasthan and ranked 7th important disease (Table 6). Most of the affected cases recover but recovered animals are emaciated and in poor body condition. Abbas *et al* (1992) reported 23% and 33% mortality and morbidity, respectively due to diarrhoea in camel calves in Sudan. Tanwar *et al* (2007) reported simple indigestions (54.90%), acid indigestions (10.19%) and enteritis (9.41%) as alimentary diseases of camels.

b. Pica: The incidence of pica was reported by 41.8% camel herders of southern Rajasthan and it was ranked 10th among the diseases (Table 6). Camel

Table 4. Occurrence of various reproductive problems in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Abortion	47	62.7	6.5	50	66.7	3.5	74	98.7	1	171	76.0	2	1
2.	Anoestrus	18	24.0	13	13	17.3	17.5	13	17.3	19.5	44	19.6	16.5	2.5
3.	Retained placenta	13	17.3	16	23	30.7	11	8	10.7	22	44	19.6	16.5	2.5
4.	Soft plate injury	5	6.7	21	2	2.7	21.5	18	24.0	17.5	25	11.1	21	4
Average		-	-	14.1	-	-	13.4	-	-	15	-	-	14	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

Table 5. Occurrence of various parasitic problems in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Trypanosomiasis	71	94.7	1	53	70.7	2	67	89.3	2	191	84.9	1	1
2.	Ectoparasites	50	66.7	4.5	36	48.0	6	64	85.3	3	150	66.7	4	2
Average		-	-	2.8	-	-	4.0	-	-	2.5	-	-	2.5	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

herders reported that it was commonly noticed among the animals of the herds where the animals were affected by the surra and worms. It may be due to deficiency of calcium and phosphorus. In advance stage, camel becomes, lean and hump becomes very small or disappear.

c. Rumen impaction (Band/constipation):

Constipation means delayed or infrequent passing of faeces. It is more common during drought period. The incidence of constipation was reported by 36.9% camel herders of southern Rajasthan and ranked 11th (Table 6). These ailments are common in camels of urban area used as pack animal. Occurrence of digestive system problem in camel has also been reported by Mehta *et al* (2002) in Jaisalmer area of Rajasthan. The ruminal impaction was found very high number in camel in both the area. Thus, it can be stated that digestive disorders contribute significantly to slow growth of camel herd not only in the regions of India but also in most parts of world.

d. Abdominal pain: The occurrence of abdominal pain (colic) was reported by 22.7% camel herders of southern Rajasthan and it was ranked 15th among the diseases (Table 6). The camel is restless when spasm occur, roll on the ground or sits down pressing his abdomen against the ground. As ethno veterinary treatment herders give dry crushed kachra/kachri (*Cucumis melo var. callosus/agrestis*) dissolved in water and drenched orally. It helps removing gas from abdomen.

The overall average ranking of this category of health problems was 10.6 (Table 6) indicating quite high severity of these diseases in camel herds of southern Rajasthan.

7. Poisoning

Among the poisoning problems lantana poisoning and snake bite were the major problems reported by the camel herders of southern Rajasthan.

a. Lantana (*Lantana camera L*) poisoning: It is grown parallel to road and hilly tract of this area. In local dialect it is known as buti. Generally it is not browsed by the camel but during draught when vegetation is less camel fed on it. The poisoning incidences were reported by more than half of the herders (50.7%) and ranked 8th among the diseases (Table 7), indicating severity of the problem. Ingestion of lantana causes necrosis of exposed skins, diarrhoea and even death. Some of the camel herders reported that if a camel is under shade of a tree for one week it will cure. Kohler-Rollefson (2001) reported high incidence (34.20%) of lantana poisoning in Aravali region of Pali area of Rajasthan.

b. Snake poisoning: Snake is a deadly poisonous and bites on the lip of the camel. The camel may doze and feel sleepy. After sometime, eruptions appear on his whole body. There are serious exudates from these eruptions. The incidence of snake bite was reported by 16.9% camel herders and ranked 18th, indicating less severity of the problem. The ethno veterinary treatment practiced

Table 6. Occurrence of various digestive problems in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Enteritis	50	66.7	4.5	40	53.3	5	32	42.7	11	122	54.2	6.5	1
2.	Pica (Sand licking)	36	48.0	8.5	29	38.7	9	29	38.7	12	94	41.8	10	2
3.	Rumen Impaction	23	30.7	11.5	16	21.3	14.5	44	58.7	6.5	83	36.9	11	3
4.	Abdominal Pain	16	21.3	14.5	16	21.3	14.5	19	25.3	16	51	22.7	15	4
Average		-	-	9.8	-	-	10.8	-	-	11.4	-	-	10.6	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

Table 7. Occurrence of various poisoning problems in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Lantana poisoning	23	30.7	11.5	50	66.7	3.5	41	54.7	8	114	50.7	8	1
2.	Snake bite	5	6.7	21	8	10.7	19	25	33.3	15	38	16.9	18	2
Average		-	-	16.3	-	-	11.3	-	-	11.5	-	-	13	-

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

Table 8. Occurrence of locomotor disease in camel herds of Southern Rajasthan (n = 75).

S. No.	Health problems	Year									Pooled		OR	RC
		2008			2009			2010						
		f	%	R	f	%	R	f	%	R	cf	%		
1.	Rheumatism	16	21.3	14.5	16	21.3	14.5	28	37.3	13	60	26.7	14	1

Note: f = Frequency, R = Rank of Incidence, cf= Cumulative Frequency, OR= Overall Rank, RC= Rank within category.

by the herders was to collect the camel urine and drench orally 2 to 3 litres.

The overall average ranking of this category of health problems was 13, (Table 7) indicating relatively medium severity of these problems in camel herds of southern Rajasthan.

8. Locomotor disease (Musculo-skeletal)

Among the locomotor diseases rheumatism was one and the only major problems reported by the camel herders of southern Rajasthan.

Rheumatism (Badi): It becomes chronic and more than one joint is affected. The animal is found sitting down and not getting up due to pain. In chronic cases, some camels lose condition and become thin. It is believed that in all these diseases kidneys do not work properly and excess of uric acid accumulates in some parts of the body, especially joints. The incidence of rheumatism was reported 26.37% by camel herders of southern Rajasthan and ranked 15th (Table 8) among diseases indicating quite high incidence. Gahlot (2000) reported a large number of surgical affections causing lameness like rheumatism due to trauma were 32.14%.

Trends in disease incidences in camel herds of southern Rajasthan

To understand whether there was a trend in incidences of the various health problems in camel herds of southern Rajasthan, during the three years under study. The data were analysed using the Kendall's coefficient of concordance (W). The value of the W was found to be 0.87, however, as the N was larger than 7, hence, χ^2 value was calculated, which was found significant at 1% probability, indicating significant relation between the ranks. It implies that the incidence of various health problems in the camel herds of southern Rajasthan had almost similar trend (Table 9).

Summary and Conclusion

Study concluded that trypanosomiasis (surra), abortion, camel pox (Mata), ectoparasites (Ticks), mange, maggot wound, enteritis, lantana poisoning,

Table 9. Trends in incidence of major health problems in camel herds of Southern Rajasthan.

S. No.	Health problems	Rank		
		2008	2009	2010
1	Mange	6.5	7	4
2	Ring worm	8.5	13	14
3	Tail gangrene	17.5	21.5	19.5
4	Maggot Wound	3	8	9.5
5	Eye laceration	10	10	5
6	Puncture Foot/Saddle Sore	17.5	14.5	9.5
7	Mandible Fracture	21	20.0	17.5
9	Camel Pox (Mata)	2	1	6.5
8	Mastitis	19	17.5	21
10	Abortion	6.5	3.5	1
11	Anoestrus	13	17.5	19.5
12	Retained placenta	16	11	22
13	Soft palate injury	21	21.5	17.5
15	Trypanosomiasis (Surra)	1	2	2
14	Ectoparasites (Ticks)	4.5	6	3
19	Enteritis	4.5	5	11
16	Pica (Sand licking)	8.5	9	12
18	Rumen Impaction	11.5	14.5	6.5
17	Abdominal Pain	14.5	14.5	16
20	Lantana poisoning	11.5	3.5	8
21	Snake bite	21	19	15
22	Rheumatism(badi)	14.5	14.5	13

Note: 1. Kendall's coefficient of concordance (W)= 0.87.

2. χ^2 = 54.67, significant at p= 0.01.

eye laceration, pica (Sand licking) and rumen impaction, were most common health problems prevailing in the camel herds of southern Rajasthan. There were same trends in the intensity and incidence of various health problems during the period of three years. The incidence of some diseases may be prevented by proper vaccination schedule and timely treatment in consultation with veterinarians as it was found during field surveys that delay in proper treatment was also one of the major causes of mortality in camels.

References

- Abbas B, Agab H, Mohamed GE, Yagoub SO and Mustafa K (1992). Clinical observations on field cases of diarrhoea in camel calves. Proceedings of the 5th Conference of General Federation of Arab Veterinarians held at Khartoum (Sudan), January, 21-24, pp 128-137.
- Abbas B and Omer OH (2005). Review of infectious diseases of the camel. Veterinary Bulletin 75, 1N – 16N.
- Bhakat C and Sahani MS (1999). Study of economics of different camel management practices under arid and semiarid eco-system. Annual Report, NRC Camel, Bikaner, Rajasthan. pp 34-38.
- Enwezor FNC and Sackey AKB (2005). Camel trypanosomosis - a review. Veterinarski Arkiv 75:439-452.
- Gahlot TK (2000). Surgery of the dromedary camel-musculoskeletal systems – Lameness. In: Selected Topics on Camelids. 1st Edn, Gahlot, TK (Ed), The Camelids Publishers. pp 378-382.
- Gahlot TK, Dudi PR, Sharma CK, Bishnoi P and Purohit S (2007). Surgeries of head and neck region of dromedary camel in India. In: Proceedings of the International Camel Conference on Recent trends in camelids research and future strategies for saving camels (Eds.: Gahlot, TK), College of Veterinary & Animal Science, RAU, Bikaner, 16-17 February. pp 171-175.
- Kohler-Rollefson Ilse, Mundy Paul and Mathias Evelyn (2001). A Field Manual of Camel Diseases: Traditional and Modern Health Care for the Dromedary, ITDG, London, UK.
- Kothari CR (1999). Research Methodology- Methods and Techniques. 1st Edn., Wishwa Prakashan, New Delhi, India.
- LPPS (2005). Saving the Camel and Peoples' Livelihoods: Building a Multi-Stakeholder Platform for the Conservation of the Camel in Rajasthan. Proceedings of an International Conference held on 23-25 November 2004 in Sadri. Lokhit Pashu-Palak Sansthan, Sadri, Rajasthan, India.
- Mehta SC, Bithu HK and Sahani MS (2002). Disease profile in Jaisalmeri camel in the breeding tract. Veterinary Practitioner 3(2):116-119.
- Rajput DS and Tripathi H (2009). Perception of Veterinary officers, pastoralists and traditional healers about incidence of diseases among Camels. Journal of Camel Practice and Research 16(1):55-58.
- Rathore HS (2001). Saving the camel in Rajasthan. Ecology and Farming 27:16-17.
- Richard D (1979). Study of the pathology of the dromedary in BoranaAwraja (Ethiopia). Thesis for doct. vet. Maisons-Alfort, IEMVT (Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux). pp 221.
- Tandon SN, Khanna ND, and Bissa UK (1997). To develop suitable management practices for rearing camels. Annual Report, NRCC, Bikaner, Rajasthan. pp 50-56.
- Tanwar RK, Gahlot AK, Ahuja Anil, Fakhrudeen, Bihani Dinesh, Chahar Anju and Singh AP (2007). Alimentary tract disease of camels (*Camelus dromedarius*) in arid zone of Rajasthan. In: Proceedings of the International Camel Conference on Recent trends in camelids research and future strategies for saving camels (eds.: Gahlot, T.K.), 16-17 February, 2007, College of Veterinary & Animal Science, RAU, Bikaner. pp 44.
- Tekle T and Abebe G (2001). Trypanosomiasis and helminthoses: Major health problems of camels (*Camelus dromedarius*) in the southern rangelands of Borena, Ethiopia. Journal of Camel Practice and Research 8:39-42.
- Tuteja FC, Dixit SK, Deen A, Bhati A and Sahani MS (2004). Mineral antioxidant status in serum and its relationship with somatic cell counts in camel milk. Journal of Camel Practice and Research 11(1):59-62.
- Wernery U and Kaaden OR (2002). Infectious Diseases of Camelids. 2nd edition. Blackwell Science, Berlin. pp 109-116.
- Yemenu D (2005). Livestock diseases situations and existing surveillance systems. Minutes of the livestock working group, FAO Conference, Sept, 2005.