Technical Knowledge of Camel Management Practices in the Arid Thar Desert Environment

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ABSTRACT

Information was collected from 294 camel-keepers in the Thar desert to identify the technical details of camel management and to crosscheck data for relevance testing. A total of 156 practices were identified and scientific relevance values obtained for each. Overall, 95, 37 and 24 practices had high, medium and low relevance values, respectively. In the case of trypanosomiasis, impaction, overall feeding and breeding, the variation between traditional and scientific management practices was found to be significant ($P < 0.01$), but for mange, the variation was not significant. Most single camel owners (54.46%) opted for modern veterinary drugs; owners of >5 camels (47.27%) preferred the traditional approach, while owners of 2-5 camels (43.48%) believed in a mixed management system. The number of camels significantly ($P < 0.01$) influenced these management practices. The study concluded that a balanced combination of traditional and scientific practices can cope better with problems of camel management at grass-roots level, and practices having a high and medium scientific relevance value must be preserved before they are lost.

The camel (*Camelus dromedarius*) is a useful component of the arid environment of desert ecosystem, where the vegetation of marginal land can scarcely meet human requirements for food and energy. Camels are able to sustain 20-22 per cent of body weight loss during severe famine conditions, whereas other livestock, such as cattle and buffalo, can not sustain losses beyond 10-12 per cent (Sahani and Mehta, 2004). Mainly due to the short payback period and higher cost-benefit ratio, the carting- and farming use of camels is profitable and advantageous in arid environments. The world camel population is 19.32 million, with 1.03 million camels in India. The Indian camel population is mainly confined to the northwestern states, with the highest density in Rajasthan.

Ethno-veterinary practices are used extensively, effectively, for keeping camels healthy by employing the knowledge passed on verbally from generation to generation. Technical knowledge represents an indigenous process for camel production and management

among camel-keepers. The principal focus of camel production and management is health, feeding, breeding and economics. Despite the effectiveness of modern veterinary drugs, their availability, accessibility and cost still remain a major constraint for camel-keepers. So, they still prefer and rely on various practices to cope with problems, which include traditional, as well as scientific, management practices. They use one or a combination of practices, and drug dose and frequency depend upon the severity of the disease. Camel-keepers have extensive traditional technical knowledge, which is a somewhat ecological approach to manage health problems. Traditional technical know-how is often cheap, safe, time-tested and based on easily available resources. It can also provide a useful alternative to conventional practices. There is a strong reliance by farmers on the technical knowledge, with respect to suitable plant identification, classification, feed supplementation, local reproduction, breeding, milking and surgical techniques. It is, therefore,

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necessary to investigate the prevalence and scientific relevance of technical knowledge of camel management practices in an arid environment. In the present study an attempt has been made to identify ethno-veterinary practices being practiced by the farmers for sustainable camel rearing in arid environment.

METHODOLOGY

The study investigated camel management practices at grass-roots level in the Thar desert region of Bikaner district. The father of a family generally hands down all technical knowledge to their sons, who continue with the practice.

The task of identifying technical knowledge was accomplished by a pilot study, with a questionnaire on different management aspects. Based on the pilot survey, a detailed interview schedule was prepared. The required data were collected in a suitably developed and pre-tested questionnaire by an in-depth survey method. This grass-roots level study covered various aspects of camel management practices, viz. social status of camel-keepers, ongoing agriculture practices, number of livestock technical knowledge of camel health hazards, treatment pattern, feeding, breeding, surgical management practices, economics, etc. The scientific relevance score test (Sethi and Malaviya, 1996) for each management practice was estimated, based on the experience and opinions of 35 veterinarians and scientists. Scientific relevance test (SRT) is an evaluation that depends upon four major factors: availability, accessibility, cost, effectiveness of resources.

Respondents were selected using a stratified random-sampling technique. Information were collected from sample farmers both in irrigated and non-irrigated villages of the Thar desert. Technical knowledge of camel management practices were meticulously recorded from 294 camel-keepers of six tehsils belonging to 14 villages (Bikaner district), viz. Lunkaransar, Khajuwala, Pugal, Sattasar, Jamsar, Mahajan, Katriyasar, Bikaner, Nokha, Badnu, Kuchor, Jasrasar, Kolayat and Napasar. A sample of 20-22 experienced camel-keepers was drawn from each village randomly for data collection.

RESULTS AND DISCUSSION

Details of the technical knowledge for camel management, indicating traditional, as well as scientific, practices have been reported in Table 1. For treatment of *mange*, endosulphon/melathion and neem combination had a high SRT value, whereas *rohira* bark + whey application had a low value. Kohler-Rollefson (1994)

reported that the Indian *Raikas* also used pulverized bark of the *rohira* + whey. Sulphur+engine oil had a medium SRT value, while sulphur + coppersulphate + *mansil* + potash + oil had an SRT value of 0.88. A butter-milk application was of medium relevance, but used by a large number of respondents.

As regards treatment for contagious skin necrosis, practices were of high relevancy. Salty soils and salt water have been shown to have preventive properties in a number of livestock health problems (Namianda, 1998). Ringworm was well managed by zinc oxide application. Gupta (1999) reported the use of burnt cow-dung in such cases. Camel-keepers have extensive traditional technical knowledge of a rather ecological approach for managing trypanosomiasis: a satawar/turmeric combination and allopathic drugs (quinapyramin sulphate + quinapyramin chloride) had high SRT values. The *dhalmungsuri/tumba* combination was of medium value, but was used by large number of farmers. Kohler-Rollefson (1994) reported the use of *tumba* + salt + water as an oral treatment for trypanosomiasis. For managing impaction, most practices were of high SRT value: 22.11 per cent of farmers favoured fast movement to get rid of impaction. Maximum mortality in camels (48.78%) involved problems of the digestive system (Mehta *et al.*, 2003).

In case of pneumonia, a *babul* root and ginger combination had a medium to high relevancy. To combat other respiratory problems, *gundh* of *babul* was more effective. Gupta (1999) recorded the use of powdered *methi*, or seeds, with saffron oil in cases of pneumonia in camels. Incidences of camel pox were managed by practices having high relevancy. Deworming of camels was accomplished very successfully by feeding a copper sulphate/ *chiraita* combination.

Diarrhoea problems were resolved with rice combinations, which had medium SRT values; higher values were also found in cases of feeding with *khejri* leaves and *bui* root. To control diarrhoea in sheep, Kumar (2002) found that the use of barley (*Hordeum vulgare*) flour + rice starch had a SRT value of 0.54 and was used by 73.33 per cent of farmers.

Abscess/wound/saddle gall problems were treated by 20 different practices. Neem, turpentine oil, *kapoor*, *loresine/himax* cream and applying a hot iron to the affected part were found to have higher SRT values. Chronic wound/abscess and inflammation problems are often treated by burning the affected areas with hot iron rods in different forms and patterns, or with crude surgery.

Table 1. The technical knowledge for camel management.

Technical knowledges	% Distribution	SRT* Value
Mange		
Sulpher + Engine oil - paste -apply	22.79	0.56
Engine oil + Alam (hydrated aluminium potassium sulfate salt) - apply	19.04	0.50
Burnt engine oil -apply	10.88	10.58
Endosulphon/ melathion + water - apply	14.63	0.81
Melathion/ Endosulphon + Butter milk -apply	10.54	0.48
Endosulphon + Til oil (<i>Sesamum indicum</i>)-apply	4.08	0.25
Endosulphon + Ash-apply	6.12	0.27
Neem (<i>Azadirachta indica</i>) leaves boil in water-cool-apply	15.97	0.74
Neem leaves (tender)-feed	11.22	0.68
Garlic (<i>Allium sativum</i>)-feed	9.18	0.46
Garlic + Turmeric (<i>Curcuma longa</i>) + Water -drench	6.80	0.38
DDT + whey -apply	6.12	0.19
Bark of Rohira (<i>Recomella undulata</i>) +Whey -apply	9.18	0.18
Slightly warm mustard oil (<i>Brassica campestris</i>) -apply	21.09	0.53
Dalda ghee -drench	10.20	0.45
Jal's ash (<i>Salvadora oleoides</i>)=Kheemp's (<i>Leptadenia pyrotechnica</i>) juice-apply, after that Taramira oil apply.	22.11	0.57
Taramira oil (<i>Eruca sativa</i>)-apply	13.95	0.55
Sulpher + Copper sulphate + Mansil + Potash + oil -apply	11.56	0.88
Butter milk-apply	11.90	0.27
Contagious skin necrosis		
Salt(100-200 gm)-feeding for 8 to 10 days	10.88	0.94
Keeping separate from other animal	9.86	0.86
Ring worm		
Zinc oxide-apply	16.67	0.61
Aak (<i>Calotropis procera</i>) juice-apply	15.65	0.53
Ghee + Salisalic + Benzoic acid-apply	12.58	0.65
Neem leaves-apply	14.29	0.69
Trypanosomiasis		
Satawar (<i>Asparagus racemosus</i>) + Buffalo milk-feed in repeated dose	9.86	0.77
Turmeric + Buffalo milk - feed in repeated dose	11.22	0.76
Dholmungusuri(<i>Phaseolus sublobatus</i>) + Buffalo milk-repeated dose	21.08	0.56
Salt+Kalajira+Ajwain+Methi powder+Molasses+Alam+Water-drench	18.37	0.57
1/2kg Dalia of Bajri + 1 kg molasses + 100g Red Chilies powder + 100 gm Alam+Hinge-feed	13.95	0.12
Saji (<i>Salsola baryosma</i>) +Water-drench	17.69	0.17
Suspension of tumba (<i>Citrullus colocynthis</i>) +salt+water-feed	15.99	0.32
Kalajira(<i>Carum carvi</i>) + Hing -feed	14.63	0.64
Injection (Tribaxin/Triquin)	12.24	0.97
Naganoil -3times-3 days-feed	12.93	0.92
Impaction		
Ajwain (<i>Trachyspermum ammi</i>)-feed	13.27	0.71
Ajwain-boil in water-cool-feed	11.56	0.66
Ajwain + Alam +Saji-grinding +water-drench	11.90	0.69
Ajwain+Molasses +Salt-boil-cool-drench	20.75	0.47
JHimalayan batisha-feed	7.14	0.60

*SRT-Scientific Relevance Score Test

Technical knowledges	% Distribution	SRT* Value
1/2 kg Sodium bicarbonate mixture +2kg Patsa-feed	9.18	0.91
Magnesium sulphate +Sodium bicarbonate -feed	10.88	0.94
Alam+Water -boil and next day drench in early morning	8.50	0.16
Salt water-boil-drench next day in early morning	22.79	0.51
Mustard oil =Water-drench	6.46	0.61
Taramira oil-drench	10.20	0.25
Arandi oil (<i>Ricinus communis</i>)-drench	12.93	0.64
Allow for fast movement	22.11	0.49
Kachri (<i>Cucumis callosis</i>) +Rai (<i>Brassica nigra</i>)-grinding-feed	9.86	0.67
Milk (cow or buffalo) + Sugar-boil-make rich-drench	7.48	0.09
Pneumonia		
Ginger (<i>Zingiber officinale</i>) + Ajwain +Water+Salt-boil-cool-drench	21.43	0.69
Turmeric +Salt+Ginger+Water-boil-cool-drench	19.38	0.61
Root of Babul (<i>Accacia nilotica</i>) +water-boil-cool-drench	15.99	0.51
Jaggery (<i>Saccharum officinarum</i>)-feed	13.95	0.17
Mixture of turmeric and jaggery-feed	10.88	0.23
Powdered methi (<i>Trigonella foenumgraecum</i>) + safron oil -feed	6.46	0.15
Ginger + Onion(<i>Allium cepa</i>) +Garlic + Long (<i>Syzygium aromaticum</i>)-feed	20.06	0.67
Other respiratory problems		
Gundh of Babul + water-boil-cool-drench	16.32	0.65
Flour of Jo(<i>Hordeum vulgare</i>) + Alam-boil-feed	11.22	0.15
Flour of Jo-feed	18.03	0.19
Old mehendi (<i>Lawsonia inermis</i>)+Mustard oil-drench	21.09	0.52
Camel pox		
Keeping separate from other animal	15.31	0.78
Dalda ghee-apply	7.14	0.54
Zink oxide-apply	10.88	0.63
Camel milk-apply	3.06	0.38
Deworming		
Red chilies (<i>Capsicum annum</i>) +Water-drench	5.44	0.12
Any tab(<i>Albendazole</i> / <i>Panacure</i> / <i>Nilwarm</i> etc.)-feed	12.59	0.95
Copper sulphate + Tabacco(<i>Nicotiana tabacum</i>) + Castor oil (<i>Ricinus communis</i>)-feed	20.07	0.61
Chiraita(<i>Swertia chirayita</i>)-feed	14.29	0.73
Diarrhoea		
Dalia of Bajri (<i>Pennisetum typhoides</i>) + water-drench	21.42	0.54
Bajri flour + whey-feed	8.50	0.24
Rice(<i>Oryza sativa</i>) grinded +water-boil-feed	23.47	0.51
Dhan flour + water-feed	14.29	0.54
Whey-feed	16.67	0.48
Flour of Jo + water-drench	5.44	0.12
Neblon powder	16.32	0.73
Butter milk + salt-feed	9.18	0.37
Himalayan batisha-feed	12.59	0.64
Khejri leaves(<i>Prosopis cineraria</i>)-feed	22.11	0.62
Root of Bui(<i>Aerva pseudotomentosa</i>) +water-boil-cool-feed	17.35	0.61
Breeding/Reproductive problems: (a) Retention of Placenta		
Bajri-feed	20.75	0.55
Bajri + Molasses + Wheat (<i>Triticum aestivum</i>)-feed	19.38	0.53
Molasses +Ghee-boil-cool-drench	6.46	0.15

Technical knowledges	% Distribution	SRT* Value
Ajwain + Molasses + water-boil-cool-drench	17.34	0.23
Uteroton/Replanta-feed	15.65	0.76
Mannual cleaning + Furia bolus-keep insitu	10.88	0.94
Moth (<i>Psaseolus aconitifolius</i>) + Guar's(<i>Cyamopsis tetragonoloba</i>)Dalia-feed	7.82	0.21
Root bark of Berbush(<i>Zizyphus nummularia</i>) + water-drench	18.68	0.56
(b) Maintenance of Pregnancy		
Ghee + Molasses -feed	14.62	0.69
Methi + Jeggary -feed	15.31	0.22
Molasses + Ginger + Ajwain -feed	13.60	0.18
Moth bean - feed	16.32	0.52
Bajri - feed	22.11	0.54
Abscess/Wound/Saddle Gall		
Ash + Alam - apply and clean	17.68	0.33
Ash apply	14.29	0.18
Neem water -clean wound	10.54	0.88
Neem leaves-grinding-apply	11.22	0.89
Neem leaves -apply and clean by Alam	12.58	0.95
Alam with water -boil - apply	9.86	0.43
Alam + Neem's leaves- grinding- apply	10.20	0.53
Alam heated on tawa and make powder - apply	16.33	0.52
Alam - paste -apply	7.82	0.54
Ker's(<i>Capparis decidua</i>) bark- grinding -apply	8.50	0.40
Phenol-apply	3.74	0.14
Kerosene oil -apply	5.44	0.16
Turpentine oil - apply	13.27	0.87
Turmeric + oil -apply	10.88	0.76
Mustard oil -boil-pour-fire around	20.75	0.41
Kapoor-grinding-apply	9.52	0.63
Potassium per magnate-clean	12.24	0.77
cream (Lorexine/Himax)-apply	7.48	0.91
Hot iron touch on affect part	20.41	0.60
Sidhur (<i>Bixa orellana</i>)-apply	14.62	0.50
Muscle/tendon pulled		
Mustard oil-apply	23.47	0.49
Turpentine oil - apply	31.97	0.17
Iodex-apply	7.14	0.95
Hot iron touch on affected part	24.49	0.48
Mustard oil + Alam -boil-massage	7.82	0.21
Turmeric + Mustard oil - drench	4.76	0.25
Hot fomentation with alam water/ mud water	25.51	0.80
Mouth ulcer		
Sugar + Alam mix - feed	10.88	0.19
Salt -apply	19.38	0.61
Saji + Water -boil-cool-apply	22.45	0.50
Sudden colic		
1/4 Tobacco heated up + 1 1/2 kg water -drench	13.27	0.15
Ajwain +Water -drench	15.98	0.69
Alam + Water - boil -drench	21.08	0.49

Technical knowledges	% Distribution	SRT* Value
Fracture		
Bark of Gangeray (<i>Grewia tenax</i>) + Milk -drench	16.33	0.73
Muscle Pain		
Methi-feed	17.35	0.69
Alam + Jaggery - feed	22.79	0.71
Exhaustion		
Ghee - feed	11.56	0.74
Molasses + Til oil mix boil - cool -drench	19.73	0.49
Duwa (raw rabri)-drench	7.14	0.17
Jo - grinding + water-feed	14.29	0.83
Alam + Water -feed	13.27	0.71
Tail Gangrene		
Affected part of tail dip in boiled Mustard oil	16.32	0.72
Hot iron touch on affected part	18.37	0.65
Tympany		
1/4 kg Hinge (<i>Ferula asafoetida</i>) + 1/2 kg dalda - feed	18.37	0.65
Magnesium Sulphate + Water -drench	17.35	0.67
Ajwain + salt - feed	7.48	0.56
Salt water -feed	3.74	0.23
Tumba + Salt -feed	15.99	0.61
Make camel to run	5.10	0.17
Any illness		
Molasses - feed	9.52	0.55
Boiled Molasses + Ginger -feed	11.56	0.49
Bajri Dalia -feed	20.75	0.50
Ajwain -feed	10.54	0.51
Alam -feed	22.11	0.66
Maintenance of milking camel		
Methi - feed	8.84	0.51
Methi + Mustard oil - feed	4.08	0.57
Maintenance camel		
Moth bean - feed	14.62	0.51
Ghee + Molasses - feed	17.69	0.67
Guar ki dal - feed	13.27	0.49

To treat placenta retention, root bark of *berbush* + water drenching is of medium relevance, while other practices had high SRT values. Kumar (2002) reported the use of a decoction of molasses, root bark of *berbush* and milk as having SRT value of 0.50, and being used by 87.33 per cent of farmer, for cases of placental retention in sheep. Pulled tendon/muscle cases are often resolved by hot fomentation with mudwater, since mud can retain heat for a longer time on affected parts, facilitating better circulation. Mouth ulcer was well managed by salt and *saji* application. Sudden colic was greatly reduced by drenching with ajwain + water. The bark of the gangeray tree was best in cases of fracture in camels. Muscle pain

could be well managed by feeding a *methi* or *alam* combination. Farmers overcame exhaustion in camels by feeding *Jo*, which is basically lower in thermodynamic substances.

Crude surgical methods have been used to treat cases of tail gangrene and various methods of cauterization employed to halt bleeding. Cauterization was also used for a number of problems connected with the nervous system, locomotion, dislocation, fractures, sprains and injuries (Khanna and Bissa, 1997). The pattern of cauterization varied with the nature of the disease and symptoms. To cope with tympany, a hinge combination

Table 2. Comparision between traditional and scientific management practices of camel rearing

Parameters	Traditional management practices (MPS)	Scientific management practices(MPS)	'Z' value
Disease			
Mange	60.12	39.88	0.21 ^{NS}
Trypanosomiasis	87.23	12.77	6.32 ^{**}
Impaction	83.77	16.23	5.11 ^{**}
Feeding	71.38	28.62	3.34 ^{**}
Breeding	75.44	24.56	4.15 ^{**}

** Significant at $P < 0.01$, NS-Non Significant

was of high SRT value. Tympany in sheep has been treated by giving a mixture of mustard oil + *kachri* + common salt + whey; it had a 0.72 SRT value and was practiced by 93.33 per cent of respondents (Kumar, 2002). Constipation problems were highly resolved by feeding a *kachri*/magnesium sulphate/*tumba* combination, although a few farmers also made camels run to treat constipation. Gupta (1999) reported *ajayan* + salt as being used for treating constipation in camels.

All types of illness were managed by some practice having a medium to high SRT value. Abbas *et al.* (2002) found that ethno-veterinarians have acquired a vast store of information on camel diseases and the use of plant varieties for treatment. Various practices were used on pregnancy, milking or working stages of camel. In fact, farmers have a detailed knowledge regarding roughage, concentrates etc., which is used for balanced feeding or during specific periods when additional nutrient requirements are essential.

A comparison of traditional and scientific management practices in camel rearing is given in Table 2. In cases of mange, the variation between traditional and scientific practices was not significant because a comparatively greater number of farmers used management practices, which were well recognized by the scientific community. As for trypanosomiasis, impaction, overall feeding and breeding, the variation between traditional and scientific management practices was found to be significant ($P < 0.01$). Table 3 expresses the impact of camel numbers on management practices. Most single camel owners (54.46%) opted for modern veterinary drugs, those keeping > 5 camels (47.27%) preferred the traditional approach and the owners of 2-5 camels (43.48%) believed in mixed management. Initially, this group applied traditional practices, but if a cure was not

forthcoming they switched to modern veterinary drugs. A chisquire test was applied and the value was found to be significant, which indicated that the number of camels in the herd significantly ($P < 0.01$) influenced these management practices.

The main purpose of this economic analysis is to support decision making regarding limited resource allocation. Cost of resource provides a basis for making rational choice among alternatives under various circumstances. The treatment cost depends upon severity of particular disease. The traditional treatment cost of *mange* was low as compared to allopathic treatment cost. The traditional treatment cost varied Rs. 20 to 125/- per camel. The allopathic treatment cost varied Rs.250 to 500/- per camel (injectable type) and Rs. 90 to 160 (spray/application type). The traditional treatment cost of Trypanosomiasis (Rs. per camel) varied Rs. 450 to 1000/- where as allopathic treatment cost varied Rs.90 to 100/- . The traditional treatment cost for pneumonia varied from Rs. 40 to 80/- per camel per day. Monetary values are used as a common denominator for the valuation of particular resources. This economics indicate the confidence one can have in their priority ranking of various strategies.

All technical knowledge is based on personal experience and is cost effective, arid environmentally sound and socially acceptable. Therefore, this study indicates that a balanced combination of traditional and scientific practices can cope better with problems of camel management at grass-roots level in an arid environment, and the practices having high and medium SRT values must be preserved before they are lost. It will be appropriate to hand over the know-how obtained and refinements achieved back to the arid farmers, and they should be part of the scientific and commercial processes.

Table 3. Impact of number of camel on management practices

	Modern veterinary drugs	Intermixed management (Traditional app + Mod. Vet. Drug)	Traditional approach	Overall
1 Camel	54.46	24.75	20.79	34.35
2-5 Camel	18.12	43.48	38.41	46.94
> 5 Camel	16.36	36.36	47.27	18.71
Overall	30.27	35.71	34.02	N=294
Chi square		44.32**		

**-Significant at $P < 0.01$.

ACKNOWLEDGEMENT

Sincere thanks are expressed to all veterinary doctors, the scientists and camel-keepers for providing the necessary information to accomplish this work.

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