INFLUENCE OF SEASON AND AGE ON BLOOD ELECTROLYTES IN MAGRA RAMS[#]

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ABSTRACT

The influence of season and age was studied in 60 Magra rams grouped according to age (below 1 year, 1-2 years and above 2 years) and season (summer and winter). As the age advanced, a significant (P< 0.01) decrease in the sodium and potassium concentration was detected. There was statistically significant (P<0.01) higher concentration of potassium in summer season. Regarding the chloride concentration there was no significant effect of season and age. These findings gives basis for the regular therapy application and carrying out the prevention of the metabolic disturbances of sheep with the aim of reducing economic losses.

Key words: Season, age, ram, sodium, potassium, chloride

Introduction

The biological productivity of an animal depends not only on the flow of energy, food and water within the system, but also on its adaptability to the environment, in which it lives. Domestic animals can endure some extreme environmental condition but considerable variations have been observed between different species, individual etc. in their capacity to adjust to the seasonal environmental variations. Environmental stress exerts pronounced effects on the various biochemical characteristics of blood (McDonald, 1980). Maintenance of normal level of blood electrolytes is essential for normal growth, reproduction and health of animals. The electrolytes play a great role in maintenance of osmotic pressure, fluid balance and body's acid-base balance (Satayanarayana, 2001). Knowing the metabolic profile of the ram, including blood electrolytes, is important to specify the feed status as well as to prevent health disorders which lead to the production and reproduction disturbances.

Materials and Methods

Sixty apparently healthy randomly selected males (rams) of Magra breed of sheep in three age groups, viz., below 1 year, 1-2 years and above 2 years were selected for present investigation. The animals were allowed daily, 8 hours grazing on natural pastures and shrubs. In addition, sheep were stall fed with dry roughage (wheat straw and *pala* leaves) with approximately 250 g of concentrate (*Moth churi* and *Bajra*) and some quantity of salt and mineral mixture. Drinking water was provided *ad libitum*. The blood samples were collected in winter and summer. Plasma for each sample was separated out on the same day in the laboratory. Only non-haemolysed plasma samples were used for further estimation. After collection, plasma samples were stored at -20°C in deep freeze. Sodium and potassium were estimated by flame photometry and chloride was estimated by Schales and Schales method cited by Oser (1986). The data obtained were subjected to analysis of variance (ANOVA) (Snedecor and Cochran, 1994). The critical difference among various means was worked out by "Duncun's New Multiple range Test" (DNMRT) test.

Results and Discussion

The results of study are as presented in Table 1. The overall mean values of plasma electrolytes viz. sodium, potassium and chloride in present study are in accordance with Gardner (1973), Smith *et al*. (1978), and Antunovic *et al*. (2004), in different breeds of sheep. Taking age into consideration, the analysis of variance (ANOVA) showed a significant (P<0.01) effect on sodium and potassium concentration. The highest sodium concentration 155.05±0.868 was in below 1 year and lowest 146.45±0.510 mmol/litre in above 2 years of age group. The highest potassium concentration 5.86±0.142 was observed in below 1 year and lowest 5.01±0.124 mmol/litre in above 2 years age groups.

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Table 1: Mean ± SE values of blood electrolytes in different groups of Magra rams

Parameters		sodium (mmol/L)	potassium (mmol/L)	chloride (mmol/L)
Overall		151.19±0.853	5.41±0.091	104.27±0.571
Age	Below 1 year (20)	155.05±0.868^{c}	5.86±0.142^{c}	104.07±0.547
	1-2 years (20)	152.1±0.706^{b}	5.37±0.149^{b}	105.29±0.704
	Above 2 years (20)	146.45±0.510^{a}	5.01±0.124^{a}	103.47±0.651
Season	Summer (30)	151.96±0.840	5.79±0.082^{B}	104.95±0.612
	Winter (30)	150.43±0.890	5.04±0.122^{A}	103.60±0.407

Mean comparison have been made with parameters.
Mean superscripted with different small and capital letters differ significantly (P<0.05) from each other.
Data shown in parenthesis are representing the number of animals.

A non-significant (P>0.05) effect of age was observed on chloride concentration. The highest chloride concentration 105.29±0.704 was in 1-2 years and lowest 103.47±0.651 mmol/litre in above 2 years age group. Regarding age related variations, the plasma electrolytes viz. sodium and potassium showed a decreasing trend in all age groups with the advancement of age resulting into a significant (P<0.01) effect of age on these electrolytes. The higher electrolytes in blood of young sheep could be correlated with the rapid metabolic processes due to the increase of body mass of sheep. With the rise of age, the electrolyte concentration drops in blood plasma (Lohle, 1994). Higher level of sodium in pre- pubertal stage might be due to the fact that the concentration of sodium in soft tissue and muscles are higher in early age and decrease with the advancement of age and the higher level of potassium during this stage might be due to higher assimilation (Bhattacharya *et al*., 1994). The findings of Antunovic *et al*. (2004) in ewes are in accordance with the present investigation.

According to season, there was a significant (P<0.01) effect of season on potassium concentration. During the summer season, the potassium concentration was higher than that of winter season. A non- significant (P>0.05) effect of season was observed on the sodium and chloride. The levels of all the three electrolytes were higher in the summer season. The higher values of plasma electrolytes during summer season is an indication of higher water retention by sheep because of adaptiveness to summer stress (Nath, 2006). More *et al*. (1980) and Antunovic *et al*. (2002), have reported similar type of findings regarding the sodium and potassium, supporting the present work.

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POLYMORPHISM IN 16S - 23S rRNA GENE INTERNAL SPACER REGION IN *E. COLI* ISOLATES OF CATTLE AND SHEEP

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ABSTRACT

Escherichia coli isolates 25 each of cattle and sheep obtained from diarrhoeic and normal faecal samples, belonging to certain serogroups, were subjected to PCR ribotyping i.e. determination of polymorphism in the 16S-23S rRNA intergenic space. The bacterial isolates could be discriminated on the basis of the length of rRNA intergenic space but no correlation could be found between the amplified DNA band pattern and the serogroup of *E.coli* isolates. Many of the amplified DNA bands resulted due to occurrence of multiple amplicons at regular size intervals were found common in bacterial isolates of both species but few of the bands were also found species specific either in cattle or in sheep isolates.

Key words: Ribosomal RNA, 16S-23S rRNA intergenic space, *Escherichia coli*

Introduction

Escherichia coli is the major facultative Gram negative organism, contributing to the normal flora of gastrointestinal tract of all animals and is also abundant in the environment inhabited by animals. This species is a cluster of many different types of strains, majority of which are nonpathogenic but some of them may be opportunist pathogens having pathogenic potential in general or for a particular host. It thus becomes important to type the strains by different methods for characterization and to find correlation with pathogenicity. Several typing tools are available for this purpose which include biotyping, serotyping, resistotyping and genotyping. Of all these methods,

genotyping or molecular typing methods hold great promise in pinpointing heterogeneity in the genomic portion of different strains. Many types of genetic variability has been documented for *E. coli* isolates of different host species. Repetitive DNA fluctuates in size and nucleotide sequence within and among strains and sequence variability in by comparative DNA sequencing (Van Belkum *et al*., 2001). By random amplification of individual genes recovered from strains with a different ancestry has been demonstrated polymorphic DNA, evidence has been provided for the existence of a large pool of strain specific genes. These techniques offer several benefits over classical typing method such as avoiding the need for stable monocultures of bacterial cells, increased assay sensitivity, stability and significantly faster reaction time as observed by Relman and Persing (1996). A molecular type, which stems from a DNA fingerprint or nucleotide sequence inherently, contains more information about a given strain.

Both 16S and 23S rRNA contain sufficient information (bases) for reliable phylogenetic analysis but the 16S rRNA is most widely used in molecular geneology. Of late, the more variable intergenic spacer (IGS) region which lies between the 16S and 23S rRNA transcription units, was targeted for differentiation of bacterial species observed by Kostman *et al*. (1992). The PCR ribotyping i.e. analysis of the 16S-23S rRNA intergenic spacer region, also yields genotypic information about the strain in the form of size polymorphism. The present paper deals with the heterogeneity and comparison in the intergenic regions of different strains of *Escherichia coli* isolated from cattle and sheep.

Materials and Methods

Isolation and identification of *Escherichia coli*

The faecal samples of diarrhoeic and normal cattle and sheep were collected aseptically. The procedure for isolation and identification of bacterial culture was done as per technique described by Carter *et al*. (1994). After isolation and purification, bacterial cultures were subjected to primary tests of

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identification. Isolates that seemed to be typical *E. coli* on primary tests were then subjected to secondary biochemical tests. Twenty five isolates from cattle and sheep each were selected for study.

Serological typing of *E. coli*

All *E. coli* isolates from cattle and sheep were serotyped by National *Salmonalla* and *Escherichia* Research center, Central Research Institute, Kasauli, Himachal Pradesh.

16S-23S rRNA gene intergenic spacer region of *E. coli* isolates of cattle and sheep

A total of 50 strains of *Escherichia coli*, 25 from cattle and 25 from sheep were subjected to determination of 16S-23S rRNA intergenic spacer region polymorphism following the technique described by Kostman *et al*. (1992). The primers used for amplification of 16S-23S ribosomal RNA intergenic space were having the sequence-16S F/ TTGTACACACCGCCCTCA and 23S R/GGTACCTTA GATGTTTCAGT.

Amplification of DNA

Bacterial genomic DNA was extracted and purified from cell lysates using phenol:chloroform extraction 3 times and precipitated by alcohol in the presence of 3M sodium acetate (Rochelle *et al*., 1992). Purity and integrity of DNA was checked by agarose gel electrophoresis. Quantity of DNA was estimated by spectrophotometric method and optical density (OD) was recorded both at 260 and 280nm. A_{260}/A_{280} ratio of around 1.9 (1.8-2.0) indicated best quality of DNA. The amplification was achieved in 35 cycles, each consisting of 3 stages: denaturation at 94°C for one minute, primer annealing at 55°C for 1.5 minute and extension at 72°C for 1.5 minutes. Denaturation in first cycle and extension in last cycle was carried out for five minutes.

The PCR products were electrophoresed in 1.5% agarose gel. Amplicons were visualized under UV transilluminator. The molecular size of amplified DNA bands was estimated by molecular marker loaded simultaneously with each primer products in the gel. The distance run by amplified fragments from the well was translated to molecular size, using computer programme DNA OPT ver. 1.0.

Results and Discussion

16S-23S rRNA gene intergenic spacer region of *E. coli* isolates of cattle and sheep *Escherichia coli* isolated from diarrhoeic and normal faecal samples of cattle and sheep were found pathogenic as well as non-pathogenic when subjected to determination of polymorphism in intergenic spacer (IGS) region, which lies between the 16S and 23S rRNA transcription units, displayed polymorphism and allowed differentiation of the bacterial isolates. The results of the PCR amplification of the intergenic space using primer pairs binding to 3' end of 16S rRNA subunit gene and 5' terminus of 23S rRNA subunit gene are presented in Table 4 and 5 for cattle and sheep isolates respectively. Considering PCR amplification product bands of all *E. coli* isolates, the band appeared at any of the 10 positions were named as A, B, C, D, E, F, G, H, I, and J with base pair approximately 1010, 1000, 900, 800, 700, 625, 600, 550, 500, 400. The maximum number of bands that appeared in any strain were 6 and minimum one. In some isolates, no band appeared.

The frequency distribution of different PCR amplified bands is presented in Table 1. Depending on the frequency, 16S-23S rRNA intergenic bands of different sizes were discernible in a clear cut pattern. Bands B, C, D, E and G were the most prevalent bands with overall frequency nearing to 50% or more and were almost uniformly distributed among the host species studied. In contrast, bands A, F, H, I and J were much less frequent with frequency varying from 2 to 28 per cent. Moreover, the less frequent bands also exhibited species specificity that is band H and J bands were found only in cattle isolates and A and F bands only in sheep isolates. A band was present in 14 sheep isolates.

Polymorphism in band pattern of *E. coli* isolates in relation to serogroups

When comparison was made between strains of *E. coli* of a particular serogroup within same or with different host species of animal, 9 serogroups were found among both host species and great polymorphism in number of bands and band pattern was observed as revealed in Table 2.

Ribotype profile of *E. coli* isolates of cattle and sheep revealed similar band pattern in many of the strains belonging to different serogroups (Table 4 and 5) and the strains could be divided into many subgroups on the basis of their band patterns. Moreover, within a host species, strains with similar serogroup showed different band patterns. It was also noted that despite of similar conditions and repetitions, no DNA band was amplified in some of the strains e.g. cattle isolate no. 56, 62, 64, 65, 67, 70, 71 and 73 with different serogroups and 78, 79, 90 isolates of sheep with serogroups O2, O5 and O115.

When compared the ribotype profiles of *E. coli* strains belonging to same serogroup but different host compared (Table 2) eight such common serogroups, O60 and O109 (4 isolates each) were most frequently found in both host species. Polymorphism in total number of bands as well as in band pattern was noticed and in some no DNA band could be amplified. Similar polymorphism in amplified band pattern was clearly discernible in other serogroups i.e. O131, O77, O76, O8, O38 and O136. Moreover, similar band pattern was also noticed in the strains of different serogroups and of different host origin e.g. O8 of sheep (isolate 77) to

Table 1: Frequency distribution of PCR amplified 16S-23S rRNA intergenic space bands of *E. coli* isolates of cattle and sheep

Size of band in bp	Overall frequency	Host species-wise frequency	
		Cattle	Sheep
1010-A	14(28)	-	14 (56)
1000-B	23(46)	5 (20)	18 (72)
900-C	28 (56)	10 (40)	18 (72)
800-D	35(70)	14 (56)	21 (84)
700-E	25 (50)	13 (52)	12 (48)
625-F	2 (4)	-	2 (8)
600-G	17 (34)	9 (36)	8 (32)
550-H	1 (2)	1 (4)	-
500-I	5 (10)	4 (16)	1 (4)
400-J	1(2)	1 (4)	-

Note: Figures in parenthesis indicate overall frequency percentage.

Table 2: Polymorphism in band pattern of *E. coli* isolates of some serogroup in different host species

S.No.	Host species	Isolate No.	Serogroup	No. of bands	Band pattern
1.	Sheep	86	O 60	4	A,B,C,D
	Sheep	87	O 60	6	A,B,C,D,E,G
	Sheep	88	O 60	5	A,B,C,D,E
	Cattle	62	O 60	no band	-
2.	Sheep	94	O 109	6	A,B,C,E,D,F
	Sheep	93	O 109	1	D
	Cattle	64	O 109	no band	-
	Cattle	65	O 109	no band	-
3.	Cattle	60	O 131	5	B,C,D,E,G
	Cattle	61	O 131	6	B,C,D,E,G,I
	Sheep	84	O 131	5	A,B,C,D,G
	Sheep	85	O 131	4	A,B,C,D
4.	Cattle	72	O 96	1	C
	Cattle	73	O 96	no band	-
	Cattle	74	O 96	2	D,E
	Cattle	75	O 96	6	B,C,D,E,G,I
5.	Cattle	63	O 77	2	C,D
	Sheep	91	O 77	1	B
	Sheep	92	O 77	3	D,E,F
6.	Cattle	66	O 76	3	E,G,I
	Sheep	95	O 76	4	A,B,C,D
	Sheep	96	O 76	6	A,B,C,D,E,G
7.	Sheep	76	O 8	4	B,C,D,E
	Sheep	77	O 8	6	B,C,D,E,G,I
	Cattle	53	O 8	4	C,D,E,G
8.	Cattle	51	O 38	3	D,E,G
	Cattle	52	O 38	3	D,E,G
9.	Cattle	67	O 136	no band	-
	Sheep	97	O 136	4	A,B,C,D

Table 3: Common band pattern in *E. coli* isolates of different serotypes

S.No.	Host species	Serogroup	Band pattern
1.	Cattle	O 131	B,C,D,E,G,I
	Cattle	O 96	B,C,D,E,G,I
	Sheep	O 8	B,C,D,E,G,I
2.	Cattle	O 8	C,D,E,G
	Cattle	O 120	C,D,E,G
	Sheep	O 113	C,D,E,G
3.	Cattle	O 38	D,E,G
	Cattle	O 38	D,E,G
	Cattle	O 101	D,E,G
	Sheep	O 12	D,E,G
4.	Sheep	O 25	A,B,C,D,E,G
	Sheep	O 60	A,B,C,D,E,G
	Sheep	O 76	A,B,C,D,E,G
	Sheep	O 157	A,B,C,D,E,G
5.	Sheep	O 143	A,B,C,D
	Sheep	O 131	A,B,C,D
	Sheep	O 60	A,B,C,D
	Sheep	O 76	A,B,C,D
	Sheep	O 136	A,B,C,D
	Sheep	O 85	A,B,C,D
	Sheep	O 37	A,B,C,D
6.	Sheep	O 8	B,C,D,E
	Sheep	O 153	B,C,D,E
7.	Cattle	O 24	B,C,D
	Cattle	O 153	B,C,D
8.	Cattle	O 58	D,E
	Cattle	O 96	D,E

that of O131 and O96 of cattle, O8, O120 of cattle to O113 of sheep. Different serogroups in the same host species also showed similar band pattern (Table 3). These observations indicated that the serogroups have no correlation with the length of 16S-23S rRNA intergenic space and the instances of similar band patterns in the *E. coli* strains of different host origins are very few considering all the strains put together. It indicates that *E. coli* isolates have probably undergone modifications in the process of adaptations into different conditions of intestinal tract of the host species and thus show polymorphism.

These observations are in conformity to earlier findings of Kostman *et al*. (1992) and Carter *et al*. (1994) in which the technique of 16S - 23S rRNA IGS polymorphism was exploited in identification and differentiation of *Pseudomonas capacia* and *E. coli* and found ribotype amplicons ranging in size from 200 bp to 2 kb.

The organization of eubacterial transcription unit was 5'-16S-23S-5S-3' and there were 2-11 rRNA copies per bacterial cell as observed by Gettlieb and Rudner (1985) and Srivastava and Schlessinger (1990). The intergenic spacer region between 16S and 23S rRNA genes encoded several tRNAs and contained several direct repeat sequences in noncoding regions of the gene clusters (Bacot and Reeves, 1991). In *E. coli* there were seven genes for rRNA of two types (Boros *et al*., 1979). One of these contains tRNA genes for alamine and isoleucins while the other containsed tRNA genes for glutamic acid in the 16S-23S spacer regions.

The occurrence of multiple amplicons of regular size interval could possibly have been due to multiple copies of any of the tRNA genes present in the 16S-

Table 4: Schematic representation of PCR amplified 16S-23S rRNA intergenic space band pattern of *E. coli* isolated from cattle (Not to scale)

Marker	51-O38	52-O38	53-O8	54-120	55-O36	56-O158	57-O24	58-O101	59-O153	60-O131	61-O131	62-O60	63-O77	64-O109	65-O109	66-O76	67-O136	68-O58	69-O78	70-O141	71-O154	72-O96	73-O96	74-O96	75-O96
1010-A																									
1000-B							-		-	-	-														-
900-C			-	-	-		-		-	-	-		-									-			-
800-D	-	-	-	-			-	-	-	-	-		-					-	-					-	-
700-E	-	-	-	-	-			-		-	-					-		-	-					-	-
625-F																									
600-G	-	-	-	-				-		-	-					-									-
550-H																			-						
500-I					-						-					-									-
400-J					-																				

Table 5: Schematic representation of PCR amplified 16S-23S rRNA intergenic space band pattern of *E. coli* isolated from sheep (Not to scale)

Marker	76-O8	77-O8	78-O2	79-O5	80-O113	81-O153	82-O25	83-O143	84-O131	85-O131	86-O60	87-O60	88-O60	89-O12	90-O115	91-O77	92-O77	93-O109	94-O109	95-O76	96-O76	97-O136	98-O85	99-O37	100-O157
1010-A							-	-	-	-	-	-	-						-	-	-	-	-	-	-
1000-B	-	-				-	-	-	-	-	-	-	-			-			-	-	-	-	-	-	-
900-C	-	-			-	-	-	-	-	-	-	-	-						-	-	-	-	-	-	-
800-D	-	-			-	-	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
700-E	-	-			-	-	-					-	-	-			-		-		-				-
625-F																	-		-						
600-G		-			-		-		-			-		-							-				-
550-H																									
500-I		-																							
400-J																									

23 S rRNA intergenic region resulting due to gene duplication as shown by Christensen *et al*. (1999) and binding of forward or reverse primer with rRNA genes at multiple sites. Failure in amplification of bands from some of the strains could have been due to certain unknown factors that block PCR reaction or due to non-binding of the primers due to alteration in ribosomal genes.

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SCHEDULING OF DURATION AND FREQUENCY OF AN INDIGENOUS FORMULATION AGAINST SARCOPTICOSIS IN DROMEDARY CAMEL

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ABSTRACT

One herbal drug formulation named NRCC/FII was put on trial for scheduling the duration and frequency of application on naturally occurring clinical cases of mange in dromedary camel. A total of 5-7 applications were found to be effective when applied once in a day daily initially for 3 days followed by alternate application for rest of the days. In less severe cases a schedule of local one application daily for 2 days followed by 2 days interval application was found effective.

***Key words*:** herbal formulation, dromedary camel, sarcopticosis

Introduction

Diseases with plants or with their products have been taken care of since long in Ayurveda. Presently plant medicine appears to be a thrust area of research due to their effectiveness against variety of diseases, local availability and reduced dependency on high technology of drug manufacturing with their frequent and economic use in rural areas. Therefore efforts made earlier to have an effective herbal drug for the skin management need to be continued with respect to scheduling the duration and frequency as a part of research both in terms of economy and effectiveness.

Materials and Methods

A group of 36 camels was selected from the herd maintained at National Research Centre on camel after thorough clinical examination. These animals were regrouped as group I, II, III, IV, V and VI comprising of six animals in each group and were maintained as a separate herd at the centre on routine feeding and managemental conditions. The herbal formulation NRCC/FII was prepared as per method of Dixit *et al*. (2002) and applied locally on animals of each group except group I, which acted as control. Around1.5-2 liters of formulation FII was applied daily on each animal of group II, daily for 3 days followed by alternate day on group III, daily for 3 days followed by a lapse of 2 days on group IV, daily for 2 days followed by alternate days on group V and daily for 2 days followed by a lapse of 2 days on group VI animals. The amount of formulation varied with the condition of skin and severity of skin lesions. The formulation was applied locally using a clean duster separately for each group of animals with forced rubbing. Before application of herbal formulation, all the animals were bathed with decoction of bark of babool (*Acacia julifora*) which was prepared by boiling the bark in the tap water (1:16) for about 15-20 minutes in a tin vessel on a gas burner and stored in a plastic container until used. The animals were watched daily for recording of symptoms before application of drug. Skin scrappings were collected from different affected sites of the animals at 5 days of interval in 10% KOH solution and examined microscopically using standard procedure (Sloss and Kemp, 1978). Areas of cutaneous lesions were washed with plain water properly. Excisional, elliptical and punch biopsy techniques were performed depending upon site and position of lesions with the care that important diagnostic parts viz. lesions, crusts, surrounding tissue, leading edge of lesions etc. are included in the sample. The collected specimens were preserved in 10% formalin and processed particularly for histological examination. Improvement in clinical symptoms, primarily the condition of skin was the main therapeutic index for assessing the effectiveness of formulation apart from skin scrappings examination and a healing profile of connective tissue on histopathological examination. The observations recorded were suitably tabulated, presented and analysed as per Snedecor and Cochran, 1994.

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Results and Discussion

The clinical recovery in animals of group II to VI was observed from 3rd day onwards from different symptoms such as itching, uneasiness, cracks and bleeding, excoriation, thickening and wrinkling of skin (Table 1.1). Rapid and complete recovery was noticed in animals of group II. The results were comparable of group III and IV particularly at the time of withdrawal of indigenous treatment when only ramnances of a few symptoms viz. hypermelanosis, alopecia etc. were discernible though hyper pigmentation of skin started returning towards normalcy along with sufficient number of hair growth at places (Table 1.1 and 1.2). The symptoms such as uneasiness, itching, reddening and biting might be a reflection of the reaction of the body to its internally secreted various amines and movement of mites to different layers of skin, forcing the animals for intermittent rubbing against hard objects which may result into falling of hair and thickening of skin (Sena *et al*., 1999; Dixit *et al*., 2002). Keratinization and proliferation of connective tissue might be additional contributors to propagation of disease. These relate to similar observations of Singh and Gahlot (2000) and Rathod (2006). Various internal amines responsible for causation of anxious symptoms in the animals and making skin unconditional and hyperpigmented remain a few important factors of care in treatment. Diluting or diminishing over effect of pigmentation remained a natural properties of ingredients (Turmeric, camphor etc.) used in the formulation either through decreased production or diminishing hyperstimulation of melanocytes. Skin scrappings examination carried out at every five days interval became negative between 10th to 15th day of application of drug (Table 2) whereas animals of control Group I remained positive with aggravation of clinical symptoms till last day of observation. Animals of Group V and VI could become negative after 2nd week of applications which means this duration can be attempted in less severe cases of disease.

A total of 5 applications daily in animals of group II were sufficient to relieve the animals from sufferings to a maximum extent. Nearly same pattern was noted in animals of group III meaning thereby 3 applications daily followed by few more on alternate days might be enough for effective redressal of disease. The recovery pattern in animals of group IV can also be rated as satisfactory based on progress in clinical recovery from the disease. The animals of group V and VI required less number of applications with comparable results. A reducing trend in the occurrence of the symptoms in animals of group V is comparable to group VI particularly on economic grounds and health status of animals provided one can afford to provide more time to body to restore patho-physiological status satisfactorily. Recovery from clinical symptoms using various herbal preparations such as Himax ointment by Sena *et al*. (1999), Teeburb by Tripathi and Pradhan (1978) and formulation F1 by Dixit *et al*. (2002) have previously been recorded with variable degree of success. But their applications in routine have been quite expansive and exhaustive in terms of economy and man power. This trend of use of herbal formulation FII even in very serious cases can be put in use with more efficacy and accuracy. In less severe cases initial 2 regular applications followed by 2 days interval would be a satisfactory approach whereas in moderate cases 4 days interval would be categorically logical. Grossly, the affected areas showed alopecia, corrugation and grayish colouration of skin with crusts and eruptions on head, neck, thigh, and flank region. Microscopically, there was presence of minute cavities in epidermal layer, which extended into the dermis. These cavities were filled with tissue debris along with infiltration of mononuclears. There was proliferation of fibrous connective tissue at some foci and marked eosinophilic infiltration with oedema was observed (Fig. 1). Some cases showed leucocytic infiltration predominantly of mononuclear cells around hair follicles (Fig. 2) and blood vessels. The affected follicles contained mites, keratinous debris and inflammatory infiltration. The gross characteristics observed were thickness of skin, alopecia and greyish discolouration. These pathological observations have also been described by earlier authors including Mourad *et al*. (1987), Basu *et al*. (1995), Singh and Gahlot (1999), Dixit *et al*. (2008) and Dixit *et al*. (2009) during their studies on camels.

Histopathological characteristics revealed presence of minute cavities or tunnels in the epidermal layer which extended into the dermis and presence of mites, keratinous debris and inflammatory infiltration in the follicle. Most of the findings such as hyperkeratosis, proliferation of fibrous connective tissue along with eosinophilic infiltration obtained in study were also noticed by Basu *et al*. (1995). The ingredients used in the present formulation are somewhat anciently and indirectly described to possess antiparasitic, anti-inflammatory and anti pruritic action individually and/ or collectively in one or the other way in addition enriching the nutritional status of skin by way of lubrication, increased circulation and supplementation of basic ingredients required for prompt healing and restructuring of damaged tissue (Dixit *et al*., 2008). Recordings of observations in animals group VI cannot be said to encouraging one which indicates failure of presence of sufficient quantum of formulation at desired sites to produce desired results. Skin scrappings examination carried out at every five days interval became negative

Table 1.1: F1 Skin and behavioural changes in mange affected camels

OBSERVATIONS	GROUP I					GROUP II					GROUP III				
	DAYS					DAYS					DAYS				
	0	5	10	15	30	0	5	10	15	30	0	5	10	15	30
Uneasiness	6/6	6/6	6/6	6/6	6/6	6/6	2/6	0/6	0/6	0/6	6/6	3/6	0/6	0/6	0/6
Itching	6/6	6/6	6/6	6/6	6/6	6/6	3/6	0/6	0/6	0/6	6/6	4/6	0/6	0/6	0/6
Excoriation	6/6	6/6	6/6	6/6	6/6	6/6	4/6	0/6	0/6	0/6	6/6	3/6	2/6	0/6	0/6
Erythema	6/6	6/6	6/6	6/6	6/6	6/6	4/6	0/6	0/6	0/6	6/6	2/6	0/6	0/6	0/6
Cracks and bleeding	6/6	6/6	6/6	6/6	6/6	6/6	2/6	0/6	0/6	0/6	6/6	4/6	0/6	0/6	0/6
Thickening and wrinkling	6/6	6/6	6/6	6/6	6/6	6/6	4/6	2/6	0/6	0/6	6/6	6/6	3/6	0/6	0/6
Alopecia	6/6	6/6	6/6	6/6	6/6	6/6	6/6	4/6	4/6 hair growth started	Continued	6/6	6/6	6/6	2/6	0/6
Hyper melanosis	6/6	6/6	6/6	6/6	6/6	6/6	6/6	2/6	Continued	Continued	6/6	6/6	6/6	4/6	1/6

6/6= No. of animals affected/ No. of animals used in experiment
Group I -Untreated group
Group II -Indigenously treated daily
Group III -Indigenously treated daily for 3 days followed by alternate day

Table 1.2: F 1 Skin and behavioural changes in mange cases of camels

Observations	Group IV					Group V					Group VI				
	DAYS					DAYS					DAYS				
	0	5	10	15	30	0	5	10	15	30	0	5	10	15	30
Uneasiness	4/6	2/6	0/6	0/6	0/6	4/6	3/6	2/6	0/6	0/6	4/6	2/6	4/6	3/6	0/6
Itching	4/6	2/6	2/6	0/6	0/6	4/6	4/6	2/6	2/6	0/6	4/6	1/6	2/6	3/6	0/6
Excoriation	4/6	2/6	0/6	0/6	0/6	4/6	3/6	2/6	2/6	0/6	3/6	2/6	2/6	1/6	0/6
Erythema	3/6	2/6	2/6	0/6	0/6	1/6	1/6	1/6	0/6	0/6	2/6	2/6	2/6	2/6	0/6
Cracks and bleeding	2/6	2/6	0/6	0/6	0/6	4/6	2/6	2/6	1/6	0/6	3/6	2/6	2/6	2/6	0/6
Thickening & wrinkling	4/6	3/6	2/6	Persisted	Persisted	4/6	4/6	4/6	4/6 reduced inrtensity	Persisted	4/6	4/6	2/6	2/6 (persist)	Persisted
Alopacia	2/6 partial	Persisted	Persisted	Persisted	hair growth started	4/6	4/6	4/6	4/6 hair growth started	Continued	4/6	4/6	4/6	4/6 growth started	Continued
Hypermelanosis	2/6	2/6	2/6	2/6	2/6 reduced intensity	4/6	4/6	4/6	2/6 reduction started	Continued	2/6	2/6	2/6	2/6 reduced intensity	Continued

6/6 = No. of animals affected/ No. of animals used in experiment
Group IV -Indigenously treated daily for 3 days followed by a gap of 2 day
Group V -Indigenously treated daily for 2 days followed by alternate day
Group VI-Indigenously treated daily for 2 days followed by a gap of 2 day

Table 2: Skin scrappings examination

S.No	Sample	Groups	Days				
			0	5	10	15	30
1	Skin	I	+	+	+	+	+
2		II	+	+	-	-	-
3		III	+	+	-	-	-
4		IV	+	+	+	-	-
5		V	+	+	+	+	-
6		VI	+	+	+	+	-

+ Positive for mites/ova - Negative for mites/ ova

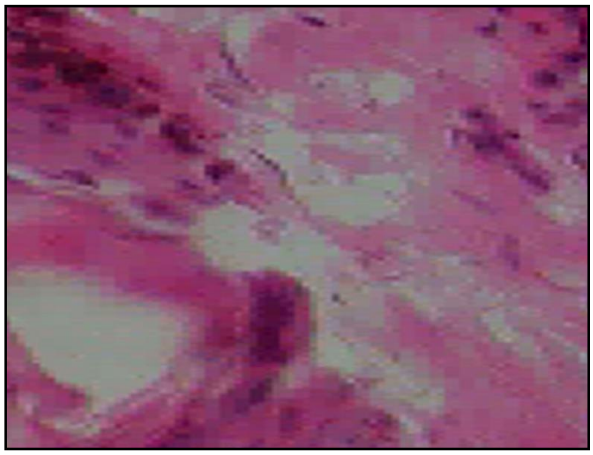

Fig. 1: Microphotograph of skin of camel having mange showing oedema and inflammatory infiltration predominantly of fibroblasts and eosinophils (H&E 200X).

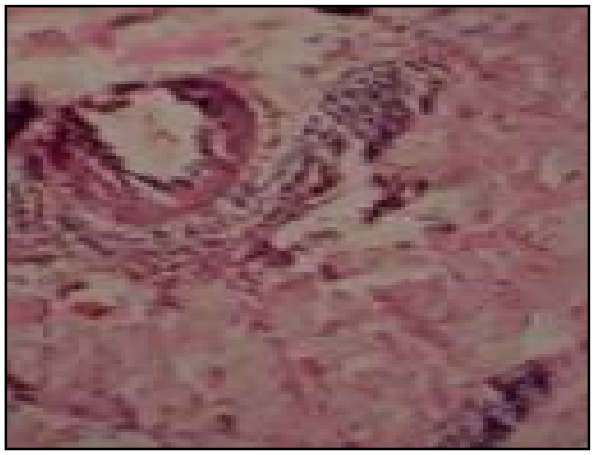

Fig. 2 : Microphotograph of skin of camel having mange showing inflammatory infiltration predominantly of mononuclears around the hair follicle (H&E 200X).

between 10th to 15th day of application of drug (Table 2) where as animals of control Group I remained positive with aggravation of clinical symptoms. In animals of Group VI where reduced intensity in the symptoms was a positive finding but presence of positive cases in skin scrappings examination put a question mark on its efficacy following this schedule and therefore discouraged to be used as per this schedule. A limited trial of this indigenous formulation II has indicated that a combination of initial daily applications for 3 days followed by alternate day application may be an effective schedule for desired therapeutic effect .However, further research on more number of animals is called for before its field use.

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COMPARATIVE EVALUATION OF EPIDURAL ANESTHESIA OF BUPIVACAINE, XYLAZINE AND KETAMINE IN GOATS[#]

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ABSTRACT

Comparison of epidural analgesic action of bupivacaine, xylazine and ketamine was carried out in 18 goats, comprising of 3 groups (6 animals in each group). Bupivacaine (0.5%) @ 1.50 mg/kg, xylazine @ 0.05 mg/kg and ketamine @ 2 mg/kg b. wt. were administered epidurally (L_7-S_1) in group I, II and III, respectively. The clinical parameters like induction time, duration of anaesthesia, recovery time, time to get up and time to walk were assessed in all groups of animals. The corresponding mean ± SE values for group I, II and III animals for induction time were 10.50 ± 0.72, 9.10 ± 0.40 and 6.80 ± 0.25 minutes, for duration of anaesthesia were 87.20 ± 3.46, 140 ± 3.03 and 54.00 ± 1.20 minutes, for recovery periods were 190 ± 2.16, 143 ± 3.36 and 115 ± 2.60 minutes and time to get up was 261.10 ± 19.7, 262.83 ± 2.79 and 118.00 ± 2.26 minutes, and for time to walk were 277.83 ± 20.68, 273.8 ± 2.80 and 120 ± 1.69 minutes, respectively.

***Key words*:** Epidural anaesthesia, bupivacaine, xylazine, ketamine, goats

Introduction

A wide range of regional anaesthetics *viz.*, paravertebral, epidural, pudental and spinal were introduced to treat various affections of abdominal and pelvic region. Due to greater and effective coverage of epidural anaesthesia, popularity of spinal anaesthesia, is increasing day by day. Epidural anaesthesia was first reported by Corning in 1985. Currently the epidural anaesthesia is the most popular regional anaesthetic technique in veterinary practice. The present study was undertaken with the objective of comparing epidural analgesia of bupivacaine, xylazine and ketamine in goats.

Materials and Methods

The present study was undertaken in 18 goats which were grouped into three groups comprising of 6 animals in each group.

Group-I: 6 Injections of bupivacaine (0.5%) @ 1.50 mg/kg b.wt. epidurally (L_7-S_1).

Group-II: 6 Injections of xylazine @ 0.05 mg/kg b.wt. epidurally (L_7-S_1).

Group-III: 6 Injections of ketamine @ 2 mg/kg b.wt. epidurally (L_7-S_1).

The clinical parameters like induction time, duration of anaesthesia, recovery time, time to get up and time to walk were assessed in all the animals.

Results and Discussion

Induction time: The Mean ± SE induction time values recorded in group I, II and III animals were 10.50 ± 0.72, 9.10 ± 0.40 and 6.80 ± 0.25 minutes, respectively. These findings are in agreement with the earlier workers (Kinjavdekar *et al*., 2000; DeRossi *et al*., 2003a and DeRossi *et al*., 2003b). However, the present results differed from the earlier workers (Adentunji *et al*., 2002) who recorded the onset of anaesthesia within 1.8 ± 3.5 minutes in West African dwarf goats after epidural administration of bupivacaine.

Duration of anaesthesia: The average duration of anaesthesia was 87.20 ± 3.46, 140± 3.03 and 54.00 ± 1.20 minutes in animals of group I, II and III, respectively.

The values of duration of anaesthesia recorded in present study were similar to that of DeRossi *et al*. (2003a); Kinjavdekar *et al*. (2000) and Adetunji *et al*. (2002).

Recovery period: The mean ± SE recovery period were 190 ± 2.16, 143 ± 3.36 and 115 ± 2.60 minutes were recorded in group I, II and III, respectively. The values recorded for recovery time in present study are in accordance with findings of Kumar *et al*. (1990), whereas the recovery time differed from the earlier workers (Gill *et al*., 1983) in bupivacaine epidural anaesthesia where they reported the recovery duration as high as 346.06 minutes with epidurally administered bupivacaine in ox.

Time of get up: The mean ± SE time to get up were 261.10 ± 19.7, 262.83 ± 2.79 and 118.00 ± 2.26 minutes in group I, II and III, respectively. The present results differed from Adetunji *et al*. (2002) and

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Table 1: Maean ±SE values of induction time, duration of anaesthesia, recovery time, time to get up and time to walk from anesthesia (min.)

Group	Parameters (in Minutes)	Mean ± SE values for group I, II and III
Group I	Induction time	10.50±0.72
	Duration of anaesthesia	87.20±3.46
	Recovery time	190.00±2.16
	Time to get up	261.16±19.70
	Time to walk	277.83±2.68
Group II	Induction time	9.10±0.46
	Duration of anaesthesia	140.00±3.03
	Recovery time	143.00±3.36
	Time to get up	262.83±2.79
	Time to walk	273.83±2.80
Group III	Induction time	6.80±0.25
	Duration of anaesthesia	54.00±1.20
	Recovery time	115.00±2.60
	Time to get up	118.00±2.26
	Time to walk	120.00±1.69

Hendrickson *et al*. (1996) who have reported much quicker as well as delayed times in getting up respectively.

Time to walk: The mean ± SE times to walk were 277.83 ± 20.68, 273.8 ± 2.80 and 120 ± 1.69 minutes in animals of group I, II and III, respectively. The animals to which epidural ketamine was given were able to walk early as compared to animals in which bupivacaine or xylazine was given.

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EFFICACY OF EPRINOMECTIN POUR ON AGAINST NATURAL INFESTATION OF SARCOPTIC MANGE IN GOATS

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ABSTRACT

Twelve non-descript goats of either sex, infected with *Sarcoptes scabiei var caprae*. were randomly divided into two group A and B of six animals each. Animals of group 'A' were administered eprinomectin pour on @ 500 µg/kg body weight, whereas animals of group 'B' served as positive control and were administered injectable ivermectin @ 200 µg /kg body weight subcutaneously. The animals of group 'A' revealed 100% reduction in mites/eggs count on 14 day post application whereas animals of group 'B' revealed positivity for *Sarcoptes* and its eggs on day 14 post treatment. Thus, study suggests that eprinomectin pour on @ 500 ug/kg body weight is highly efficacious against natural infestation of sarcoptic mange in goats.

***Key words*:** Sarcoptic mange, eprinomectin, goats

Introduction

Among all diseases, ecto and endo parasite diseases in goats attain important status because they not only cause direct damage but also inflict some injury on lowers the immunity of host which pave way to array of other diseases of biological origin. Among ectoparasitic diseases mange caused by *Sarcoptes scabiei* is important because it has zoonotic potential (Arlian, 1989). There are numerous reports of sarcoptic mange in goats from Africa and Asia (Manurung *et al.*, 1990; Lughano and Dominic, 1996; Katoch *et al.,* 2000; Ujjwal and Dey, 2010). Clinically sarcopic mange is characterized by weight loss, reduced productivity and sometimes heavy infestation leading to mortality (Manurung *et al.*, 1990). *Sarcoptes* infestation in goats also alters the haemato-biochemical indicators, increases oxidative stress and decreases antioxidant status in goats (Ujjwal and Dey, 2010). Overcrowding of animals in houses, markets, dips and communal grazing land facilitate the spread of *Sarcoptes Scabei* (Lughano and Dominic,1996). Moist condition favours the proliferation of mites. Inspite of vast knowledge about sarcoptic mange it is difficult to control. In the present study eprinomectin pour was evaluated against sarcoptic mange of goats.

Materials and Methods

Twelve non descript goats of either sex, maintained by division of nutrition, Faculty of Veterinary Sciences and Animal Husbandry, R.S. Pura, Jammu, naturally infected with sarcoptic mange showing lesions on head, face, around eyes, neck, back, brisket region, extending to abdomen and to inside the hind legs were randomly divided into two groups of six animals each. Animals of group A were administered single application of eprinomectin pour-on (Indian Immunological Ltd, Hyderabad) at dosage of 500 µg/kg body weight. Animals of group B served as positive control and were administered injectable ivermectin @ 200 µg / kg body weight. Scrapings from four locations of infected parts were taken till blood oozed out from all animals on day 0, 7, 14, 21 and 28 days post treatment.

Results and Discussion

Eprinomectin pour-on treated group revealed absence of mites and their eggs in two animals on 7 day post treatment (7 DPT). On 14 DPT all animals revealed absence of mites/eggs in scrappings collected from 4 different locations of animal whereas, animals of ivermectin treated group showed partial reduction in number of mites and their eggs on 7 DPT. A few locations showed presence of mites/eggs (Fig. 1 and 2) even on 14 DPT. Thus, second dose of ivermectin was used which resulted in complete recovery from sarcoptic mange in animals of group "B".

Like present observation, Barth *et al.* (1997) also reported high efficacy of eprinomectin pour on @ 500 µg /kg body weight against *Sarcoptes bovis* and *chorioptes bovis* and safe in lactating cows. Similarly, Rehbein *et al.* (2005) also observed 100% reduction in mites count on day 14 post application. Recently, Plant *et al.* (2005) reported high efficacy of topical eprinomectin in alpacas and lamas.

Eprinomectin is absorbed soon after topical

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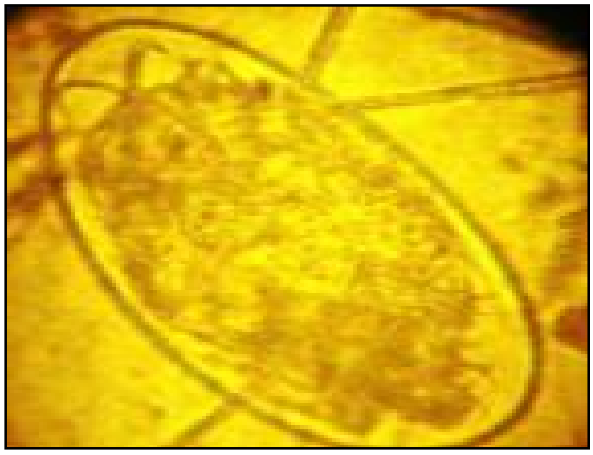

Fig. 1: Egg of *Sarcoptes scabiei var caprae*

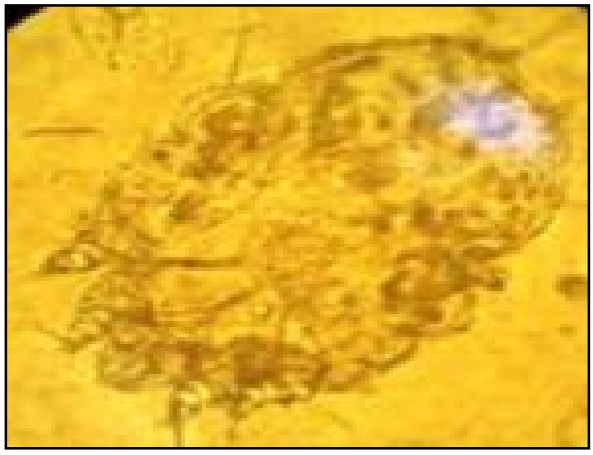

Fig. 2 : Adult *Sarcoptes scabiei var caprae*. from scrappings of goat

administration and achieve peak plasma concentration of 22.5 ng/ml within 2-5 days post application and reduce to 1ng/ml in 21 days post application. It is mainly metabolized in faeces. It also has extremely low milk plasma coefficient, thus does not require any milk and withdraw period. It also helps in control of endoparasites particularly GIT nematodes (Cringoli *et al.*, 2003, Richard, 1984, Forbes *et al.,* 2004). Thus, present study suggest that eprinomectin pour-on @ 500 µg /kg body is highly efficacious against natural infestation of *Sarcoptes scabiei var caprae* in goats. .

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HISTOLOGICAL STUDIES ON RETE TESTES OF MARWARI GOAT (*CAPRA HIRCUS*)[#]

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ABSTRACT

Rete testes were observed as a plexus of epithelium lined spaces in the loose connective tissue of the mediastinum testis. Rete testes consisted of irregularly anastomosing channels lined by simple cuboidal to simple squamous epithelium having septal, mediastinal and extratesticular parts. The tubuli recti opened into rete testes succeeded by the ductuli efferentes.

Key words: Rete testes

Introduction

Literature for the histological structure of the rete testes of goat is meagre and scanty, especially on the goats of the semi-arid zone. The present study was undertaken in an attempt to provide certain histological details on the rete testes of goat.

Materials and Methods

Histological examination was done of testes taken from 6 adult goats. Pieces of tissue 4-6 mm in thickness were taken from each testis. The tissues were fixed in 10% formal saline for 48-72 hours and in Bouins fluid for 12 to 24 hours. Fixed tissue was latter washed in running tap water for 6-10 hours followed by dehydration in ascending grades of alcohol, clearing, embedding in paraffin wax.

Preparation of blocks, section cutting and mounting of sections on albuminized slides, drying of sections and finally staining was done.

Various staining procedures were followed for cellular and connective tissue details.

a. Haematoxylin and Eosin stain (Singh and Sulochana, 1996). The conventional method of H and E staining was adopted. Ehrlich's haematoxylin and 1% aqueous solution of Eosin were used.

b. Van Gieson stain (Luna, 1968) was used to demonstrate the collagen fibres.

c. Verhoeff's elastin stain (Drury and Wellington, 1967) was used to demonstrate elastic fibres.

d. Gridley's reticulum stain (Luna, 1968) was used to demonstrate reticular fibres.

e. Masson's trichrome stain (Luna, 1968) was used to demonstrate collagen fibres.

Results and Discussion

Rete testes were observed as a plexus of epithelium lined spaces in the loose connective tissue of the mediastinum testis. It consisted of irregularly anastomosing channels lined by simple cuboidal to simple squamous epithelium having septal (Fig. 1), mediastinal (Fig. 2) and extratesticular parts (Fig. 3). The septal rete was short and relatively straight. The mediastinal rete was a labyrinth of intercommunicating channels which occupied about two-thirds of the central axis of the testis, whereas extratesticular rete was located outside the testis and formed sac-like dilations. These findings are in agreement with observations made by Davis *et al.* (1970) in most mammalian species, Singh and Bharadwaj (1980) in camel, Oris *et al.* (1984), Kakade (1986), Goyal and Williams (1987) and Kakade and Singh (1990) in goat, Viotto *et al.* (1993) in cat, Dellmann and Eurell (1998) in domestic animals. Rete testes were lined by simple cuboidal to simple squamous epithelium. These findings are in agreement with Goyal (1971) in buffalo, Dellman and Carithers (1996) in domestic animals and Kishore (2006) in ram.

However, Girish *et al.* (2001) described that rete testis in dog consisted of intra and extra testicular parts, whereas Goyal (1971) noted that the epithelium lining of different segments of rete testis varied from simple cuboidal to pseudostratified columnar in buffalo. Dalvi and Pandit (1991) reported that rete testis in goat was lined by simple columnar non-ciliated epithelium.

[#] Part of M.V.Sc. Thesis submitted by first author to Rajasthan Agricultural University, Bikaner.

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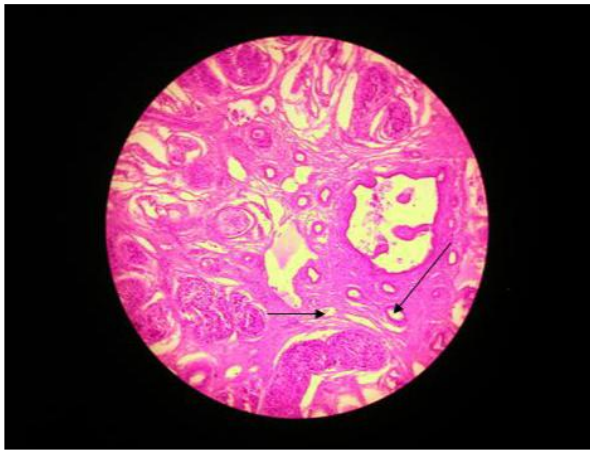

Fig. 1: Septal rete testes (H & E Stain 100X)

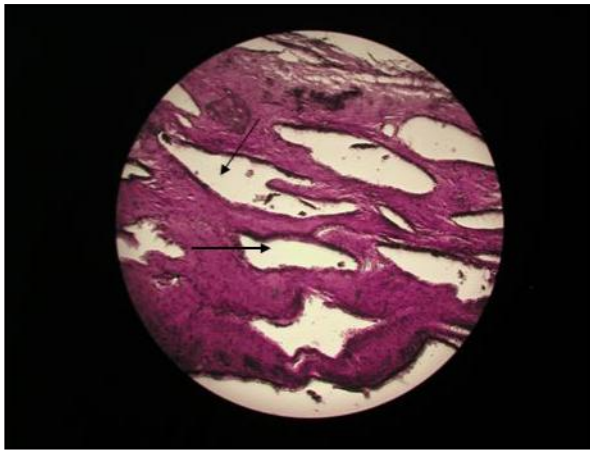

Fig. 3: Extratesticular rete testes (Van Gieson's Stain 100X)

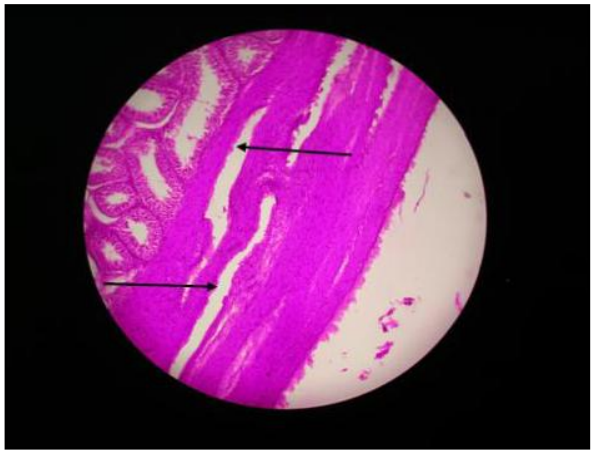

Fig. 2: Mediastinal rete testes (H & E Stain 100X)

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NODULAR DERMATITIS-PATHOLOGICAL EXAMINATION IN A SHEEP

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Skin diseases are very common in sheep flock due to their gregarious nature, which predispose them to readily infect one another. Skin diseases cause great economic losses to the leather and tannery industries due to much destruction of skin and hide. Nodular dermatitis is one of the important type of dermatitis of sheep and in some instances, it causes debilitation in the animal.

A sheep aged about 2 years was submitted with the complaint of skin disorders on the extremities, head and neck region. Biopsy samples were collected from the affected areas of skin in 10 per cent formal saline and were processed for further histopathological examination. Tissue sections of 4-6 micron thickness were stained with haematoxylin and eosin.

The gross examination of lesions revealed multiple, firm, brown papules or nodules with ill-defined borders and button size, seen most usually on the extremities, head and neck region. Histopathological examination revealed circumscribed nodular structure with necrosis with inflammatory infiltration (Fig. 1) accompanied with abundance of epitheloid histeocytes. More mature lesions tended to show numerous giant cells and spindle shaped fibroblastic cells (Fig. 2). These findings are in corroboration with those described by Jubb *et al.* (1993), Scott *et al*. (1995) and Rakhi Khanna *et al.* (2003) in dogs.

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Fig. 1: Microphotograph of skin of sheep having nodular dermatitis showing circumscribed nodule with necrosis and inflammatory infiltration

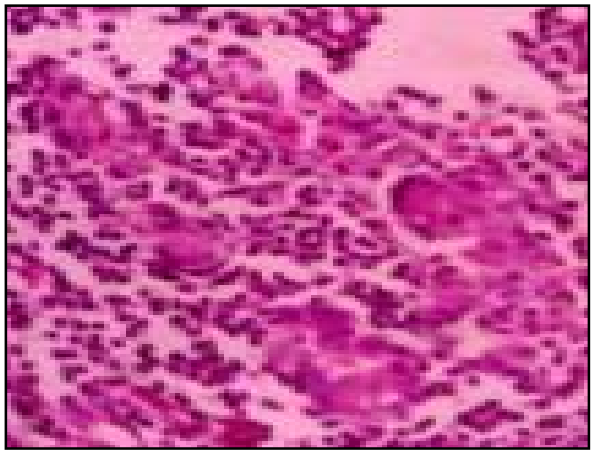

Fig. 2: Microphotograph of skin of sheep having nodular dermatitis showing numerous giant cells and spindle shaped fibroblasts

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LIVER FUNCTION TESTS IN SHEEP DURING STRESS

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ABSTRACT

The experiment was designed to assess the effect of drought on serum enzymes in 100 sheep of both sex in western part of Rajasthan. All animals belonged to farmers' stock. The parameters included serum Aspartate amino- tranfearase (AST), Alanine amino transferase (ALT) and alkaline phosphatase (AKP) with overall mean values of 90.673 ± 3.455; 82.009±1.959 and 24.984±0.972 IU/L, respectively. It was found that the sex effect was significant (P=0.05) only on the mean values of AST. A significant (P=0.05) age effect was noticed on the mean values of ALT and AKP.

***Key words*:** Sheep, sex, age, AST, ALT, AKP

Introduction

Any change in the body, physiological or pathological may lead to changes in the serum enzymes concentration (Gahlot, 1988). They are good indicators of the functioning of different vital organs like kidney, liver, heart etc and can provide a good picture of health status of animal. The liver has great functional reserve and sign of hepatic failure generally develops when 70% or more of the functional capacity of the liver is lost (Tennant, 1999). An early recognition of the ailments affecting hepatic tissue is important for assessment of the liver changes and their treatment.

Materials and Methods

The experiment was designed to evaluate the effect of stress due to drought on serum enzymes in sheep (up to 5 years of age). The effects of sex and age were also determined. The animals belonged to farmers' stock of drought stricken area of western part of Rajasthan particularly area in and around Jaisalmer district. The animals belonged to similar environmental habitat and managemental practices. Field grazing pattern was adopted for the animals. Animals browsed *Ziziphus nummularia* leaves and also received small amounts of loppings of *Prosopis cinerearia* trees. Blood was collected from jugular vein under complete aseptic condition in to the test tubes without any anti coagulant. All the samples were collected and processed in duplicate. Clear serum was pipetted out into another clear dry test tubes and only non haemolysed serum samples were used. The serum was stored at -20ºC in deep freeze. Aspartate amino- tranfearase (AST), Alanine amino transferase (ALT) were determined by Reitman and Frankel's (1957) method of kit (Glaxo) and alkaline phosphatase (AKP) by Kind and Kings (1954) method of kit (Span). To determine the effect of age and sex the mean values were compared statistically by using 't' test from the respective mean value. 1

Results and Discussion

The overall values of serum enzymes viz.aspartate amino- tranfearase (AST), Alanine amino transferase (ALT) and alkaline phosphatase (AKP) and their mean values according to sex and age are presented in Table 1. The overall values of serum enzymes AST, ALT and AKP were 90.673 ± 3.455, 82.009 ± 1.959 and 24.984 ± 0.972 IU/L, respectively. The ranges were from 46.08 -184.32, 28.74 -113.25 and 9.44 - 40.18 IU/L, respectively.

The overall mean values of AST, ALT and AKP in present investigation were higher than those recorded by Healy and Falk (1974), More and Sahni (1979), More *et al*. (1980), Alonso *et al*. (1997) and Latif *et al*. (1997) in sheep. The overall mean values of AKP was lower than those reported by Pernthaner *et al*. (1993), Baugartner and Pernthaner (1994) and Latif *et al*. (1997) in sheep.

The effect of sex was studied with respect to liver function test. The effect was significant (P<0.05) on AST. The values of enzyme may differ according to physiological conditions of animals with varying nutritional regimens (Negi *et al*., 1960). Present study revealed non significant (P>0.05) changes in AKP activities due to sex.

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Table 1: Liver function tests in sheep during stress

S.No.	Effects	AST (IU/L)	ALT (IU/L)	AKP (IU/L)
1.	Overall (100)	90.673 ± 3.455 (46.08 -184.32)	82.009 ± 1.959 (28.74 -113.25)	24.984 ± 0.972 (9.44 - 40.18)
2. a.	**Sex:** Male (30)	78.066± 5.486 (46.08-167.04)	84.897 ± 1.747 (35.37-110.95)	25.126 ± 1.704 (9.44-40.18)
b.	Female (70)	96.076[b] ± 4.199 (54.72-184.32)	80.771[a] ± 2.692 (28.74-113.25)	24.921[a] ± 1.192 (9.44-40.18)
3. a.	**Age:** 0-2Yrs (51)	87.776 ± 3.966 (46.08-167.04)	87.502 ± 2.368 (35.37-113.25)	22.329 ± 1.455 (9.44-40.18)
b.	Above 2 Yrs (49)	93.688[a] ± 5.729 (54.72-184.32)	76.291[b] ± 2.958 (28.74-110.95)	27.746[b] ± 1.850 (11.78-40.18)

(i) Figures in the parentheses indicate numbers of animals for the effects and range for the different parameters
(ii) In sex effect mean values of all parameters of female animals have been compared with respective mean values of animals
(iii) In age effect mean values of all parameters of the animals of above 2 years of age group have been compared with respective mean values of animals of below 2 years of age group
(iv) Mean superscripted by letter "a" does not differ significantly (P>0.05) and letter "b" differs significantly (P= 0.05) from the respective means (male and 0 to 2 tears age group)

The age effect was significant (P<0.05) on both parameters except AST. More and Sahni (1979) recorded age wise variations in AST and AKP activities in lambs and their results corroborated partially with those in present investigation. Healy and Falk (1974) found little variations in the values of AST due to age and sex in sheep. However, in present investigation the mean value of AKP increased in higher age group although non-significantly (P>0.05). Baugartner and Pernthaner (1994) recorded the influences of age on the serum AST, ALT and AKP levels in sheep. These results agreed partially with those of present investigation. The observations of Yigit *et al*. (2002) for AST and AKP were different than those recorded in present investigation with increasing age in sheep. It was noticed that the mean values of AST for sheep were within normal range, serum ALT values in present investigation were higher while that of AKP was lower than the standard normal respective values.

The variations in the different indices of liver function tests in sheep indicated the load on the liver due to adverse conditions during drought in terms of infection and infestation. These results reveal the functional status of liver (Coles, 1986). Higher activities of serum AST is generally observed due to liver damage. Higher serum ALT activities in present investigation indicated towards liver involvement. Cellular degeneration in liver results in higher serum values of ALT enzymes. However, as per Coles (1986) the higher serum ALT activity in sheep do not occur as the liver do not contain much ALT. Probably in the present investigation the higher activity indicated over production of enzyme (Coles,1986).

Kaneko *et al*. (1999) reported that AST and ALT activities can increase in many hepatic diseases of small domestic animals. AST activity is high in liver, kidney, pancreas and erythrocytes and damage to the cells.

Alakline phosphatase activities were low in the present investigation. This enzyme hydrolyse phosphoric esters with liberation of in organic phosphorus (Coles,1986). In the present study screening of animals revealed a deficiency of phosphorus leading to low serum phosphorus levels. This might be due to low AKP activities. Lower levels indicated decreased osteoblastic activities in animals (Kaneko *et al*., 1999). This showed overall depression of growth and metabolic activities.

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CHIEF EDITOR

STING BITE STOMATITIS IN A DOBERMAN DOG AND ITS SUCCESSFUL MANAGEMENT

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Introduction

Stomatitis includes inflammatory processes of oral mucosa, tongue and gingiva that usually results into ulceration, inflammatory changes, necrosis and subsequent secondary bacterial infection (Morgan, 1997). Any infectious, physical, chemical or traumatic agent significantly alters the replication, maturation or exfoliation of healthy mucosa and causes stomatitis (Hoskins, 1995). The occurrence of stomatitis accompanied with local or systemic infection is commonly reported in dogs and cats. The present case put on record a clinical case of sting bite stomatitis in a dog and its successful therapeutic management.

Case history and clinical observations

A six-year-old male Doberman dog was presented to the Department of Veterinary Medicine with complaint of anorexia, salivation and a swelling at mandibular region. As per history the dog was exposed to an attack of honey bees a day before. Clinical examination of the patient revealed stingy salivation, inflammatory changes on oral mucosa particularly on bitten areas, bleeding from gums, foul breath and enlarged left mandibular lymph nodes (Fig.1). The dog was apparently dull, depressed with rise in rectal temperature (104.4°F) and it was not feeling to take feed and water.

On the basis of history and clinical observations the case was diagnosed as sting bite stomatitis. Haematological examination of the dog indicated eosinophilia (16%), leucocytosis (20,000/µl) and borderline thrombocytopenia (80,000/µl).

Therapeutic management

The dog was treated with broad spectrum antibiotic, Ceftriaxone (Intacef) @ 20 mg/kg b. wt., intravenously to control secondary bacterial infection associated with stomatitis. Metronidazole @ 25 mg/kg b. wt. i/v was included to control anaerobic infection of oral cavity. To replenish fluid and electrolytes loss, Inj. Dextrose Normal Saline was administered @ 50 ml/kg b. wt., intravenously. Supportive treatment (comprised of Inj. Meloxicam @ 0.5 mg/kg b. wt. i/m to reduce pain and inflammation of oral mucosa. Antihistaminic and multivitamins parentral preparations were also included in supportive therapy. Inj. Ascorbic acid was administered 5 ml i/v for early healing of the affected mucosa. Inj. Prednisolone @ 1.0 mg/kg b. wt., i/m was given to improve platelet count. The therapeutic regimen was continued for 3 days and the owner was advised to perform rinsing of mouth of dog with 0.1 to 0.2% chlohexidine solution once or twice a day as an antiseptic mouthwash.

After 3 days of treatment, there was marked improvement in the condition of patient as the dog started to take feed and water. There was reduction in swelling of mandibular area, with complete disappearance of the inflammatory lesions following therapy (Fig. 2). Post treatment haematological values were found within the physiological limits. Further, the patient was discharged from hospital. However, monitoring and follow up was done for a week. After a week time of therapy the dog was quite alert and active with signs of complete recovery (Fig. 3).

Discussion

Stomatitis may be a primary entity or secondary to systemic disease. The inflammatory lesions of mouth may arise from infectious, deficiency diseases or because of physico-chemical factors (Kahn, 2005). Inflammatory changes may be localized or diffused. The extent and severity of lesions varies as per the causative factor. In the present case, the dog accidentally licked honeycomb at farm house and had attack of honey bees on mouth and oral cavity resulting into stomatitis.

Morgan (1997) described the most common presenting complaints associated with stomatitis as anorexia, gingivitis, excessive salivation, reddening and hyperamic changes on oral mucosa, bleeding from the gums, dysphagia, fever, depression and regional lymadenopathy. In akin to the documentation of Morgan (1997), the dog also exhibited similar set of symptoms. Haematological changes observed in the present case were also in

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Fig. 1: Inflammatory changes on oral mucosa due to sting bite in a dog.

Fig. 3: Recovered dog after a week time.

agreement with the findings of Hoskins (1995). Eldredge *et al*. (2007) discussed the therapeutic management of stomatitis by using broad spectrum antibiotics, anti-inflammatory drugs (NSAID), multivitamins and daily rinsing of oral cavity with 0.1 to 0.2% chlorhexidine solution for speedy recovery.

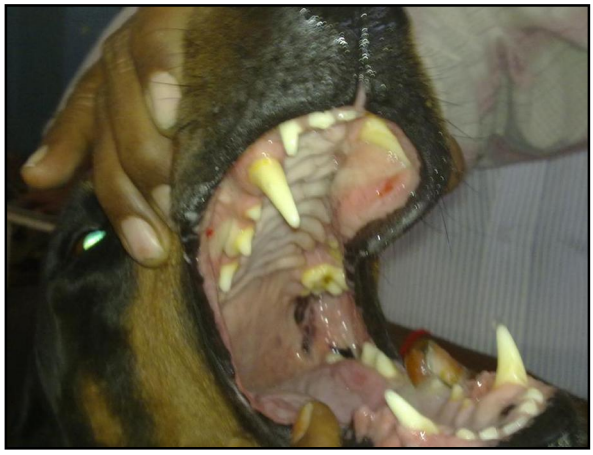

Fig. 2: Disappearance of the inflammatory lesions of oral mucosa.

Ettinger and Feldman (2005) recommended regular cleaning of teeth with antiseptic, antimicrobial with Metronidazole and corticosteroid therapy for stomatitis in dogs and cats.

The sting bite stomatitis dog responded well to broad spectrum antibiotic, antihistaminic, NSAID, antioxidant and local antiseptic care and showed complete recovery after a week time.

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THERAPEUTIC MANAGEMENT OF PNEUMONIA IN SHEEP

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ABSTRACT

Fifteen adult sheep showing clinical signs of respiratory distress, nasal discharge (watery to mucous), depression, inappetance to anorexia, high rise in temperature, lacrimation, rough and dull hair coat, divided into three equal groups were successfully treated with three different combinations of treatment. Nasal swabs recorded presence of *E. coli* predominately.

Key words: Therapeutic management, pneumonia, sheep

Introduction

Among diseases of respiratory system, pneumonia appears to rank first particularly in sheep. The occurrence is influenced by many factors viz. region, season, age, management system and immune status. To record the clinical changes in naturally occurring cases in sheep in varying season and to improve the therapeutic management, study was carried out in outgoing cold season, February-March, 2010 on animals maintained at Central Sheep and Wool Research Institute, Avikanagar.

Materials and Methods

A group of fifteen adult sheep of Patanwadi and Malpura breeds, weighing around 25-40 kg was selected after their clinical examination. These animals were further divided into three groups- G I, G II and G III. They were examined daily before and after treatment for recording physiological parameters, clinical signs, changes notable through auscultation. The collected nasal swab samples were subjected to bacterial culture. The bacterial isolates were then inoculated on primary, differential and/or selective media and were characterized by morphological, cultural and biochemical characteristics.

The animals of group G I were treated with treatment regimen T I and G II and G III with treatment regimen T II and T III, respectively. The T I consisted of Amino-glycoside-Amikacin, T II of Fluoroquinolone-Enrofloxocin (Enrocin 10%,Vetnex) and bronchodialators-Etophylline and Theophylline (Deriphyllin) and T III of Synthetic penicillins-Ampicillin plus cloxacillin (AC-VET FORTE, Intas), Aminoglycoside-Amikacin and bronchodialators-Etophylline and Theophylline.

The T I -Amikacin was injected @ 7.5 mg/kg b.wt. 12 hourly. T II Enrofloxacin was injected @ 10 mg/kg b.wt. 12 hourly and bronchodialators 1 ml i/m 12 hourly for two days only. Remaining three days only antibiotic was given with same dose and interval. T III -penicillins were given @ 15 mg/kg b.wt. 6 hourly for 2 days followed by 8 hourly for remaining 3 days and bronchodilators followed the same dose, route and duration as of T II. The treatment schedule was continued for 5 days.

Results and Discussion

All the animals of group I, II and III started showing clinical recovery from 2nd day onwards from various symptoms of dullness, depression, dyspnoea, nasal discharge, inappetance, high rise in temperature, lacrimation, abdominal respiration, reduced ruminal motility and scanty faeces. Rapid recovery was noticed in animals of group III with notable changes specially at the time of withdrawal of treatment when only a few symptoms viz. reduced inclination to walk and intake particularly to water were discernible though attempt to take feed started returning towards normalcy along with efficient efforts to accompany other active animals (Table 1). The symptoms such as dullness, depression, inappetance and high rise in temperature may be a reflection of the reaction of the body to its internal changes occurring due to propagation of a variety of micro-organisms, subsequent release of pyrogens and other related intrinsic factors within the system and dyspnoea, nasal discharge, lacrimation may be the outcome of a complex interaction of environmental factors producing stress, a variety of micro organisms working synergistically to damage the cells lining the respiratory tract allowing colonization and invasion of other organisms and a compensated host response. These relate to similar

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observations of Stevenson and Robinson (1970), Lehmkuhl and Cutlip (1984) and Robinson (1983). Out of total fifteen nasal swab samples, fourteen were subjected to bacterial isolation. Based on cultural examination and characterization, a total of 31 pure bacterial isolates (11 Gram positive and 20 Gram negative) were obtained. Out of total 20 Gram negative bacterial isolates, 11 were presumptively identified as *E. coli* and one *Proteus* spp. along with unidentified isolates. Out of total 11 Gram positive isolates, 2 were presumptively identified as *Staphylococcus* spp. Remaining isolates could not be identified. All the pure bacterial isolates were preserved for further characterization by serotyping and PCR. Thirty bacterial isolates were subcultured at desired interval and preserved at 4^0C for further characterization. The therapeutic approach used in G I shown good recovery in less congested cases particularly when diaphragmatic lobe was not or less severely affected as two out of five treated animals continued to show signs of uneasiness even after 5^{th} day of treatment. Amikacin has been a drug of choice in respiratory tract infection (Riviere and Papich, 2009) with certain precautions.

The applied preparation Deriphylline, is a combination of theophylline and etophylline in the ratio of 1:3. Low doses of theophylline have an anti-inflammatory or immunomodulatory effect *in vivo* (Tinkelman *et al*., 1993; Reed *et al.,* 1998*;* Ward *et al*., *1993;* Kidney *et al*., 1995). Though, the molecular mechanism for the anti-inflammatory action of theophylline is currently unknown, but low-dose theophylline is an effective add-on therapy (Kazuhiro *et al*., 2002). More recently it has been shown that low concentrations of theophylline were able to inhibit the activation of NF-êB and reduce the expression of inflammatory genes in a manner similar to corticosteroids (Tomita *et al*., 1999). In addition, eosinophil survival induced by IL-5 and GM-CSF is decreased by low concentrations of theophylline independently from PDE inhibition and changes in cAMP (Ohta *et al*., 1996; Yasui *et al*., 1997)). The effects of theophylline are relatively smaller but it can markedly reduce histone H4 acetylation at the GM-CSF promoter when targeted by dexamethasone (Shute *et al*., *1998*). Waterborg (2000) has shown that even in the resting state histones are acetylated and that small differences in the number of acetylated histones result in biophysical changes. Low-dose theophylline enhances histone deacetylases (HDAC) activity in epithelial cells and macrophages. HDACs are phosphoproteins whose activity is modified according to their phosphorylation status (Pflum *et al*., 2001). This increased HDAC activity is then available for corticosteroid recruitment and predicts a cooperative interaction between corticosteroids and theophylline. This mechanism occurs at therapeutic concentrations of theophylline and is dissociated from phosphodiesterase inhibition (the mechanism of bronchodilation) or the blockade of adenosine receptors, which are partially responsible for its side effects. It inhibits phosphodiesterase, which degrades cyclic nucleotides, hence increased amount of intra cellular CAMP molecules causing smooth muscle relaxation. Overall effect of the drug is to produce bronchodilation by bronichial muscle relaxation and suppression of response of airways to stimuli.

Enrofloxacin is a broad-spectrum bactericidal antibiotic and is effective against a broad spectrum of Gram-positive and gram-negative bacteria (Riviere and Papich, 2009) and accordingly was evaluated in present clinical cases of pneumonia with support of bronchodialators with comparable efficacy. The G III treated group was comparatively

Table 1: Clinical changes in different treated groups

S. No	Symptoms	G I		G II		G III	
		0 day	5^{th} day	0 day	5^{th} day	0 day	5^{th} day
1	Dyspnoea	ˇ	3/5	ˇ	1/5	ˇ	-
2	Nasal discharge	ˇ	-	ˇ	-	ˇ	-
3	Inappetance	ˇ	2/5	ˇ	3/5	ˇ	2/5
4	High rise in temperature	ˇ	-	ˇ	-	ˇ	-
5	Lacrimation	ˇ	-	ˇ	-	ˇ	-
6	Disinclination to walk	ˇ	2/5	ˇ	2/5	ˇ	1/5
7	Abdominal respiration	ˇ	-	ˇ	-	ˇ	-
8	Reduced ruminal motility	ˇ	-	ˇ	-	ˇ	-
9	Scanty faeces	ˇ	-	ˇ	-	ˇ	-

responded well. Ampicillin acts by inhibiting the synthesis of bacterial cell walls. It inhibits cross linkage between the linear peptidoglycan polymer chains that make up a major component of the cell walls of both Gram positive and Gram-negative bacteria. Synergistic antibacterial effects of mixtures of ampicillin and cloxacillin is well known (Bornside, 1968; Sutherland and Batchlor, 1964). To reduce the development of drug-resistant bacteria and maintain the effectiveness of amikacin and other antibacterial drugs, antibiotics should be used only to treat or prevent infections that are proven or strongly suspected to be caused by bacteria and repeated clinical trials are need of the day in view of changing pattern of microbials and antimicrobials and based on present study combination used in G III can be a better choice but after trial on more number of animals.

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DYSTOCIA DUE TO UNUSUAL MONSTER CALF IN A BUFFALO

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Monstrosity is an important foetal cause of dystocia in animals. Teratological development or arrest in ovum may result in the death or malformations of the antenatal individual resulting in dystocia (Roberts, 1986). Hancock (1954) and Arthur (1956) reported its occurrence about one in one lac bovines, at birth, while in buffaloes its occurrence is more than the cattle. Dystocia due to Diplophagus dicephalus dipus tetrabrachius ziphopagus dicaudatus (Shelar *et al*., 2007), dicephalus tetrabrachius dipus dicaudatus in buffalo has been reported by Pandey *et al*. (2009). In the present case report, complete duplication was present with defective genital organs.

Case history: A Murrah buffalo in 2nd parity with complete gestation period was presented to the College Hospital, with the history of labour pain since last 9 hours. The clinical parameters (temperature, pulse, heart beat) were within the normal range. Per-vaginum examination revealed fully dilated cervix with a foetus in anterior presentation, dorso-sacral position and two fore limbs in the birth canal. Further, critical exploration revealed two heads attached to the same foetus and two more fore limbs flexed beneath the body and lodged against maternal pelvic brim. Foetal movements and other reflexes were absent. Since delivery in this case was not possible with other obstetrical operations, it was decided to perform caesarian operation.

Fig. 1:Dicephalus Tetrabrachius Sternopagus Tetrapus Dicaudatus in Buffalo

Treatment: Before undertaking caesarean operation, animal was stabilized with adequate intravenous fluid, dexamethasone and antibiotics. The caesarean section was performed in left lateral recumbency under local analgesia (2% Lignocaine hydrochloride solution) with local infiltration along the site of incision (parallel and lateral to milk vein) following all aseptic precautions. The uterine incision which was large in this case than routine caesarian section, was sutured using chromic catgut No. 3 employing Cushing's pattern. Following closure of the surgical wound, the dam was put under antibiotic umbrella of parentral and intrauterine antibiotics.

Description of the monster calf: The well developed dead male monster calf was apparently having two normal heads, two bodies joined at sternum, four fore limbs, four hind limbs and two tails, the two scrotum were also observed to be without testes. Besides, the external genitalia were also observed to be defective. The penis was totally missing in both the halves (Fig.1). During postmortem examination, only one heart, lung, spleen, liver and pair of kidneys were found within the monster calf. The liver was extensively enlarged. The monster calf was diagnosed as "Dicephalus Tetrabrachius Sternopagus Tetrapus Dicaudatus" monster as per description given by Craig (1941).

Discussion

In monozygotic twins, incomplete division of embryo into two components at the primitive streak state leads to conjoined monstrosities (Noden and Delahunta, 1985). Such types of features are due to non-genetic teratologic defect which, arises from a single ovum and are monozygotic. Dicephalus is a malformation of the head resulting from incomplete twinning in humans and animals (Jenkins and Hardy, 1968). Several authors have reported such type of incomplete and or complete conjoined twin monster calf in buffaloes (Jenkins and Hardy, 1968; Patil *et al*., 2004; Shelar *et al*., 2007 and Pandey *et al*., 2009).

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CHRONIC PYOMETRA IN A THOROUGHBRED MARE

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Infertility associated with chronic pyometra in mare is generally a form of genital tract infection. The term pyometra is usually reserved for situations in which chronically-accumulated pus causes marked uterine distension. It is uncommon in mares because endometritis usually causes luteolysis with consequential relaxation of the cervix for drainage of the exudates. It is often noticed when there is interference with the natural drainage of fluid from uterus due to reduced myometrial contractions, poor lymphatic drainage, over stretched uterus and cervical abnormalities. Other pre-disposing factors include persistent mating induced endometritis with bacterial infections like *P. aeruginosa* (Hughes *et al*., 1966), *K. pneumoniae* (Dimock and Edwards, 1927) or *S. zooepidemicus* (Causey *et al*., 1995). The spermatozoa themselves are responsible for initiating a marked inflammatory response leading to a persistent endometritis in susceptible mares (Katila, 1995). It often becomes a chronic condition because of the absence of clinical signs of systemic illness. Ultrasound examination reveals a fluid-filled uterus in the absence of a foetus. The uterine fluid contains echogenic large particles representing debris. The present paper reports successful treatment of chronic pyometra in a mare using lavage technique in association with use of antibiotic and ecbolic.

Case history

A Thoroughbred mare, aged over 9 years, with reproductive history of foaled 4 times, month of last foaling February-2009, three times mated with stud stallion after normal foaling and chronic genital discharge for the past four months, was brought to referral clinics, ACVM, Jaipur, for Gynaecological interventions. The development of pyometra was due to natural mating which lead to chronic endometritis associated with normal cervix. The mare intermittently expelled thick creamy yellowish discharge from vagina.

Diagnosis and Treatment

Diagnosis of pyometra was made by rectal palpation of a large thick walled, distended uterus concomitant to breeding history and clinical signs. The culture of endometrial swab revealed growth of mixed organism. Ultrasonography examination revealed fluid filled uterus.

Despite all this, the clinical examination revealed overall favourable condition of mare for handling the case with fairly good prognosis.

In order to expel purulent discharge from the uterus, the mare was treated with large volume lavage i.e. warm and cold saline solution on alternate days, for seven days. The technique involved infusion of luke warm (40°C) 7% physiologic sterile saline on 1st day followed by cold (4°C) saline on 2nd day, on 3rd day again warm 5% saline, then on 4th day cold 5% saline, followed by on 5th day warm 3% saline, on 6th day cold 3% saline, on 7th day normal saline at room temp, into the uterus via a catheter that was retained within the cervix via a cuff (Fig. 1). The fluid was siphoned out of the uterus by gravity flow. The broad spectrum antibiotic Lenovo IU (Intas Pharmaceuticals Ltd.) 30 ml (Levo-floxacin 20 mg; alpha tocopherol solution 5 mg) was infused intrauterine after repeated large volume lavage. Oxytocin (70 IU) was given intravenous to achieve drainage of exudates. The lavage was repeated until the fluids recover became clear. The response to treatment was monitored by the combination of rectal palpation and ultrasound examination.

Results and Discussion

An uneventful recovery observed after successful treatment of pyometra. The case was thus successfully treated and no vaginal discharge was seen thereafter. The ultra sonography also revealed the clear picture of uterus and the culture of endometrial swabs did not reveal any bacterial growth. Mare successfully mated after regain of genital health and confirmed pregnancy after pregnancy diagnosis by rectal palpation.

Pyometra in mare has been classified as either open or closed. In open pyometra, the cervix remains open, but purulent material accumulates because of impaired uterine clearance. Vulvar discharge is often seen in open pyometra, which may vary in consistency ranging from watery to creamy (Sampler *et al*., 2007).

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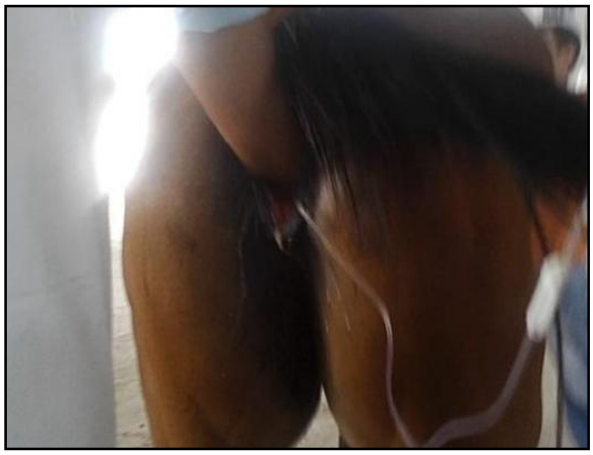

Fig. 1: Uterine lavage in mare

The prognosis for fertility in most cases of equine pyometra is hopeless. Hughes *et al*. (1966) developed the concept of susceptibility to endometritis and confined that resistant mare could eliminate induced infection without treatment, whereas susceptible mare could not. Robert (1971) stated that mares are susceptible to chronic uterine infection and endometritis usually become easily reinfected after foaling or after each service unless preventive therapeutic procedures are taken. Brinsko (2001) described that uterine lavage is an extremely useful therapeutic technique that can be applied to a number of reproductive problems in the mare. The enhancement of the mare's own uterine defence and the mechanical removal of uterine contaminants are its major therapeutic advantages over other techniques, including use of ecbolic agents such as oxytocin or prostaglandins. When performing uterine lavage or any other procedure, in which the cervix of the problem mare is violated, employing meticulous aseptic technique is imperative to minimize contamination and optimize the chances of a successful outcome.

Rathore (1992) described alternate use of hot and cold infusion of hypertonic saline for 7 days in pyometra cases, which was very successful in chronically infected mares, while Wolff *et al.* (1963) have successfully removed the uterus and ovaries from mares with severe pyometra or uterine abscess. Brinsko (2001) stated that uterine lavage, used alone or in conjunction with antibiotic therapy, is believed to be beneficial in the treatment and prevention of infectious endometritis. The rationale for using uterine lavage in the treatment of uterine infections is based upon: reduction of bacterial numbers and removal of exudates from the uterine lumen, enhanced physical clearance of uterine contents by stimulation of uterine contractions, and recruitment of neutrophils and possibly opsonins by inducing transient irritation of the endometrium.

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SURGICAL MANAGEMENT OF BILATERAL CRYPTORCHIDISM IN COCKER SPANIEL DOG WITH HYDROCOEL

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Cryptorchidism is the absence of one or both testes from the scrotum. This usually represents failure of the testis to move, or "descend," during foetal development from an abdominal position, through the inguinal canal, into the ipsilateral scrotum. A testis can be found anywhere along the "path of descent" from high in the posterior (retroperitoneal) abdomen, just below the kidney, to the inguinal ring, found in the inguinal canal.

Cryptorchidism is heritable and is a sex-limited autosomal recessive trait in dogs (Johnston *et al.,* 2001). The incidence of cryptorchidism seems to be

Fig. 1: Photograph of dog showing absence of both the testis.

Fig. 2: Photograph of dog swelling right side of penis.

Fig. 3: Photograph of dog showing hydrocoel in right testis.

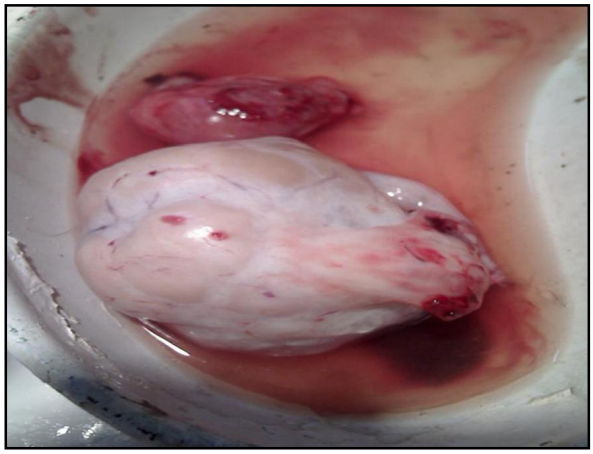

Fig. 4: Photograph showing removed swollen right testis.

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higher in purebred and inbred dogs than in Mixed-breed dogs (Cox *et al.,* 1978). High prevalence of cryptorchidism within lines of inbred cocker spaniels and miniature schnauzers has been reported (Pulling, 1953). Most commonly Cryptorchidism is a unilateral condition with right testicle being most frequently retained (Crane, 1990). Retained testes are smaller and when viewed histologically, the diameter of seminiferous tubules is reduced by up to 60 % compared to those of scrotal testes (Kawakami *et al.,* 1988).

Cryptorchid animals are usually sterile due to impaired spermatogenesis and thus, such animal should never be bred and should be castrated. Attempts at correction of cryptorchidism through hormonal treatment were not effective in dog (Wallace and Cox, 1980), and orchiopexy is considered unethical because of the hereditary nature of the disease.

The present paper reports orchidectomy in case of right unilateral cryptorchidism with hydrocoel in cocker spaniels dog.

Case history and surgical management

A 7-years old cocker spaniel dog, weighing approximately 12 kg, was presented with the history of absence of both the testes in the scrotal sac while a large swelling was present on right side of penis (Fig. 2). The dog was anaesthetised with atropine-xylazine -ketamine combination and restrained in spine recumbency. After routine surgical preparation, a right paramedian incision was given over the swelling. The testicle was exposed and ligation of spermatic cord was done using chromic catgut No.1 and finally right testicle with hydrocoel (Fig. 3) was removed (Fig. 4).

The Muscles were sutured by chromic cat gut No.1 and skin was sutured in routine manner using silk thread. Postoperative medicinal therapy comprised of broad spectrum antibiotics (Ceftriaxone @ 7 mg/kg b.wt., i/m, bid) for 5 days and Meloxicam @ 1 mg/kg b.wt. i/m, sid for 2 days, respectively. Daily dressing of wound was done using povidine- iodine once daily along with restricted exercise. Healing occurred uneventfully without any complication.

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EVALUATION OF IMIDOCARB DIPROPIONATE FOR THE TREATMENT OF CANINE BABESIOSIS

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Babesias are microscopic blood parasites that cause disease in many animals (Ano *et al*., 1999). *Babesia* sp. These protozoal organisms parasitize erythrocytes and cause anaemia in the host. Many different species exist with varying host specificity. *B. canis* and *B. gibsoni* are two organisms commonly known to infect dogs (Perkins, 2000). Both organisms have *Ixodid* tick vectors and are found throughout Asia with *B. canis* being more prevalent. There is also evidence that some direct animal-to-animal transmission may occur, as and when an infected dog with oral abrasions bites another dog. Kennel settings with poor tick surveillance and control are at a higher risk for housed animals to develop babesiosis (Carnet *et al*., 1999).

History

The present study included six cases of canine Babesiosis irrespective of the sex brought to the Shri Sai Advanced Polyclinic, Indore.

Table 1: Rectal temperature (°F) of different breeds of dogs with age

S.No.	Breed of Dog	Age in years	Rectal Temperature (°F)
1	Labrador	5	104.2
2	Labrador	6	104.4
3	German shepherd	8	105.2
4	German shepherd	4	103.2
5	German shepherd	6	104.4
6	Doberman	3	106.2

Other symptoms

All the dogs were having high temperature ranging between 103-106 °F (Table 1). They were lethargic with conjunctiva, gums pale in colour showing signs of anaemia.

Blood samples from each dog were taken before treatment. The Hb and TLC showed decrease in their values. Among the differential leucocyte counts the lymphocytes showed increased values. SGPT, Serum Creatinine and BUN also showed rise in their respective values as shown in the Table 2.

Table 2: Pre-treatment haemato-biochemical values of dogs of various breeds

S.No	Breed	TLC (Thousands/ cumm)	Lymphocyte (%)	Hb (%)	SGPT (IU/L)	BUN (mg/dl)	Serum Creatinine (mg/dl)
1	Labrador	6.4	33	9	77	28	2.5
2	Labrador	6.0	32	8	81	29	3.0
3	German shepherd	7.0	30	9	79	30	2.0
4	German shepherd	6.7	36	7	80	31	2.2
5	German shepherd	6.6	34	10	76	29	2.1
6	Doberman	6.4	33	9	80	30	3.0

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Table 3: Post-treatment haemato-biochemical values in dogs of various breeds

S.No	Breed of Dog	TLC (Thousand/ Cumm)	Lymphocyte (%)	Hb (%)	SGPT (IU/L)	BUN (mg/dl)	Serum Creatinine (mg/dl)
1	Labrador	8.1	28	13	65	24	1.3
2	Labrador	8.0	27	13	62	22	1.1
3	German shepherd	7.9	28	12	69	25	1.5
4	German shepherd	8.5	27	13	70	23	0.9
5	German shepherd	7.8	28	12	67	24	0.7
6	Doberman	8.0	28	13	65	23	1.0

Treatment

Out of 6 dogs, 4 dogs were initially treated for bacterial infection and were given Inj. Ceftriaxone @ 20 mg/kg b.wt. i/v for 3 days. These cases did not respond to Ceftriaxone and hence were switched over to Ciprofloxacin infusion i/v 100 ml daily for another three days. The temperature of these dogs did not come down after 6 days of treatment. In the blood smear in two cases *B. canis* (typical bull eye) appearing inside R.B.Cs was noticed whereas in other cases, symptoms were typical suggestive of blood protozoan infection but it could not be seen in blood smear. After the confirmative diagnosis these dogs were given two injections of Imidocarb diproprionate @ 5 mg/kg intramuscularly at an interval of 1 week. Along with this treatment these dogs were given Inj. Tribivet 2 ml daily for 7 days, Inj. Imferon 2 ml, i/m for three days and NS 250 ml, i/v daily for 5 days as supportive treatment. After 1 week of treatment blood samples were again taken from all the dogs and haematobiochemical parameters were estimated and all the values were well within the normal range as shown in Table 3.

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PREVALENCE, ETIOLOGY AND ANTIBIOGRAM OF SUBCLINICAL MASTITIS IN CROSSBRED COWS

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ABSTRACT

Overall prevalence rate of Subclinical mastitis in present study was 56.1 per cent. Quarter-wise highest prevalence of subclinical mastitis was recorded in right hind quarter (37.78%) followed by left hind quarter (26.08%), right forequarter (21.73%) and left forequarter (17.39%). Lactation stage-wise analysis indicated more prevalence in 4th to 5th month (70%) followed by 1st to 3rd month of lactation (30%). The study revealed predominance of *Staphylococcus, Streptococcus* and *Escherichia coli* as the causative agents of bovine sub clinical mastitis. Overall sensitivity of isolates from sub clinical mastitis in HF cows indicated maximum sensitivity to Gentamicin (93.75%) followed by Chloramphenicol (87.5%) and Ciprofloxacin (75%).

Key words: Mastitis, subclinical, cows, *Staphylococcus, Streptococcus, E.coli*

Introduction

Mastitis is the most prevalent infectious disease of adult dairy cows having greatest economic importance. Although advances have been made in various diseases of dairy animals, mastitis continues to be a major threat to high yielder and in particular exotic crossbreds. Maximum number of subclinical mastitis (SCM) cases have been recorded in rainy season. The mastitis causing pathogens may be refractory to particular antibiotic in a specified area due to indiscriminate use of antibiotics in mastitis. The present study, therefore, was aimed to know the prevalence and antibiogram of subclinical mastitis in crossbred cows in Udgir area.

Materials and Methods

The present study was conducted on a dairy cow herd located in Udgir, Distt. Latur having total 41 lactating Holstein Friesian (HF) cows during monsoon season. Whole herd was screened for sub-clinical mastitis by California Mastitis Test (CMT). Information pertaining to physiological status of individual animal, age, milk yield per day, lactation number and lactation stage was collected. Milk samples collected taking all aseptic precautions from cows with positive CMT were immediately subjected to microbiological investigations and drug sensitivity. The *in vitro* antibacterial sensitivity pattern of bacterial isolates was determined by standard disc diffusion technique (Bauer *et al.,* 1966).

Results and Discussion

In the present investigation subclinical mastitis (SCM) was recorded in 23 HF crossbred cows among 41 cows screened indicating overall prevalence rate as 56.1 per cent. The prevalence of subclinical mastitis reported from different states of India by different workers were 17.33% (Singh *et al.,* 1994), 48.7% (Bansal *et al.,* 1995), 53.54% (Tiwari *et al.,* 2000), 56.76% (Chandra *et al.,* 1989), 25-78% (Paul *et al.,* 2000), 74.10% (Pachauri *et al.,* 2001), 94.54% (Shukla and Supekar, 1986). The high incidence rate of SCM observed in the study may be attributed to monsoon season, stress of high milk yield, breed predilection and non-implementation of strict hygienic measures for control of subclinical mastitis (SCM).

Quarter-wise highest prevalence of subclinical mastitis was recorded in right hind quarter (37.78%) followed by left hind quarter (26.08%), right fore quarter (21.73%) and left fore quarter (17.39%). Similar pattern of affection of quarters was observed earlier by Shastri (2001). The highest prevalence in hind quarter might be due to continuous soiling of hind teats during defecation and urination and subsequently ready environment for microorganisms to grow. Apart from this, the difference in the quarter infection rate could be due to genetic resistance, difference in teat length, teat shape, teat orifice morphology, breed and management of houses (Radostitis *et al.*, 2007).

Lactation Stage-wise lactation analysis indicated more prevalence in 4th to 5th month (70%) followed by 1st to 3rd month of lactation (30%). Similar observations were recorded by Prasad *et al.* (2001). The present findings of season and breed also corroborates with the findings of Rady and Sayed (2009) who noticed higher prevalence of subclinical mastitis in humid weather than in summer and winter while Holstein Friesian breed is most susceptible to mastitis than native breed.

Milk samples of all the affected quarters were found bacteriologically positive. The findings of the current study revealed predominance of *Staphylococcus, Streptococcus* and *Escherichia coli* as the causative agents of bovine sub clinical mastitis. The different isolates recovered from the milk samples of affected cows were *Staphylococcus aureus* (70%), *Staphylococcus aureus* and *Streptococcus agalactiae* (10%), *Staphylococcus aureus* and *Escherichia coli* (5%), *Staphylococcus aureus* and *Bacillus cereus* (5%), *Bacillus cereus* (5%) and *Escherichia coli* (5%). This is in agreement with the earlier reports of Rady and Sayed (2009).

Overall sensitivity of isolates showed maximum sensitivity to Gentamicin (93.75%) followed by Chloramphenicol (87.5%), Ciprofloxacin (75%), Enrofloxacin (68.75%), Ampicillin (31.25%), Ceftriaxone (25%), Oxytetracyclin (18.75%) and Streptomycin (6.25%). Similar sensitivity results were earlier reported by Dhakal *et al.* (2007).

Antibiogram of *Staphylococcus aureus* showed maximum sensitivity to Chloramphenicol and Gentamicin (92.8% each) followed by Ciprofloxacin (71.4%), Enrofloxacin (64.3%) and Ampicillin (28.6%). Though most of the authors have found proven efficacy of third generation cephalosporins in clinical mastitis, in the present study sensitivity to cephalosporin limited to three milk samples (21.4%). Almost all the isolates were resistant to streptomycin except one. Earlier workers have reported highest sensitivity of mastitic organism to Enrofloxacin, Gentamicin (Dhakal *et al*., 2007) and Chloramphenicol (Rao *et al*., 1989) and least sensitivity to ampicillin (Dhakal *et al*., 2007).

Colonies of *Streptococcus* were sensitive to Enrofloxacin, Chloramphenicol, Gentamicin (100% each) and Ciprofloxacin (50%). *E.coli* and *Bacillus cereus* were found sensitive to Enrofloxacin, Ciprofloxacin, Gentamicin (100% each) and Chloramphenicol (75%).

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DYSTOCIA DUE TO UTERINE TORSION IN A DOE

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Dystocia in goats may be caused by uterine displacements such as uterine torsion, displacement of the uterus in inguinal hernias, rupture of prepubic tendon, folding of the uterus cranial to the pelvis and cervico-vaginal prolapse. Uterine torsion as a cause of dystocia is frequently observed in large ruminants and occasionally in ewes and does (Roberts, 1971). The present report records a case of dystocia due to torsion in a doe.

Case history and diagnosis

A full term, local, non-descript, pregnant doe was presented at Veterinary Clinics, GADVASU, Ludhiana. The animal was in second parity. As per history, the gestation period was complete, water bags was intact and the animal was partially anorectic, dull and depressed. The animal was straining since a day before being brought to the clinic for examination and treatment. Per-vaginal examination revealed the presence of clockwise obstruction of the vaginal passage and case was diagnosed as post-cervical right side uterine torsion.

Obstetrical procedure

After casting the animal on right side, foetal palpation was done abdominally, pressure was applied on abdomen with hands to secure it and two rotations of the body were given by means of a twisting grip on the hind legs. Per-vaginal examination revealed that the torsion was still present. The animal was given rest for sometime and again the procedure was repeated. Complete detorsion of uterus was achieved in one roll. Per-vaginal examination revealed partial relaxation of the os, Dexamethasone 3 ml, Epidosin 2 ml and Enrofloxacin 10 ml intramuscularly were administered. After about two hours, cervix was sufficiently dilated to deliver foetus. Two female foetuses, one live and one dead were delivered with manipulation and mild traction. Post-obstetrical treatment involved parentral administration of antibiotics, anti-inflammatory, analgesics and haemostatics. The animal had uneventful recovery.

Discussion

Torsion involves the rotation of uterus along its longitudinal axis with twisting of anterior vagina. It is a complication of late first stage or early second stage of labour due to instability of the uterus which results from the greater curvature of organ being dorsal and the uterus being disposed anteriorly to its subilial suspension by the broad ligaments. Torsion may be due to running of the animal, loss of foetal fluids and movement of the animal up and down the hill. Earlier workers have reported a very low incidence of uterine torsion (Dhaliwal *et al.,* 1986; Sood *et al.,* 2002). A similar anatomical presentation of the reproductive tract as in bovines may be another potent cause for this condition in does (Arthur *et al.,* 1989). In the present study, the gestation period of the doe was complete and as per the history, the animal was hyperactive which seemed to be the most probable cause for torsion of uterus in the doe in this case. Observations of the case show that failure in progress of parturition despite presence of all the signs indicate that it may be because of uterine torsion.

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CLINICAL STUDIES ON POST PARTURIENT HAEMOGLOBINURIA IN BUFFALOES

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Haemoglobinuria being a production disease not only drastically reduces milk production but also causes great losses in term of mortality and high expenses of treatment. This disease is characterized by intravascular haemolysis, haemoglobinaemia, haemoglobinuria and anaemia. Post parturient haemoglobinuria is seen in both recently parturated buffaloes and advanced pregnant buffaloes. Fodder grown on phosphorus deficient soil, draught condition and prolonged housing are considered predisposing cause of disease (Radostits *et al*., 2007). These cases have reported in the month of October and November (winter) with existing draught condition in this area of Rajasthan. Disturbance in phosphorus homeostasis result due to more drain of phosphorus through milk in recently calved animal and or increased demand for the development of foetus during advanced pregnancy (Samad, 1997; Chugh *et al*., 1998; Pirzada *et al*., 1998; Bhikane and Kawitkar, 2000).

Case History

Thirteen buffaloes approximately 7 to 12 years age with 3rd to 5th lactation with history of passing coffee colour urine, reduced appetite, dullness and open-mouth breathing were presented to clinic of department of clinical veterinary medicine, ethics and jurisprudence, Bikaner. Out of these nine were pregnant (seven to nine and half months) and remaining 4 buffaloes had recently parturated.

Clinical findings

Coffee colour urine, frequent urination, constipation, straining during defaecation, decreased ruminal motility and drop in milk production in parturated buffaloes were the main clinical findings in affected animals. Conjunctiva and mucous membrane of vulva were pale in colour indicating anaemia.

Haematobiochemical and urine examination

Bebzidine test was applied to confirm presence of blood in urine and urine was centrifuged to detect haemoglobinuria. The urine of recently parturated buffaloes was also subjected to Modified Rothera's test to detect the case of ketosis if any associated with haemoglobinuria. Blood samples were collected from jugular vein with aseptic precaution in two test tubes. One test tube containing EDTA @ 1mg/ml of blood for estimation of haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC) and in other test tube without anticoagulant for estimation of serum inorganic phosphorus, serum glucose, serum urea nitrogen and serum creatinine at 0 day and after recovery (when haemoglobinuria ceased). Thin blood smears were also prepared for the screening of haemoprotozoan infection.

Treatment

All the buffaloes except one were treated with 60 g of sodium acid phosphate (Ranbaxy Laboratory Limited, Animal Health Division) dissolved in one litre of 5% dextrose intravenously for 3 to 5 day, Sixty grams of sodium acid phosphate dissolved in 300 ml of distilled water was given subcutaneously once and 60 g of sodium acid phosphate was given orally for 3 to 5 days. Inj. Ascorbic acid 50 ml (each ml containing 100 mg of ascorbic acid) mixed in 5% dextrose was given intravenously for 3 to 5 days. Adjuvant therapy consisted of Inj. Livadex Forte (each ml containing choline chloride 100 mg, nicotinamide 100 mg, cyanocobalamine 50 mcg, Folic acid 10 mg, pyridoxine hydrochloride 5 mg and liver extract 10 mg and phenol as preservative 0.5% w/v) 10 ml i/m for 5 days, Inj. Vetade (each ml containing Vitamin A (as palmitate) 250,000IU, Vitamin D_3 25000 IU, Vitamin E (as dl-alpha tocopheryl acetate) 100 IU and Benzyl alcohol 2% w/v as preservative Sesame oil Q.S.) 10 ml intramuscularly on alternate days (three injections) and Inj. Jectocose plus (each ml containing Iron sorbitolcitric acid complex 50 mg, folic acid 500 mcg, hydroxocobalamin acetate 50 mcg) 9 ml i/m for 5 days and Inj. Curan-9 (contains concentrate copper 1.92% and glycine mixture 5.58% in suitable vehicle) 3ml s/c once.

One buffalo was ketotic which was also given injection 25% Dextrose 1000 ml intravenously for 3 days along with the same treatment as given to the other buffaloes.

Most of the animals responded after three days

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treatment while others responded after five days treatment while two animals died during course of treatment.

Results and Discussion

The results of study are presented in Table 1 All the thirteen cases were reported during winter (October-November). Smith, 1996 and Chugh *et al*., 1998 have also reported cases of post parturient haemoglobinuria in buffaloes during winter season. Radostits *et al*. (2007) reported the occurrence of post parturient haemoglobinuria during winter months due to prolonged housing and feeding on phosphorus deficient soil as seen in the thirteen cases of post parturient haemoglobinuria taken for this study. The clinical signs observed in the present study are in agreement with Samad *et al*. (1979); Digraskar *et al*. (1991); Bhikane *et al*. (2004) and Radostits *et al*. (2007).

Haematological analysis revealed significant decrease in haemoglobin, packed cell volume and total erythrocyte count. Similar finding have been recorded by Benjamin, (1978), Smith (1990); Digraskar *et al*. (1991); Bhikane *et al*. (2004); Chakarbarti, (1994) and Radostits *et al*. (2007).

Serum biochemistry revealed significant decrease in inorganic phosphorus and is attributed to the deficiency of phosphorus in fodder and soil (Nagpal *et al*., 1968). Hypophosphataemia results in impaired glycolytic pathway and depletion of ATP in erythrocytes. Subnormal concentration of ATP predispose red blood cells to alter function and structure, a loss of normal formability and an increase in fragility, ultimately leading to haemolysis. (Wang *et al.,* 1985; Ogawa *et al*., 1989; Nassif, 1995; Selim *et al*., 1998; Rizk *et al.,* 1999 and Radostits *et al* ., 2007).

Serum urea nitrogen showed significant increase attributed to the endogenous release of corticosteroid, starvation and tubular epithelial necrosis. Dehydration also occurs which is source of decreased renal perfusion, resulting into reduced glomerular filtration rate and increased blood urea level (Benjamin, 1978; Latimer *et al*., 2003; Finco and Ducan 1976 and Stogdale, 1981). Increase in blood urea could be due to the failure of the urea recycling process through salivary glands and its non utilization by microbes in the rumen during digestive disorder (Singh *et al*., 1989). In the present study serum creatinine levels were significantly increased which resulted into reduced glomerular filtration rate and haemoglobinuric nephrosis. (Samad *et al*., 1979). The glucose level was not much affected in most of buffaloes but in one ketotic buffalo serum glucose level was signicantly low.

For treatment sodium acid phosphate given in 5% dextrose was found quite effective as had also been to seen by Singh *et al*., (1989) and Pandey and Mishra (1987). Injection ascorbic acid helped in reducing oxidative stress of R.B.C, reducing intravascular haemolysis and iron to stay in reducing state (Benerjee, 1998).Therapeutic efficacy of sodium acid phosphate and ascorbic acid in haemoglobinuric buffaloes has been recorded by Chakarbarti (1994) and Bhikane and Kawitkar (2000).

Adjuvant therapy with Injection Livadex forte was used to restore ruminal motility and to improve appetite, Injection vetade was found efficacious due to increased demand of vitamin A for foetal

Table 1: Clinico-haemato-biochemical profile of haemoglobinouric buffaloes before and after treatment

S. No.	Parameters	Mean ± SE	
		Before treatment	After treatment
1	Temperature (ºF)	102.25 ± 0.18	100.5 ± 0.06^{NS}
2	Respiration (per minute)	32.54 ± 0.63	20.30 ± 0.43^{a}
3	Pulse (per minute)	80.3 ± 0.62	55.24 ± 0.68^{a}
4	Haemoglobin (gm/dl)	5.75 ± 0.04	7.05 ± 0.03^{a}
5	PCV (%)	16.53 ± 0.23	22.10 ± 0.20^{a}
6	TEC (million/cumm)	2.89 ± 0.05	3.80 ± 0.03^{a}
7	Serum glucose (mg/dl)	50.75 ± 0.25	52.74 ± 0.24^{NS}
8	Inorganic phosphorus (mg/dl)	1.65 ± 0.02	4.75 ± 0.06^{a}
9	Creatinine (mg/dl)	2.15 ± 0.02	1.50 ± 0.03^{a}

NS=Non significant a= P= 0.01

development (Roy, 2001), Vitamin D in maintaining calcium phosphorus homeostasis and Vitamin E as an additional anti oxidant reducing RBC cell wall fragility, normalizing tissue respiration and synthesis of ATP (Banerjee, 1998). Injection Jectocose plus was used as a haematinic to compensate haemoglobin loss and Injection Curan-9 was given to boost up the activity of copper containing enzyme, superoxide dismutase, which is part of the erythrocytes protection mechanism against oxidative stress (Smith *et al*., 1975).

The clinical and haemato-biochemical parameters attained almost a normal range after treatment.

The present study concluded that sodium acid phosphate with ascorbic acid, Vita A, D_3 and E, injectable iron and liver stimulant and copper gycinate can be successfully used for the therapeutic management of phosphorus deficiency haemoglobinuric buffaloes.

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EFFECT OF DIFFERENT SOURCES OF CHOLINE ON PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILERS

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ABSTRACT

An experiment of 0-42 days in day-old 150 Vencobb broiler chickens was conducted to determine the effect of herbal source of choline as a replacement for synthetic choline chloride on broiler performance and carcass characteristics. Birds were randomly distributed into three groups (T_0, T_1 and T_2), one untreated control and two treatment groups. Chicks in Group T_0 were given feed without any additional source choline chloride. Chicks of Group T_1 were fed with feed mixed with herbal product (*Repchol, Ayurvet Ltd., Baddi, India*) @ 500 g/tonne of feed and T_2 was given combination of synthetic choline chloride (*Mebros, Chembur, Mumbai, India)* @1 kg/ tonne (60%) and biotin @ 150 mg/tonne of feed. Weekly body weight, feed consumption and feed efficiency were recorded for all the three groups. Ten birds from each group were randomly sacrificed to record the absolute organ (liver, spleen, kidney, and bursa of Fabricius) weight and for carcass quality assessment on 42nd day of study. Carcass traits were evaluated by recording live weight, dressed weight, eviscerated weight and pectoral muscle weight at the end of experiment. A significant ($P<0.05$) increase in body weight gain and improvement in FCR was observed in herbal and synthetic supplement groups as compared to control. An overall improvement in carcass quality parameters was also evident in treated groups (T_1 and T_2). Sensory evaluation studies for herbal supplement were observed to be better than synthetic supplement.

Key words: Broiler chickens, performance, synthetic choline and herbal

Introduction

Choline is an essential amino acid for chickens. Supplementation of choline in poultry ration is well established to improve growth, performance and carcass quality in broilers (Attia *et al.,* 2005). The choline has a energy sparing role by reducing maintenance requirement and thus improving overall growth and productivity (Schrama and Gerrits, 2000). One of its functions is to furnish methyl group. Choline is essential for the prevention of fatty liver and perosis in poultry. The experimental study was designed with an aim to evaluate comparative efficacy of synthetic and herbal preparation on growth and performance of broilers and carcass quality in addition to assess beneficial effects of herbal choline over synthetic one in improving performance of broilers

Materials and Methods

The study was conducted on 150 day-old broiler chicks (Vencobb) at the poultry farm, College of Veterinary and Animal Science, Udgir, Maharashtra, India.

Experiemental birds, their management and diets: The vaccinated chicks were randomly divided into three groups with one control (T_0) and two treatment (T_1 and T_2) groups having 50 birds in each group with 4 replicates of each. All the birds were fed with broiler and finisher rations as per NRC requirements (Table 1). The feed was analysed as per AOAC (1990) to estimate proximate principles. Chicks in Group-T_0 were offered basal broiler starter and grower feed without any additional source of choline chloride, T_1 group birds were supplemented with Repchol (*Ayurvet Limited, Baddi, India*) @ 500 g/tonne of feed and T_2 with synthetic choline (60% pure) (*Mebros, Chembur, Mumbai, India*) @ 1 kg/ tonne of feed along with Biotin @150 mg/tonne of feed from day 0-42, respectively. The birds were reared under standard managemental conditions in deep litter system and offered feed and water *ad libitum.*

Growth and performance study: Weekly body weight, feed consumption and feed efficiency were recorded for all the three groups. The feed consumption was calculated and expressed as g/ day/group. Chicks of each group were weighed individually on day 0 and then at weekly intervals. Mean live body weight (g/chick/week) was computed at weekly intervals from 1st and 6th week of study. On

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Table 1: Composition of feed offered to different experimental groups (T_0, T_1 and T_2) during 0-42 days.

Ingredient	Broiler Starter	Broiler Finisher
Crude Protein (%)	21.2	19.0
M.E. (K Cal/kg)	2950.00	3000.0
Fat (%)	3.20	3.45
Fibre (%)	3.40	3.26
Calcium (%)	1.03	0.95
Available phosphorus (%)	0.45	0.42
Lysine (%)	1.28	1.05
Methionine (%)	0.50	0.46
Salt (%)	0.35	0.34
Sodium (%)	0.18	0.17
Antioxidant	0.10	0.10

the basis of weekly live weights and feed consumption, the FCR values of each group were calculated.

Carcass characteristics: At the end of feeding trial, three birds per replicate were fasted for 12 hours, slaughtered and eviscerated to record the absolute organ (liver, spleen, kidney, and bursa of Fabricius) weight and for carcass quality assessment at the end of experiemental study. Carcass traits were evaluated by recording Live weight, dressed weight, eviscerated weight, giblet weight and pectoral muscle weight. The data were statistically analyzed (Snedecor and Cochran, 1990)

Results and Discussion

The results of study have been presented in Tables 2 to 5.

Growth and Performance: The results of the experimental study revealed a significant improvement in weekly and final body weight and FCR in broilers (Table 2).

Table 2 : Mean (± SE) values of live body weight (g) of experimental chicks at weekly intervals

Groups	Body Weight					
	Week 1	Week 2	Week 3	Week4	Week 5	Week 6
T_0	123.71±1.19	314.80±7.93	707.97 ^{a}±3.44	934.6 ^{a}±20.10	1241.70±13.20	1634.0 ^{a}±21.80
T_1	124.32±1.32	294.90±32.29	772.70 ^{b}±7.8	1007.9 ^{b}±21.88	1323.0±7.25	1717.20 ^{b}±35.86
T_2	127.60±1.7	330.30±10.97	779.66 ^{b}±7.25	1019.3 ^{b}±7.34	1327.10±8.08	1730.40 ^{b}±30.11

Means bearing different superscripts within rows differ significantly from each other at (P=0.05).

Final body weight (g) of treatment groups T_1= (1717.20) and T_2 (1730.40) was significantly (P=0.05) higher than untreated control T_0 (1634). A similar trend in weekly body weight gain among three groups was observed. Feed conversion ratio of treated groups T_1 (1.57) and T_2 (1.53) was observed to be numerically lower than control group (1.63). However, no significant difference among total feed consumption could be recorded for three groups (Table 3).

Table 3: Mean (± SE) values of voluntary feed intake (g) of experimental chicks at weekly intervals of study.

Groups	Voluntary Feed Intake					
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
T_0	89.19±1.10	295.02 ^{a}±2.05	533.20±4.86	409.86 ^{a}±14.09	579.65 ^{b}±13.15	742.42±16.76
T_1	87.97±1.23	277.24 ^{b}±3.02	545.53±7.55	370.01 ^{ab}±15.27	623.14 ^{ab}±11.77	796.13±19.14
T_2	90.61±1.10	296.67 ^{a}±2.85	530.18±5.58	392.41 ^{a} ±20.21	586±18.17	766.97±28

Means bearing different superscripts within rows differ significantly from each other at (P=0.05).

Table 4: Mean (±SE) values of relative organ weight (g) (liver, kidney, spleen & bursa) at 42nd day of experimental study

Groups	Liver	Kidney	Spleen	Bursa
T_0	47.0±3.25[a]	5.78±0.2[a]	1.53±0.16[a]	1.56±0.16[a]
T_1	37.9±2.31[b]	6.75±0.39[a]	1.80±0.15[a]	1.47±0.18[b]
T_2	35.5±2.28[b]	6.93±0.47[a]	1.91±0.15[a]	1.33±0.14[b]

Means bearing different superscripts within rows differ significantly from each other at (P=0.05).

Table 5: Mean (± SE) values of dressed weight (g) of experimental chicks of different groups at the end of study period

Parameters	Groups		
	T_0	T_1	T_2
Dressing percentage	986.90±33.55[a]	1092.80±34.65[b]	1338.7±35.49[b]
Eviscerated weights	907.20±18.16[a]	1034.7±22.46[b]	1011.0±7.11[b]
Pectoral muscle weight	283.10±6.28[a]	328.7±5.17[b]	316.45±10.29[b]

Internal organ weight: A significant (P=0.05) increase in mean values of liver weight (g) was recorded in group T_0 (47.0 ± 3.25) when compared with group T_1 (37.9 ± 2.31) and T_2 (35.5 ± 2.28), respectively, at 42nd day of experimental study (Table 4). However, the two treatments were non-significantly different. The increase in mean values of liver weight of group I might have resulted due to minimal hepatopathy as the chicks were maintained on feed without addition of choline chloride which might possibly have caused the deposition of fats in liver. Bursa of fabricius also depicted similar trend like that of liver.

The mean weight of kidney and spleen did not differ significantly among three groups. Harms and Russell (2002) and Jason *et al*. (1997) in their experiments, have also shown that presence of choline chloride in ration decreases the liver weight in broiler chicks owing to the role of donor methyl group of choline having a potential role in fat metabolism and thereby reducing fatty deposition in liver.

Carcass quality parameters: Live weight, dressing percentage, evicereated weight, pectoral muscle weight were significantly (P=0.05) higher in treatment groups as compared to untreated control at the end of experimental trial indicating the beneficial effect of using herbal choline supplement (Table 5). The mean values of dressed weights (g) in chicks of treated groups T_1 (1092.80 ± 34.65) and T_2 (1338.70 ± 35.49) were significantly higher than the mean values of control group T_0 (986.90 ± 33.55) at 42nd day of study indicative the beneficial effect of using herbal/synthetic choline chloride in feed. However, the mean values of dressed weights in experimental chicks of T_1 and T_2 were non-significantly different. Similar trend was observed for evicereated weight (Table 5).

Supplementation effect of herbal or synthetic source of choline was also observed to potentiate the pectoral muscle yield in treatment groups than control. Mean value of pectoral muscle in chicks were significantly higher in group T_1 (325.80 ± 8.03g) and T_2 (328.70 ± 5.17g) as compared to that of untreated control T_0 (283.10 ± 6.28 g) (Table 5). The indvidual constituent herbs of Repchol viz. *Trigonella foenum graecum*, *Nigella sativum* and *Achyranthus aspera* have been reported to improve livability and carcass traits in broilers. Abaza (2001) found that supplementation of *Nigella sativa* in ration improved the performance of broilers and had no negative impact on carcass traits and sensory qualities of meat. *Soy lecithin*, an important natural source of choline, inositol and linoleic acid, is also reported to play important roles in cell growth and improving carcass traits in broilers (Wafsi, 1994).

Sensory evaluation: The crude sensory evaluation of chicken prepared out of these experimental chicks was carried out by expert panel members. As per opinion of expert panel members appearance and juiciness of the product prepared from chicks reared on feed mixed with herbal product was good as compared to the products prepared from chicks of group I and IV. However, products did not show any kind of variation in flavour and tenderness when compared amongst themselves. The findings of present study are in concomitance with those of Vogtand and Rauch (1991) that supplementation of herbs in poultry ration does not affect the flavour and texture of meat.

Herbal ingredients of Repchol namely *Trigonella foenumgraecum, Nigella sativum and Citrullus colocynthis* and many more, are rich source of choline required for improving growth, productivity and hepatoprotection (Al-Ghamdi and Türkdoan, 2003). Nasir *et al*. (2005) also reported that supplementing *Nigella sativum* in poultry ration improved growth performance and total egg production in layers. The synthetic choline and herbal ingredients in Repchol might have elevated metabolic and conversion rate for effective utilization of leading to improvement in these parameters. The results are in confirmation with those reported by Jadhav *et al*. (2009) that supplementation of phytoadditive Repchol promotes body weight gain in broilers. The observations tallied the similar noting of Sapcota *et al*. (2007) who reported that supplementation of herbal growth promoters improved weight gain and FCR in broilers. Further, findings also matched with the recordings of Bhanja *et al*. (2007) who stated that the herbal choline supplemented pullets produced significantly ($P<0.021$) more per cent hen day eggs (84.72) along with significantly ($P<0.013$) better feed efficiency (1.34 vs 1.54) during 33-36 weeks of age as compared to pullets fed with commercial feed grade choline.

Conclusion

On the basis of overall results, it was concluded that Repchol @ 500 g/tonne of feed can replace synthetic choline and biotin in poultry ration. Significantly better results in carcass quality and sensory evaluation studies have been noticed with the supplementation of Herbal formulation Repchol to broilers.

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MANAGEMENT OF POST-PARTUM UTERINE PROLAPSE IN A NON-DESCRIPT DOE

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Uterine prolapse is the eversion of the postpartum uterus and cervix through the vulva. Occurrence of uterine prolapse is common in cow and ewe, less common in sow and doe (Dhaliwal *et al.,* 1986) and rare in mare (Jackson, 1995). The successful management of post-partum uterine prolapse in a non-descript doe is presented in this report.

Case history and observations

A four-year non-descript doe was brought to Teaching Veterinary Clinical Complex of College of Veterinary and Animal Sciences, Pantnagar with the history of complete eversion of uterus immediately after delivering two live and one dead foetuses. Clinical examination revealed that oedematous, completely everted uterus exposing the maternal caruncles was hanging down to the level of hocks without any traumatic injury or necrosis (Fig.1). The abdominal straining and restlessness were other symptoms observed. The rectal temperature was 103°F with elevated pulse and respiratory rates.

Treatment and Discussion

Melonex-P 3 ml and Chlorpheneramine maleate @ 0.2 mg/kg was administered intramuscularly. Caudal epidural anaesthesia was achieved by injecting 2.5 ml of 2% lignocaine hydrochloride solution at 1st inter-coccgyeal space. The prolapsed mass was thoroughly washed with 1:1000 potassium permanganate solution, ice packs were applied to reduce size of the oedematous prolapsed mass followed by smearing of xylocaine jelly over it. The hind quarter of doe was elevated and hind legs were held apart. The vulvar lips were then pulled apart and starting from the end of the uterus nearest to vulva, the prolapsed mass was replaced by exerting pressure with palm. Finally the ovarian pole of the uterus was pushed by fist through vulva, vagina and pelvic cavity till the prolapsed uterine horn was reverted to its normal position. Oxytetracycline bolus 500 mg was placed in uterus and 500 mg of the same antibiotic was given intramuscularly. Also 50 ml of calcium borogluconate was given slowly by intravenous route. The doe was discharged from hospital without any immediate reproductive problem with the advice for follow-up treatment.

Fig.1: Uterine prolapse showing maternal caruncles - Fresh case

Relaxation of pelvic ligament along with straining and lack of uterine tonicity might be the cause for occurrence of uterine prolapse in ewes (Wani *et al*., 2000), whereas Morrow (1980) and Noakes *et al.* (2001) reported that the hypocalcaemia and lack of exercise are the predisposing factors. In this case prolapse might be due to uterine inertia, which in turn may be due to hypocalcaemia. There was no reoccurrence following parentral administration of calcium borogluconate. Post-partum uterine prolapse in doe has been reported by Majeed and Taha (1995); Selvaraju *et al.* (2004) with its reason being the deficiency of calcium (Raju and Rao 2001). Uterine prolapse has been reported in doe by Raju and Rao (2001). Uterine prolapse is an emergency case, which needs immediate handling and treatment, otherwise interference in the blood supply of prolapsed tissue may result in oedema, cyanosis and may sequel into gangrene. Further, any delay in the treatment of uterine prolapse may cause death of the patient due to shock.

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FIBROSARCOMA IN BUFFALO - A CASE REPORT

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Fibrosarcoma is a tumour of mesenchymal cell origin composed of malignant fibroblasts in a collagenous background (Vegad, 2007). Fibrosarcomas are common in dogs and cats but are rare in domestic animals (Kahn *et al.* 2005). Incidence of tumours in buffalo has been reported only 19.02% in comparison to cattle (53.5%) (Singh *et al.,* 1991).

History and observations

A Murrah she buffalo, aged 8 years, was presented to First Grade Veterinary Hospital, Patratu, Ramgarh, with big growth at the sternum. The history revealed that growth was small at the beginning (approximately three months back) but had a continuously growing tendency. The growth was hard in consistency and haemorrhagic in appearance having size of 20-22 cm length and 18-20 cm wide. Animal was treated earlier with application of magnesium sulphate and glycerin paste and antibiotic without fruitful results.

Treatment and Discussion

After 24 hours of fasting, the animal was given xylazine as pre anaesthetic @ 0.02 mg/kg b.wt. i/m 10 minutes before surgery. Animal was controlled in lateral recumbency. The area was prepared for aseptic surgery. Local infiltration of 10 ml 2% lignocaine hydrochloride at the base of growth was done. A 6-inch long circular incision at the base of the swelling was made. The growth was separated by the blunt dissection. The bleeding vessels were ligated with chromic catgut No.1 and the mass was removed. The subcutaneous tissue was closed by chromic cat gut No.2. The skin wound was closed with silk No. 2 in routine manner. The mass was weighing 2 kg, 22 x 20 cm in size, highly vascular and hard in consistency. The vascularity and hardness may be due to the malignancy and abundant collagenous framework, respectively (Vegad, 2007).

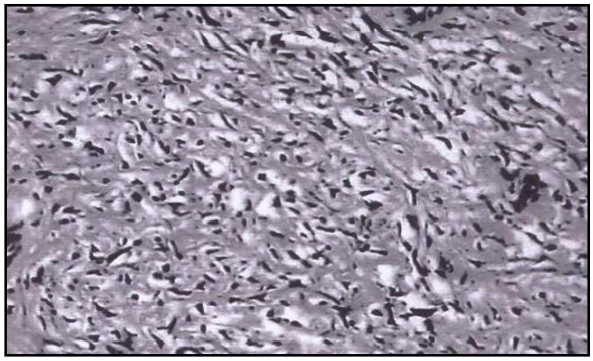

Fig.1: Proliferation fibroblasts in interwoven bundles running in crisscross directions (H&E 100X).

The firmness of tumour might also be due to involvement of dermis, subcutaneous fat and invasion of musculature along fascial plane (Kahn *et al.,* 2005). In the present case, the growth was solitary corroborate with the findings of Valentine (2004). The growth was present ventrally below the sternum, which is contrary to facial fibrosarcoma (Britt *et al*., 1998) and fibrosarcoma affecting the mammary gland (Orr, 1984) in cow.

Histopathological examination of tumour mass revealed that the stromal part of the growth was comprised of transverse elongated or whirling pleomorphic fibroblasts (Fig. 1). These fibroblast had enlarged hyper chromatic nuclei. Further the stroma had abundant capillaries and other blood vessels, confirming it to be fibrosarcoma. Post operatively animal was administered streptopenicillin 2.5 g i/m for 5 days and meloxicam 15 ml intramuscularly for 3 days. Regular cleaning and dressing of surgical wound with povidone iodine (5%) was undertaken until the sutures were removed 10th day post operatively. The wound healed uneventfully. Wide and deep surgical excision is the treatment of choice for fibrosarcoma but recurrence is common (Kahn *et al.,* 2005). In present report, the recurrence was not reported till 6 month after the excision.

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SURGICAL CORRECTION OF CHERRY EYE IN TWO NEOPOLITAN MASTIFF PUPS

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A Cherry is a prolapse of the third eye lid and is most commonly seen in puppies (Christmas, 1992). It may be unilateral or bilateral and most commonly affects Bull Dog, Neopolitan Mastiff, Cocker Spaniel, Beagle and Basset Hound breeds of dogs (Herrera, 2005). Cherry eye may result from hereditary weakness in the connective tissue surrounding the gland (Schoof, 1999). It appears as red mass in the inner canthus of the gland of the eye following prolapse of the gland. The eye shows persistent inflammatory reaction due to lachrymation in most of the cases and may lead to dryness (Keratoconjuctivitis Sicca) (Gelatt, 1999). Definitive treatment is surgical correction since the tear production is remarkably affected, (Slatter, 2002).

The present report accounts for successful surgical correction of cherry eye encountered in two cases.

History

Two Neopolitan Mastiff pups, aged 4 to 6 months, were referred to Sanjay Gandhi Animal Care Center, Delhi in December 2009 with appearance of red mass in the inner corner of the eye with occular discharge and chronic conjunctivitis, with the cases were diagnose for prolapsed of gland of third eye lid (cherry eye). It was unilateral in one case while bilateral in other case.

Surgical technique

The pups were premedicated with atropine sulphate @ 0.04 mg/kg b.wt., xylazine hydrochloride @ 1 mg/kg b.wt., i/m and ketamine hydrochloride @ 10 mg/kg b.wt., i/m. The pups were restrained in lateral recumbency. Initially, in both pups, the surgical correction for reposition of the prolapsed gland was done by Pocket or Imbrication technique (Moore, 1983).

The inner aspect of the third eye lid gland was exposed. Two parallel semi elliptical incisions were made through the bulbar conjunctiva around the periphery of prolapsed gland and secured with small eye forceps.

Blunt incision was made to form a small pocket. The incision was closed using 5/0 vicryl suture material and buried continuous suture pattern. Knots were placed on anterior part of the third eye lid. The same procedure was adopted for the other eye in bilateral affected pup.

The pups were treated with inj. Intacef (Ceftriaxone) @ 10 mg/kg b.wt., i/v once daily for 5 days, with inj. Meloxicam @ 0.3 mg/kg b.wt., s/c once daily for 3 days, topical dressing were conducted t.i.d with Gentamicin sulphate ointment for 7 days. The pups recovered in eventfully and attained aesthetic appearance.

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Fig.1: Cherry eye in Neopolitan Mastiff pup.

Fig. 2: Surgically corrected Cherry eye.

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EFFECT OF CONCENTRATE FEEDING ON BODY WEIGHT GAIN IN KIDS RAISED IN SEMI ARID REGION

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ABSTRACT

Effect of feeding concentrate along with groundnut straw agro waste on growth and economics was studied under semi intensive system of management. Twelve Jamunapari kids of 3 months of age, besides 6 hours grazing on almost denuded rangeland, were fed concentrate mixture containing CP-20, EE-4.5, CF-9.6, NFE-56.5 and total ash-9.4% (on dry matter basis) along with groundnut agro waste in approx 50:50 ratio for a period of four months. Per animal recorded average daily dry matter intake was 129 g/kgW$^{0.75}$ and average daily weight gain was 67 g. The average initial and final body weight of individual animals recorded were 9.18±0.213 kg and 17.24±0.512 kg, respectively. The recorded FCR and FCE were 6.97:1 and 14.34%, respectively. The net income generated on sale of each kid was Rs. 434. Providing concentrate supplement could sustain a daily gain of 67g/day even in the nutritionally and climatically stressful period on supplementation of concentrate in their daily ration.

Key words: Jammunapari kids, semi intensive system, concentrate feeding, growth, economics

Goat rearing as an upcoming enterprise in Rajasthan is adapted well by economically backward marginal farmers and agricultural labourers (Kumar *et al.,* 2006). Being efficient converter of agro waste, bushes and tree leaves etc., goat possesses immense potential for commercial exploitation under intensive and semi-intensive system of management. This species of domestic livestock could be raised with zero financial input.

The present study was undertaken to study the effect of concentrate feeding on kids growth.

Materials and Methods

The study was undertaken on 12 apparently healthy Jammunapari kids, of average 9.18 kg body weight at three months of age, maintained in goat unit at the Apollo College of Veterinary Medicine, Jaipur. The data were generated during the winter months commencing from November to February 2008, when all experimental kids had to combat stress incidental to moderate to severe cold climate and winds etc. Further in order to over rule negative effect of worms *in situ* on weight gain efficiency and sexual maturity etc, each kid was dewormed with Albendazole (Valbazen, Pfizer) @ 7.5 mg/kg b.wt. orally. Flumethrin (Bayticol, Pfizer) an insecticide/ acaricide was also applied along the mid dorsal line from head to base of tail @ 1 ml/10 kg body weight to eliminate ectoparasites, if any. Kids were housed in asbestos sheds with kaccha sandy floor and were maintained under semi intensive system of management with 6 hour daily browsing the bushes and tree leaves etc. Besides, the kids were on routine feeding regime, comprising of dehydrated ground nut agro waste (GNAW) *ad lib* (90% DM) and standard concentrate mixture, compounded in the department. Its ingredient composition were *Bajra* 47%, *Guar korma* 12.5%, *Dal churi* 12.5%, wheat bran 12.5%, *Til* oil cake 12.5%, mineral mixture 2% (Gwala, Zydus Animal Health Ltd) and salt (1%). Free access to fresh and clean drinking water to kids was provided throughout the day. The experimental trial was for 120 days duration divided into 8 intervals of 15 days under each.

Fortnightly data on body weight gain were generated for each kid under standard condition and mean weight was calculated. Dry matter intake was ascertained by subtracting the left over feed from the total quantity of feed offered to each kid on day to day basis, assuming DM percentages in the ration components in the form of ground nut agro waste and concentrate mixture as 90%. DCP and TDN of the concentrate and roughage ration were 14.38% and 60.09% as stated in Table 1. Proximate principles were analyzed as per AOAC (1990). Calculated values of DCP and TDN were taken as reported by Reddy (2007) and Sen (1978). FCR was calculated at fortnightly interval following the standard method.

Cost economics was determined on the basis of actual cost of individual ration components (Rs. 9/- and Rs. 3/-, for concentrate mixture and ground nut agro-waste, respectively) and cost of live weight of animal @ Rs. 100/kg as prevailing cost in the local market at Jaipur (Deka, 2008) .

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Statistical analysis of data so generated was carried out as per method described by Snecedor and Cocharan (1990)

Results and Discussion

The chemical composition and nutritive values of GNAW and concentrate offered DM basis vis-à-vis net intake of DCP and TDN by the kids has been summarized in Table 1 and 2, respectively. The fortnightly weight gain by the kids have been plotted in Fig.1. It was observed that initial average body weight of kids was 9.18 ± 0.213 at the start of experiment. On an average each kid consumed 31.66 kg of GNAW and 30.83 kg of concentrate with a total feed intake of 62.49 kg on as fed basis equivalent to 56.25 kg on dry matter basis for 120 days i.e. 0.468 kg/kid/day.

Per kg metabolic body weight (g/kg$W^{0.75}$) intake of groundnut agro waste and concentrate per kg metabolic body weight (g/kg$W^{0.75}$) were 64 and 65 g, respectively, with a total intake of 129 g.

Intake of roughage concentrate ratio was maintained at approx 50:50 level. Each kid on an average gained 67 g/day biomass and a total of 8.06 kg biomass by the end of experimental trial. FCR and FCE recorded were 6.97:1 and 14.34 %, respectively.

Fortnightly data generated on live body weight gain by kids during the trial period (Fig. 1) revealed that each kid on an average gained 67 g/day when compared with documented optimum body weight gain of 90 g by Jammunapari kids aged 3-6 months (Rout *et al.,* 1998), it was observed that kids in present trial gained significantly lesser body weight than the optimum for this breed of goats.

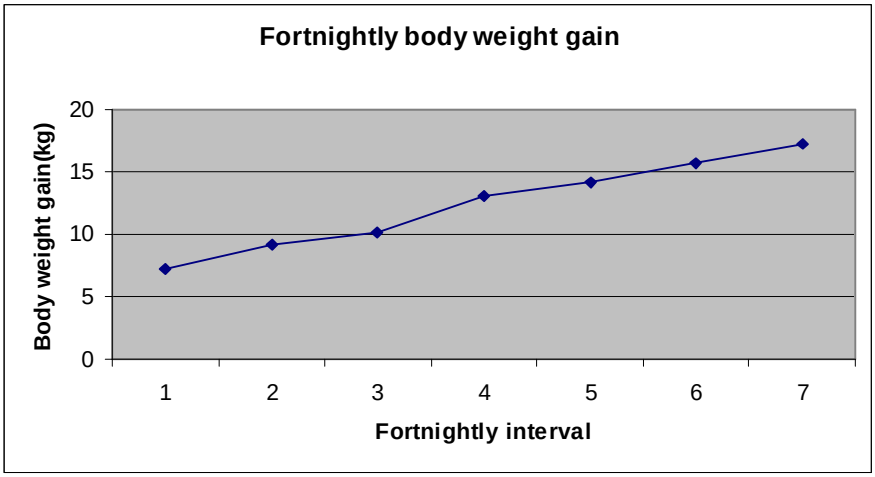

Fig.1: Body weight gain (kg)

The difference of 23 g/kid/day body weight gain of by kids in the present trial could be attributed to factors viz. nutritionally and climatically stressful period of peak winter months, variation in feeding regimen data as reported by different workers and sub clinical microbial infection which might have gone unnoticed during the course of study.

Table 1: Nutrient composition of feed

Component	GNW	Concentrate	Composite r-ration
DM	90	90	-
CP	10.5	19.8	-
EE	1	4.5	-
CF	40	9.6	-
Ash	8	9.4	-
NFE	42	56.5	-
Organic matter	92	90.6	-
DCP	8	14.38	11.19
TDN	53	60.09	56.5

The present findings reported herein are in agreement with Singh *et al.* (2007) who reported that kids born in autumn showed significantly higher weight gain (P<0.01) by 14.66% than those born in winter. The studies on range land from semiarid and arid regions revealed that herbage are nutritionally poor, being low in CP and high in structural carbohydrates, specially during post monsoon season. Crude Protein content of pasture decreased from 10% in monsoon to 4.4% in winter, also dry matter content increased and digestibility decreased due to higher cell wall content (Pachauri, 1988).

Afzal *et al.* (2004) also reported environmental effects viz. temperature, humidity and availability of good quality feed in sufficient quantity can effect the growth and production.

Table 2: Daily feed/nutrient intake of kids under trial

Ingredients	Quantity consumed
Concentrate (g)	231
GNAW (g)	237
Total (g)	468
Concentrate (g/kgW$^{0.75}$)	64
Concentrate (kg/100 kg b.wt.)	1.748
Groundnut waste (g/kgW$^{0.75}$)	65
Concentrate (kg/100 kg b.wt.)	1.794
Total (g/kgW$^{0.75}$)	129
Total (kg/100 kg b.wt.)	3.54
Daily total DCP (g) intake	52.10
Daily total TDN (g) intake	263

Table 3: Financial input/output analysis

Average initial body weight of kids (kg)	9.18±0.213
Market Value of starter kid @ Rs.100/kg (Rs)	918
Feeding cost per kid for120 days (Rs)	372.50
Total concentrate feed consumed 120 days (kg)	30.83
Cost of concentrate @ Rs. 9/kg (Rs)	277.47
Total roughage consumed 120 days (kg)	31.66
Cost of roughage @ Rs. 3/kg (Rs)	94.98
Total feeding cost (Rs)	372.50
Average final body weight of kids (kg)	17.24±0.512
Market Value of kid @ Rs.100/kg (Rs)	1724
Appreciation in market value of kid (Rs)	806
Net gain due to 120 days feeding (g)	433.50

Mahanta *et al.* (2003) reported that supplementation of concentrate feed @1% of body weight to local breed kids along with grazing resulted in average daily gain of 39.44 g/kid/day. Improvement in body weights of almost of similar kind in Jamunapari, Jhakrana, Parbatsar, Marwari and Black Bengal goats on supplementation of concentrate was reported by Patel *et al.* (1998) and Das and Ghosh (2001)

Cost Economics

Average total of feeding for the entire lot of twelve kids for 120 days experimental period was for concentrate mixture Rs. 9x 370 kg = Rs3330/-+ GNAW Rs.3 x 380 kg = Rs.1140/- with an overall cost of Rs. 4470 equivalent to Rs. 372.5 for each kid. The return from the average total body weight gain of 8.07 kg/kid per 120 days on taking the prevailing market rate Rs.100/kg was to be 8.07 kg x Rs. 100x12 = Rs. 9672 leaving net gain as Rs. 9672 – Rs. 4470 = Rs. 5202/- in 12 kids equivalent to Rs. 433.5 for each kid.

It was observed that goat kids on concentrate supplementation could sustain a body weight gain of 67 g/day during the environmentally and nutritionally stressful climate of the year.

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INDUCTION OF PARTURITION IN A HEIFER WITH CHRONIC CERVICO-VAGINAL PROLAPSE AND PROLONGED GESTATION

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Ante-partum prolapse in animals is a serious complicacy which leads to loss of production and the death of neonate and the mother if not treated properly in time. Ante-partum prolapse of vagina was the commonest form (Pandit *et al*., 1982) and most of the cases were recorded during advanced pregnancy from the 7th month of gestation (Raman and Bawa, 1977; Mishra *et al*., 1998). In the present case, treatment and management of ante-partum prolapse from 6th month of gestation and subsequent prolonged gestation and post partum prolapse after induced parturition in a crossbred heifer has been discussed.

Case history and Observations

A heifer of a progressive farmer of Saderbal, Srinagar, Kashmir had been showing 1st and 2nd degree of vaginal prolapse since 6th month of gestation. At 220 days of gestation, the vaginal prolapse progressed to 4th degree. The heifer was found lying on the ground and straining severely. The prolapsed vagina was smeared with dung and slight haemorrhage was also seen. The os cervix was protruded out. The ventral side of the prolapsed mass was more bulged.

Treatment and Discussion

The heifer was first administered 10 ml of Dicyclomine hydrochloride i/m (Spasmovet, Wockhardt India Ltd, Mumbai) to reduce the straining. After three hours, six ml of 2% Lignocaine hydrochloride (Xylocain) was injected as epidural anaesthesia. The prolapsed mass was cleaned and washed properly with cold water. Fifty ml of Povidone iodine solution (Betadine, Win-Medicare Ltd., New Delhi) was mixed with two litres of cold water for final washing of the prolapsed mass. First the ventral part of the vagina was lifted and it helped to urinate. Pressure was applied with the palm of both the hands and gradually the prolapsed mass was replaced. To prevent recurrence, a suture was applied around the vulva using Buhner's needle keeping four fingers dilatation between the vulvar lips. A double strand of saline pipe (drip set) was used as suture material.

Two ml of Duraprogen (dihydroxy progesterone caproate, Unichem Laboratories, Mumbai) was injected i/m to minimize the straining and also to reduce the contractions of the genital tract. Fluid therapy along with mild calcium (Rintose, Wockhardt Ltd., Mumbai) was also given to the animal intravenously @ 500 ml daily for two days as the animal was slightly off fed. Liquid vitamin mineral supplement was given (Ostovet liquid 50 ml orally; Glaxo India Ltd., Mumbai) once daily for twenty days to provide mild calcium for maintaining the uterine tone. Higher concentration of calcium was not given as it may cause increased uterine contractions and it is also a predisposing factor for milk fever. Antibiotic treatment (Wolicyclin DS 15 ml i/m; Wockhardt Ltd., Mumbai) was given for four days. The animal was also administered orally with probiotic (Biovet plus boli- 1½ boli; Wockhardt Ltd., Mumbai) twice daily for four days. Regular dressing of the vulva at the sites of the stitch was given with povidone iodine solution (Betadine). At the completion of 270 days the loop suture was removed. The heifer was healthy during the period. Ehsan *et al*. (2002) found the buhner's method most effective in treating vaginal prolapse during different stages of pregnancy in cows which agreed well with the present case. Buhner's suture was also used successfully in treating vaginal prolapse of ewes in south east Scotland (Scott and Gessert, 1998). Off and on the vaginal prolapse was seen when the animal was sitting on her hind limbs. However, it disappeared gradually, once the heifer remained in the standing position for some time. When the gestation length prolonged more than 280 days, the owner insisted for induction of parturition as the heifer was getting more uncomfortable due to the complicacy of vaginal prolapse. Generally in heifer the parturition occurs earlier than the pluriparous cows (Hafez, 1996). The prolongation of the gestation length might be due to the administration of progesterone during the last trimester of pregnancy (Noakes *et al*., 2001). By 285 days, the heifer was injected with 32 mg of Dexamethasone sodium (Dexa, 8 ml, Sarabhai Chemicals Ltd., Vadodora) intravenously to induce parturition. After 39 hours of the dexamethasone

injection the heifer calved normally without any assistance. The placenta was shed after five hours of calving. Devanathan and Quayam (1987) used 24 mg dexamethasone to induce parturition in buffaloes beyond 280 days of gestation with cervico-vaginal prolapse with calving within 48 h of the treatment. O-Farrell and Langley (1975) injected betamethasone between day 255 and 288 of pregnancy and reported calving within 4-5 days in most of the cows. They also found that cows treated earlier in pregnancy took longer to respond. Claydon (1984) injected betamethasone on day 280 of pregnancy or later and reported calving after 42 h. Intramuscular injection of 39 mg dexamethasone to Friesland heifers on day 267 of pregnancy caused induction of parturition in about 57 h (Terblanche *et al*., 1976). Less time required to induce calving in the present case might be attributed to the difference in the species and breeds of the animals, quantity of dose used and stages of gestation. The higher incidence of placental retention due to the induction of parturition with hormones as reported by the earlier workers (O-Farrell and Langley, 1975; Claydon, 1984; Prakash and Madan, 1986) was not found in the present case which might be due to the administration of calcium and phosphorus supplement during the ante-partum period to combat the ante-partum prolapse and also due to the induction made later than term. One and half hours after shedding of the placenta, the heifer again showed cervico- vaginal prolapse with protruding of two cervical rings. The animal was straining severely. Initially 10 ml of Spasmovet was given as i/m injection. After one hour, epidural anaesthesia was given and replacement of the prolapsed mass to the pelvic cavity was made. The buhner's suture was also applied but with only single strand of saline pipe. The cow was also treated with antibiotic and probiotic as given earlier. Ostovet was administered orally at the rate of 50 ml twice daily for 10 days for faster uterine involution. Cow with cervico-vaginal and uterine prolapse had lower calcium levels than the normal cows (Marques *et al*., 1996) which might have worked as a contributing factor to prolapse during puerperium. Vicenti *et al*. (1992) reported higher estradiol 17 â and lower serum calcium levels in pregnant cows with vaginal prolapse than their controls. Serum inorganic calcium and phosphorus levels were lower in ante-partum prolapsed cows and post-partum prolapse was also reported in same cows (Rathore *et al*., 1987). The recurrence of cervico-vaginal prolapse has also been reported after calving in cows with ante-partum prolapsed (Rathore *et al*., 1987). Regular dressing of the vulva at the sites of the stitch was given with povidone iodine solution (Betadine) for ten days. After fifteen days the loop suture was removed. The heifer was not showing the recurrence of prolapse. The heifer was completely recovered. However, the udder was affected with mastitis which was successfully treated.

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BIOCHEMICAL ALTERATIONS INDUCED BY EPIDURAL ADMINISTRATION OF LIGNOCAINE, XYLAZINE AND BUPIVACAINE IN PIGS

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ABSTRACT

Biochemical alterations following the epidural administration of xylocaine @ 1 ml/5 kg. b.wt. (Gr. I), xylazine @ 3 mg/kg b. wt (Gr. II) and bupivacaine @ 2 ml /5 kg b. wt. (Gr. III) were studied in pigs. Serum glucose level manifested statistically non-significant alterations in groups I and II but significant (p :S0.05) elevation was observed in group III animals. Serum urea exhibited non-significant alterations at different time intervals in all the groups. The serum creatinine levels manifested similar pattern of changes like serum urea in all the three groups. AST exhibited significant (P<0.05) alterations in group III, but the changes were marginal in groups I and II animals. However, normalization was discernible by 24 hrs.

Key words: Biochemical changes, pig, epidural, bupivacaine, xylazine, xylocaine

Introduction

Developing suitable anaesthetic regimen for the widely variant species in veterinary practice is appreciably a formidable task. Anaesthetic agent may be associated with some degree of hepatocellular or renal damage which is manifested in the form of changes in the values of blood AST, glucose, creatinine and urea etc. (Singh *et al.,* 1999). In the present study an attempt was made to document the changes in these clinically relevant bio-chemical parameters following epidural administration of lignocaine, xylazine and bupivacaine in pigs.

Materials and Methods

The present investigation was conducted on 15 clinically healthy pigs of either sex, aged 8-10 months and weighing between 10-25 kg. They were divided into three groups of 5 animals each. For the experimentation, three anaesthetic agents viz. lignocaine hydrochloride (Xylocaine 12%) @ 1 ml/ 5 kg b.wt., xylazine hydrochloride (Xylazin[**]) @ 3 mg/kg. b.wt. and bupivacaine hydrochloride (Sensorcaine[*] 0.5%) @ 2 ml/ 5 kg. b.wt. were employed to induce lumbosacral epidural analgesia in the animals of group I, II, and III, respectively. Blood samples were obtained before and after 1 hr, 2 hrs, 4 hrs and 24 hrs of drug administration for bio-chemical estimation of serum AST by 2, 4-DNPH method (Reitman and Frankel, 1957) and serum glucose by O-toludine method (Mark's, 1959). Serum creatinine and serum urea were estimated by Alkaline picrate method (Bonsnes and Taussky, 1945) and Diacetyl monoxime method (Wybenga *et al.,* 1971), respectively, using the standard kits of Span Diagnostic kit Pvt. Ltd. Surat, India. The quantitative estimates obtained were analyzed by one way analysis of variance (ANOVA) as per the method described by Snedecor and Cochran (1994).

Results and Discussion

Evaluation of biochemical parameters was done at different stages of observation (1, 2, 4 and 24 hrs) after the epidural administration of anaesthetic agents. Estimation done before the induction of analgesia (0 hrs) served as control value for the respective parameters (Table 1).

The alterations induced by xylocaine and xylazine in the glucose level were non-significant and marginal elevation, the peak being approximately 8.5 and 15%, respectively, at 4 hrs in group-I and 2 hrs in group-II. This observation in pigs, particularly in the context of epidural xylazine is quite different from the results obtained in other species. Eichner *et al.* (1979) reported very significant hyperglycaemia in beef cattle after i/v administration of xylazine. Similarly Brockman (1981) reported significant rise in glucose concentration after i/v administration of xylazine in cross breed sheep, the peak being at 30 minutes. Moderate hyperglycaemia was also observed when xylazine was administered i/m with ketamine in atropinized goats. (Ekka *et al.,* 1996). However, it is important to note that on all those occasions xylazine had been

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Table 1: Mean ±S.E. values of biochemical parameters following epidural administration of lignocaine, xylazine and bupivacaine hydrochloride

Parameters	Groups	Period (hours)				
		0	1	2	4	24
Serum glucose (mg/dl)	I	80.80±4.03	86.00±4.52	82.80±3.I2	87.60±2.77	81.50±3.02
	II	78.07±3.75	83.08±5.86	89.78±4.10	84.54±4.10	78.22±3.78
	III	70.58±1.44^{c}	78.02±1.27^{b}	85.60±1.54^{a}	86.30±1.47^{a}	70.77±1.61^{c}
Serum urea (mg/dl)	I	18.00±1.55	21.30±0.61	20.20±1.55	20.I9±1.11	18.08±1.57
	II	16.44±2.41	16.25±2.35	15.72±2.13	16.31±2.54	16.62±2.34
	III	13.88±2.17	13.28±2.83	14.88±2.31	16.88±1.83	13.90±2.18
Serum creatinine (mg/dl)	I	2.26±0.12	2.04±0.03	2.04±0.10	2.12±0.11	2.23±0.10
	II	2.04±0.16	2.03±0.I8	1.96±0.16	1.99±0.24	2.02±0.17
	III	2.02±0.15	1. 82±0.I5	2.00±0.17	2.10±0.16	2.04±0.15
AST (Unit/m!)	I	34.00±2.28	33.20±2.58	36.00±2.53	35.60±1.83	37.60±1.93
	II	37.20±2.06	40.20±3.23	42.00±2.75	44.20±3.38	38.20±1.56
	III	35.80±1.68^{b}	40.40±1.32^{ab}	44.40±1.40^{a}	42.40±2.03^{a}	37.40±1.60^{b}

Group I- Xylocaine; Group II- Xylazine; Group III- Bupivacaine
Means under same superscript in rows did not differ significantly (P>0.05)

administered by i/v or i/m route. Apart from the species difference, perhaps the route of administration and combination with other agent in later played a key in the differences in the metabolism of glucose subsequent to xylazine. However, Tiwary and Kumar (1996) reported significant increase in glucose after epidural administration of xylazine with local anaesthetic agents in experimental studies conducted on male buffalo calves.

Contrary to the observations in group I and II, elevation in glucose level was significant (P<0.05) in group III. However, the rise was only to the tune of 22.5 per cent. The peak increase was observed at 4 hrs when the serum glucose value elevated to 86.30 ±1.47 mg/dl from the preanaesthetic value of 70.58 ± 1.44 mg/ dl. But at 24 hrs the value had reached to the normal level (Table1). Significant increase in glucose has also been observed when bupivacaine was used along with alpha -2 agonist epidurally in male buffalo calves (Tiwary and Kumar 1996).

It is obvious from the results that serum urea and creatinine did not exhibit changes of any consequence (Table 1). Very marginal decline were well within the normal physiological range in all the three groups. Kumar and Thurmon (1979) also reported marginal alterations in the creatinine level in goats after the administration of xylazine. The AST level also did not exhibit any significant alteration in group I and II. In group Ill, it was significant (P<0.05), but clinically not appreciable. The peak increase was 44.4 ±1.4 U/ml at 2 hours from the preanaesthetic level of 35.8±1.6 U/ml. The probable reason for this rise in AST level could be due to marked struggling and temporary aggression during induction phase causing transient damage to the skeletal muscles and release of AST (Singh *et al.,* 1999).Since AST comes in the serum mostly from liver (Das, 1984) and also by damage of cardiac muscles, but in no way impairment of cardiac muscles could be attributed in this study as there was normalcy by 24 hours and other related clinical signs were normal.

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COMPARATIVE EVALUATION OF STATIC AND DYNAMIC VETERINARY INTRAMEDULLARY INTERLOCKING NAILING TECHNIQUE FOR FEMORAL FRACTURES IN CANINES

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ABSTRACT

The study was conducted on twenty four clinical cases of dogs with diaphyseal femoral fracture, divided in to four groups comprising of six animals in each group. The group I animals with transverse diaphyseal femoral fracture were treated with static intramedullary interlocking nailing with one proximal and one distal bolt. The group II animals were treated with dynamic intramedullary interlocking nailing with two distal bolts. The group III animals with oblique diaphyseal femoral fractures were treated with static intramedullary interlocking nailing with one proximal and one distal bolt and an ancillary cerclage wiring at the fracture site. Animals of group IV were treated with two distal bolts and an ancillary cerclage wiring at the fracture site. Bony union by negligible callus and early bone remodeling was the characteristic finding in group I and III where static intramedullary interlocking nailing was used. Bony union by excessive periosteal callus and early bone remodeling was characteristic finding in group II and IV where dynamic intramedullary interlocking nailing was used.

Key words: Dogs, femoral fracture, interlocking nailing

Introduction

Femur fracture is one among the common orthopaedic affections encountered in dogs (Aithal *et al.,* 1999 and Raghunath *et al.,* 2007). Fractures of shaft of femur are due to high energy trauma and therefore can result in life threatening injuries and also severe permanent disability (Kolata, 1974). Interlocking nail is a modified Steinmann pin having transverse holes designed to accommodate screws or bolts. The interlocking nail system is less expensive than a bone plate system, but has similar biomechanical properties (Beale, 2004 and Raghunath and Singh, 2002).Interlocking nails are inserted into the medullary canal and locked in place by screws or bolts inserted in the proximal and distal fracture fragments (static mode) or only on the proximal or distal fracture fragments (dynamic mode), (Dueland *et al.,* 1999). The precise veterinary interlocking nailing with external aiming device, Jig was used for repair of transverse and oblique diaphyseal femoral fracture in 24 clinical cases of dogs.

Materials and Methods

Dogs presented to Department of Surgery and Radiology Veterinary College Bidar with the history and clinical signs suggestive of femur fracture were subjected to detailed physical, orthopaedic and radiographic examination to confirm the diagnosis of femur fracture. Of these animals, twenty four animals with diaphyseal femur fracture free of other concurrent neurologic, metabolic or infectious diseases were selected and divided into four groups.

Group I: Six animals with transverse diaphyseal femur fracture were treated with static veterinary intramedullary interlocking nailing technique. In these animals, interlocking nail of diameter 5 mm (5 animals) and 6 mm (1 animal) were used. The different nail lengths used in this group were, 140 mm (2 animals), 160 mm (2 animals), 180 mm (1 animal) and 190 mm (1 animal).

Group II: Six animals with transverse diaphyseal femur fracture were treated with dynamic veterinary intramedullary interlocking nailing technique. In these animals interlocking nail of diameter 5 mm (5 animals) and 6 mm (1 animal) were used. The different nail lengths used in this group were as follows, 140 mm (1 animal), 160 mm (4 animals) and 180 mm (1 animal).

Group III: Six animals with oblique diaphyseal

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femur fracture were treated with static veterinary intramedullary interlocking nailing technique and an ancillary cerclage wiring at fracture site. In these animals interlocking nail of diameter 5 mm (5 animals) and 6 mm (1 animal) were used. The different lengths used in this group were, 140 mm (2 animals), 160 mm (3 animals) and 180 mm (1 animal).

Group IV: Six animals with oblique diaphyseal femur fracture were treated with dynamic veterinary intramedullary interlocking nailing technique and an ancillary cerclage wiring at fracture site. In these animals interlocking nail of diameter 5 mm (4 animals) and 6 mm (2 animals) were used. The different lengths used in this group were, 140 mm (4 animals), 180 mm (1 animal) and 190 mm (1 animal).

Locking bolts used were of self tapping type with a diameter of 3.0 mm with their length ranging from 16 mm to 26 mm in 2 mm increments.

In all animals' food and water was withdrawn for 12 hours before surgery. The affected limb hair was clipped and shaved from rump to hock region and scrubbed with chlorhexidine solution followed by application of surgical spirit. The dogs were given preoperative antibiotic ceftriaxone @ 20 mg/kg b. wt. i/m and anti-inflammatory meloxicam @ 0.5 mg/kg b. wt. i/m. The dogs were premedicated with atropine sulphate @ 0.045 mg/kg b.wt. i/m, followed by triflupromazine @ 1 mg/kg b.wt. i/v. After 15 minutes, anaesthesia was induced with 2.5% thiopental sodium @ 12.5 mg/kg b. wt. i/v. Anaesthesia was maintained using the thiopental sodium given in incremental doses to effect.

The animals were positioned in lateral recumbency with the affected limb at upper side and were adequately draped. Approach of the femur fracture was performed by cranio-lateral approach (Piermatti and Greeley, 1993). Post-operatively ceftriaxone @ 20 mg/kg b. wt. and meloxicam @ 0.5 mg/kg b. wt. i/m were given for 8-10 days. Surgical wound was dressed daily with Lorexane. The skin sutures were removed 10- 14 days after operation.

Clinical evaluation of animals of all four groups was done immediately after operation and on 3rd , 7th, 15th, 30th, 45th and 60th post-operative day for weight bearing (Functional outcome and lameness grade). Based on the periodical clinical examination, the functional outcome was assessed and categorized using classification devised by Fox *et al*. (1995) excellent-weight bearing without lameness, good-slight lameness principally after exercise, fair-slight to moderate lameness, but consistently weight bearing, poor-intermittent or consistent weight bearing lameness

Clinical lameness score (0-5) was given (Cook *et al.,* 1999): 0- no observable lameness,1- intermittent, mild weight- bearing lameness with little if any change in gait, 2- consistent, mild weight-bearing lameness with little change in gait, 3- moderate weight- bearing lameness , obvious lameness with noticeable "head bob'' and change in gait ,4- severe weight- bearing lameness- "toe-touching'' only, 5- non- weight bearing lameness

The affected bones were radiographed in lateral and cranio-caudal views before surgical treatment, intra operative, immediate post-operative day, 30th and 60th day from operation. Based on the periodic radiographs implant position, union of fragments, callus formation, and fracture healing was assessed.

Results and Discussion

In group I, five out of six animals (83.30%) started partial weight bearing by 1st postoperative day and these animals showed full weight bearing by 3rd post-operative day onwards. The functional limb usage by the end of 60th day in these animals was excellent. One out of six animals (case no.4) started partial weight bearing by 7th post-operative day and showed complete weight bearing only on 15th post-operative day. The functional limb usage by the end of 60th day was good.

In group III, five out of six animals (83.30%) started partial weight bearing by 1st post-operative day. These animals showed complete weight bearing by 3rd post-operative day. The functional outcome by end of 60th day in these animals was excellent. In one out of six animals started weight bearing on 7th post-operative day and this animal showed complete weight bearing by 15th post-operative day. The functional outcome by end of 60th day was excellent. The stable fixation with static intramedullary interlocking nail showed early weight bearing and good return of limb function. These result concurred with the finding of Dueland *et al*. (1996). They opined that static intramedullary interlocking nailing was clinically advantageous because of low infection rate, diminished blood loss, decreased rate of non-union and shortened hospitalization.

In group II, four out of six animals (66.67%) started partial weight bearing by 3rd post-operative day. These animals showed complete weight bearing by 7th post-operative day. The functional limb usage of these animals by end of 60th day was excellent. One out of six animals (case No.10) started partial bearing weight on 10th post-operative day and showed slight lameness principally after exercise by the end of 60th day and functional limb usage was good. One animal showed toe-weight bearing throughout study. Functional limb usage by end of 60th day was poor.

In group IV, four out of six animals started partial weight bearing by 3rd post-operative day. Animals showed complete weight bearing by 7th post-operative day. The functional outcome in these

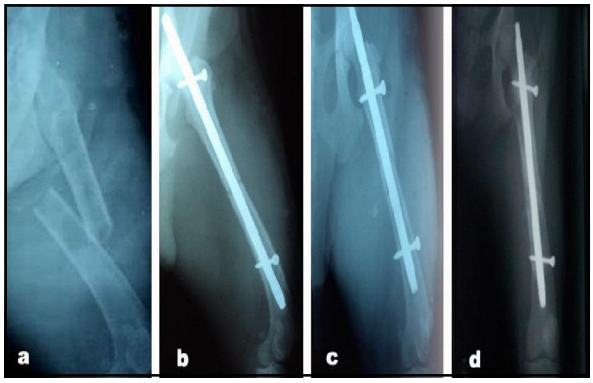

Fig. 1: Group I, a) Mid-diaphyseal transverse fracture b) immediate post-operative radiograph static IILN c) 30th post-operative day showing negligible callus. d) 60th post-operative day showing progressive healing with minimal callus.

Fig. 2: Group III, a) Mid-diaphyseal oblique fracture b) immediate post-operative radiograph static IILN c) 30th post-operative day showing progression towards fracture healing with negligible callus d) 60th post-operative day showing progressive healing with minimal callus and a faint radioluscent line still visible.

Fig. 3: Group II a) Mid-diaphyseal transverse fracture b) immediate post-operative radiograph dynamic IILN c) 30th post-operative day showing progression towards healing periosteal callus. d) 60th post-operative day showing periosteal bridging callus and moderate periosteal reaction.

Fig. 4: Group IV a) Mid-diaphyseal oblique fracture b) immediate post-operative radiograph dynamic IILN c) 30th post-operative day showing healing with periosteal callus bridging. d) 60th post-operative day showing complete obliteration of the fracture site by excessive periosteal callus.

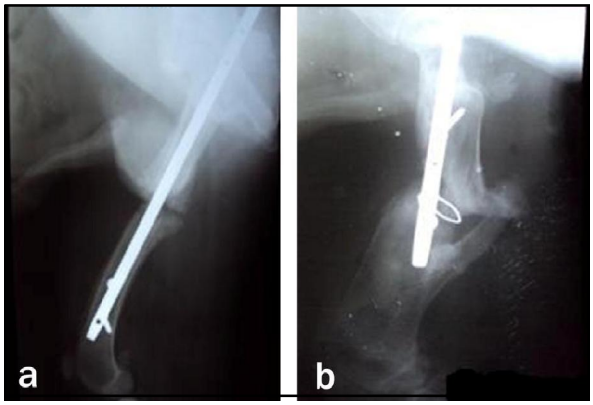

Fig. 5: Complications -a) Group II one infected animal showing delayed union, loosening distal bolt, excessive movement, more periosteal callus b) Group IV showing distal bolt near fracture site loosening and exuberant periosteal callus, malunion.

animals by end of 60th day was excellent. One animal started partial weight bearing by 7th post-operative day and complete weight bearing by 10th post-operative day. The functional limb usage by end of 60th day revealed slight lameness particularly after exercise, classified as good. One animal showed non weight bearing throughout study and functional outcome by end of 60th day was poor. The dynamic fixation done in group II animals resulted in movements of fracture site and delay in weight bearing, leading in poor results as compared to static fixation groups viz., group I and III.

In group I, all animals showed a gradual reduction in lameness in post-operative days. In five out of six animals (83.30%) there was no observable lameness by the end of 60th day. In one animal lameness gradually reduced to intermittent mild weight bearing lameness by 60th post-operative day.

In group III, all animals showed gradual reduction in lameness. By end of 60th day all the animals showed no observable lameness. The lameness decreased to nil by 60th day. This finding was in agreement with the findings of Endo *et al.* (2003) and McLaughlin (1999), they stated that grades of lameness for subsequent post-operative days gradually decreased in intramedullary interlocking nailing technique of fracture repair.

In group II, five out of six animals (83.30%) showed a gradual reduction in lameness. Out of five animals four animals showed no lameness by the end of 60th day, while one animal showed intermittent mild weight bearing lameness by the end of 60th day. One animal showed lameness with toe-touching and by end of 60th day, non weight bearing lameness was observed.

In group IV, five out of six animals (83.30%) showed a gradual reduction in lameness. These animals showed no observable lameness by end of 60th day. One animal showed lameness with toe touching and by end of 60th day non-weight bearing lameness was observed.

In group I and III where static interlocking nailing was done, the animals showed a rapid reduction in lameness when compared to dynamic fixation groups II and IV. This might be due to the fact that static interlocking nailing provides stable fixation and no fragment movement.

In group I animals, radiographs taken immediately after fracture repair, showed excellent reduction and perfect alignment of fracture fragments in all the animals (Fig. 1b). The gaps existing between the fracture fragments were negligible. The interlocking nails were seated up to distal metaphysis in five animals and up to distal diaphysis in one animal. On day 30th, all the animals implants were well positioned in static fixation mode and showed correct fragment alignment and appropriate progression towards healing, with negligible callus and presence of a radioluscent line and mild periosteal reaction at the fracture site (Fig. 1c). On day 60th, all the animals implants were well positioned and fragments showed correct alignment and appropriate progressive healing with minimal callus and cortical continuity at the fracture site (Fig. 1d).

In group III animals, radiographs taken immediately after fracture repair showed excellent fracture reduction and perfect fragment alignment. The interlocking nail was seated up to the distal metaphysis in four animals and in two animals up to distal third of diaphysis (Fig. 2b). On day 30th, all the animals implants were well positioned in static fixation mode and fragments correctly aligned with progression towards fracture healing and negligible callus with minimal periosteal reaction. The radioluscent line was visible at the fracture site (Fig. 2c). On day 60th, implants were well positioned in all the animals and fragments correctly aligned progressive healing, minimal callus and a faint radioluscent line still visible at the fracture site (Fig. 2d).

Appropriate progression towards healing with minimum callus formation around the fracture site with no periosteal callus was noticed in all the animals of group I and III by 30th post-operative day and callus bridging the fracture site by 60th day. This finding was in agreement with the findings of Moses *et al.* (2002), Durall and Diaz (1996) and Duhautois (1995). Static intramedullary interlocking nailing done in these animals caused stable fixation, direct bone healing with bridging callus. In static fixation mode one animal proximal locking bolt got loosened resulted in delayed healing with occurrence of periosteal reaction.

In group II animals, radiographs taken immediately after fracture repair, showed good alignment and excellent reduction in all the animals (Fig. 3b). The interlocking nail was seated up to distal metaphysis in four animals and seen up to distal third of diaphysis in two animals. On day 30th, implants were seen well positioned in dynamic fixation mode and showed correct fragment alignment with progression towards healing periosteal callus and moderate periosteal reaction near fracture site (Fig. 3c). On day 60th, implants were well positioned and fragments correctly aligned in all the animals. Five out of six animals showed progression towards healing with periosteal bridging callus and moderate periosteal reaction at the fracture site (Fig. 3d). In one animal, excessive periosteal callus, loosening of distal bolt and radioluscent line at the fracture line indicating delayed union was noticed.

In group IV animals radiographs taken immediately after fracture repair showed well positioned implants, correct fragment alignment and nail seated up to distal metaphysis (Fig. 4b). On day 30th, implants were well positioned, fragments properly aligned and all the animals showed progression towards healing with periosteal callus bridging the fracture site (Fig. 4c). On day 60th, implants were well positioned in five out of six animals. All these animals showed complete obliteration of the fracture site by excessive periosteal callus (Fig. 4d). In one animal, malalignment of the fracture fragments exuberant periosteal callus bridging at the posterior aspect only indicating malunion was noticed.

In group II and IV animals excessive periosteal callus was noticed in 30th day radiographs and exuberant bridging periosteal callus by 60th day was noticed. In dynamic fixation mode fracture site instability and movement caused excessive callus formation. In majority (83.33%) of animals of these

groups fracture healed by exuberant periosteal bridging callus. In group II, one animal showed infection, delayed union, loosening distal bolt, excessive movement, more periosteal callus and non weight bearing (Fig. 5a). This animal developed infection due automutilation immediate post-operatively. In group IV, one animal showed distal bolt near fracture site loosening and exuberant periosteal callus, malunion, non weight bearing and imperfect fragment alignment (Fig. 5b). In this animal pre-existing infection was present due to dog bite. Osteomyelitis developed in this animal resulted in bolt loosening, delayed union, malunion or non-union as suggested by Duhautois (2003).

Static intramedullary interlocking nailing afforded good realignment of fracture fragments, rapid regeneration, and union of fracture by minimum callus formation resulted in early functional usage of limb. Complete obliteration of the fracture site occurred by day sixty in majority of the animals (83.33%).

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SURGICAL MANAGEMENT OF OSTEOSARCOMA OF DIGITS IN A DOG- A CASE REPORT

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Bone neoplasia is a common cause of pathological fracture in the dog. Osteosarcoma is a malignant neoplasm charaterised by formation of osteoid tissue. It is the most frequent primary bone tumour in dogs accounting for 80% of bone tumours (Chun, 2005). Radiograph usually reveals primarily osteolytic lesion, with minimal periosteal changes, which may give a sun burst appearance (Garzotto and Berg, 1993). Present report deals with management of osteosarcoma of digits in a dog.

Case history and observations

A nine-year old-male spitz weighing 8 kg was presented with the complaint of swelling in the left fore limb and lameness for the past one month. Physical examination revealed a hard ulcerated swelling on the left fore digits (Fig.1). Radiograph of the affected limb revealed sun burst appearance with severe periosteal reaction. Radiograph of thorax revealed mild pulmonary infiltration. Temperature, respiratory, pulse and heart rates were within physiological limits. Heamatobiochemical values revealed no significant changes. Hence, this case was tentatively diagnosed as a case of osteosarcoma and it was decided to perform surgical amputation of affected limb, as the bone tumours are relatively resistant to chemotherapy.

Treatment and Discussion

The animal was premedicated with atropine sulphate @.044 mg/kg b.wt. s/c and xylazine hydrochloride @1.0 mg/kg b.wt. i/m. After 10 minutes anaesthesia was induced with propofol @ 4.0 mg/kg b.wt. i/v. After the preparation of the site, incision was made at the level of proximal one-third of humerus. Muscle belly was resected after ligating the arteries and veins to expose the shoulder joint. Scapular disarticulation was performed and muscle belly was sutured over it. Skin was apposed with simple interrupted sutures using silk No.1.

Histopatological examination of bone growth revealed large number of proliferating osteoblasts consisting of hyperchromatic nuclei along with more number of multinucleated giant cells (Fig. 2). Post

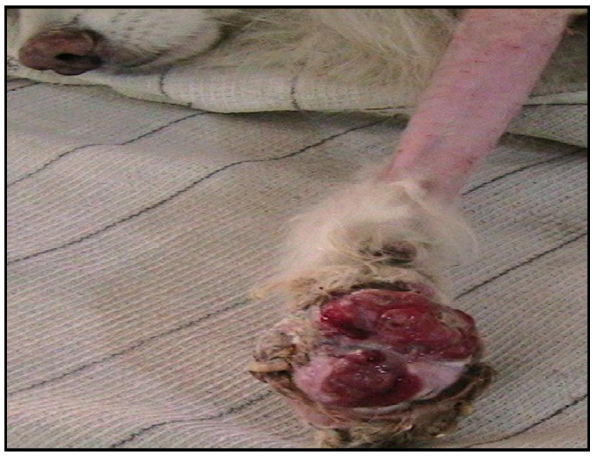

Fig.1: Hard ulcerated swelling on the left fore limb

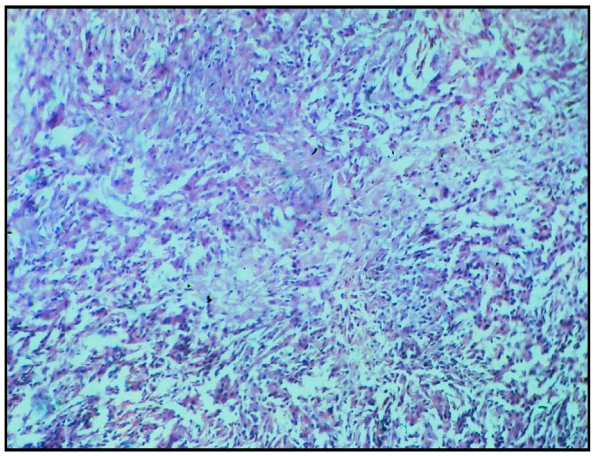

Fig. 2: Photomicrograph showing proliferating osteoblasts and many multinucleated giant cells

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operatively, Ceftriaxone was administered @ 20.0 mg/kg b.wt. i/v and Meloxicam @ 0.50 mg/kg b.wt. s/c for five days. Wound was dressed on alternate days and sutures were removed on 10th day post-operative.

The osteosarcoma is a locally invasive condition and can also metastasize to lungs and other body sites (Weinstein *et al*., 1989 and Kuntz *et al*., 1998). Different workers have reported the medical treatment with little success (Miller *et al*., 2006 and Walter *et al*., 2006). Amputation was recommended by Langenbach *et al*. (1998). In the present report amputation of affected limb was done.

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EFFICACY OF $PGF_2\alpha$ WITH OXYTETRACYCLINE IN TOXIC PUERPERAL METRITIS IN COWS

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Toxic puerperal metritis is one of the major reproductive disorders in dairy cattle. It results in heavy economic losses due to reduced milk yield, low fertility and high treatment cost. The present study was aimed to evaluate the efficacy of prostaglandin with oxytetracycline in puerperal metritis in cows.

Case history and observations

A total of 16 Holstein Friesian crossbred cows 10-14 days post-calving in their 2nd to 5th lactation were presented with the history of anorexia, depression, mild dehydration, reduced milk yield and foetid vulvar discharge. All cows showed pyrexia (103-105.5˚F), respiratory distress, ruminal atony, soiled perineal region and slight abdominal straining.

Per rectal examination revealed flaccid, doughy, non-retractable uterus suspended on pelvic brim with partially opened cervix. Out of 16 cows, in 4 cows, caruncles were palpable with large size middle uterine artery with characteristic fremitus like pulsation. Five cows suffered with retained foetal membrane that was removed manually by local veterinarian. Two cows showed milk fever on 2nd day post-calving. Remaining 5 cows presented only puerperal metritis. Uterine discharge was collected from all the animals aseptically and subjected to antibiotics sensitivity test with only oxytetracycline.

Treatment and Discussion

All reported cases were treated with $PGF_2\alpha$ (Dinoprost triomethamine 5 mg/ml) (Inj. Lutalyse, M/s Pfizer Animal Health Division, Mumbai-400021) @ 5 ml i/m on the first day followed by intrauterine oxytetracycline (50 mg/ml) (Liquid Terramycin, M/s Pfizer Animal Health Division, Mumbai-400 021) @ 60 ml daily for 5 days. Fluid therapy and required supportive treatment for three days were administered. Milk fever affected cases were treated with calcium borogluconate (Inj. Thiacal, M/s Wockhardt Ltd., Aurangabad) @ 250 ml per day for three days.

All treated animals expelled out about 12 litres of uterine discharge within three days. Uterine involutions were found to be around 50% on day 3rd and 80% on day fifth.

Caruncles were involuted completely on day 5 after treatment. Rectal temperature fell to normal values and pulsation of middle uterine artery became normal. All the animals resumed feeding after 5 days of treatment.

Toxic puerperal metritis is a disease characterized by pyrexia, anorexia, depression, dehydration, reduced milk yield and foetid watery uterine discharge (Oslon *et al*., 1986; Smith *et al*., 1998). Similar findings were recorded in the present study. In the present study, incomplete involution of middle uterine artery and caruncles was observed in 50% cases.

The disease developed within 10-14 days post-calving i.e. early in the post-partum period. These findings are similar with the earlier findings of Gilbert and Schwark (1992) who reported the disease occurrence within 1st week post-partum. The Toxic puerperal metritis is observed as acute condition due to involvement of highly pathogenic organism and other predisposing factors like stress, poor resistance of the cow, etc.

In addition, recent studies recommend the usage of oxytetracycline in the systemic treatment of cows affected with toxic puerperal metritis (Drillich *et al*., 2001 and Sheldon *et al*., 2004).

Normal myometrial activity of the uterus is greater at calving and decreases drastically around 7 to 9 days post-partum (Gajewski *et al*., 1999). Although inflammed uterus in metritis produces additional prostaglandin, the uterine musculature does not respond to this endogenous prostaglandin and involution process is delayed (Kindahl *et al*., 1999). Exogenous administration of $PGF_2\alpha$ by day 10-14 played a vital role in clearing debris from the uterus by increasing myometrial activity and uterine contractility (Gajewski *et al*., 1999).

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PREVALENCE OF REPRODUCTIVE PATHOLOGY IN STRAY BITCHES IN AND AROUND JODHPUR

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ABSTRACT

The genital tracts of 480 bitches were examined at Animal Hospital of Marwar Animal Protection Trust after spaying from January to December 2007. Of the 480 bitches (217) 45.2% had genital pathologies found in the ovaries. The most frequent pathologies found in the ovary and vagina were epoophoron cysts (5%) and transmissible venereal tumours (13.12%). Cystic endometrial hyperplasia (2.5%) and delayed puberty (5.6%) were also found. Pyometra was found in 3.95% of the bitches. Ovarion atrophy, granulose cell tumours, unilateral aplasia (uterus), uterine granuloma and carcinoma and vaginal septum were recorded in bitches which were less than one per cent. Follicular cyst oophoritis, endometerial cysts, fibroleiomyoma, vaginal polyp, lymphocytic hyperplasia were found between one to three and half per cent.

***Key words*:** Bitch, genital pathologies

Introduction

The reproductive physiology of the bitch has peculiarity of having interoestrus interval much longer than that observed in other domestic species. The bitches are considered as monoestrus with their oestrus occurring independent of season (Smith and Reese, 1968).

The objective of the present study was to determine the prevalence of reproductive pathologies in stray bitches.

Materials and Methods

The study was conducted on stray female dogs brought to animal hospital of Marwar Animal Protection Trust, Jodhpur (Rajasthan, India) for spaying under animal birth control programme. Each month, 40 bitches, above one year of age, were randomly selected from the shelter. The entire genital tracts (ovaries to uterus) were recovered immediately after spaying and macroscopically evaluated for gross abnormalities. The number of corpora lutea (CL) were counted after slicing the ovaries. The stages of the ovaries, uteri body and horns were measured and weighted and piece of each uterine horn was placed in 10 per cent neutral buffered formalin.

Results and Discussion

The reproductive pathologies observed in this study are listed in Table 1. Two hundred and seventeen (45.21%) of the 480 bitches examined had at least one macroscopic or microscopic pathology. Ovarion cysts, particularly epoophoron cysts were common in the ovaries, whereas pyometra and canine transmissible venereal tumours (CTVTs) were the main pathologies in the uterine tract and vagina, respectively. At the level of the uterine horns, twelve cases (2.5%) of cystic endometerial hyperplasia were found. There were three cases of unilateral aplasia of the uterine horns and one case of uterine carcinoma. Delayed puberty was diagnosed in 27 bitches (5.6%). Follicular cyst (3.5%), oophritis (1.45%), endometerial cyst (1.25%), fibroleiomyoma (1.04%), vaginal polyp (1.66%), lymphocytic hyperplasia (1.04%) were recorded in stray bitches.

Prevalence studies of genital pathologies in bitches are scarce. Ovarian cysts are common in the dog (Dow, 1960) and are classified according to their origin as cysts in or around the ovary (McEntee, 1990). The term paraovarian cysts refer to the remnants of the cranial or caudal mesonephric tubules; these cysts are classified as epoöphoron or paroöphoron cysts, respectively (McEntee, 1990). In the present study only epoöphoron cysts were found. Follicular cysts in the bitches have been reported with incidence between 3% (McEntee, 1990) and 16% (Dow, 1960). The other ovarian pathologies found in the present study are uncommon in the dog, but have been reported earlier. Ovarian neoplasia was reported in 1 (Cotchin, 1954) to 6% of bitches (Dow, 1960), with a higher incidence of epithelial neoplasia such as adenocarcinomas and adenomas. Oophoritis is rarely reported in the dog.

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Table 1: Frequency of reproductive pathologies in stray bitches (n=480) in Jodhpur

Ovarian pathologies		Number	Percentage (%)
A	Epoophron cysts	24	5.0
B	Follicular cysts	17	3.5
C	Ovarian cystadenoma	05	1.04
D	Ovarian atrophy	04	0.83
E	Oophoritis	07	1.45
F	Granulosa cell tumour	04	0.83
Uterine pathologies			
A	Cystic endomaterial hyperplasia	12	2.5
B	Unilateral aplasia	03	0.62
C	Uterine granuloma	02	0.41
D	Uterine carcinoma	01	0.20
E	Pyometra	19	3.95
F	Endomaterial cysts	06	1.25
Vaginal Pathologies			
A	CTVT	63	13.12
B	Fibroleiomyoma	05	1.04
C	Vaginal polyp	08	1.66
D	Vaginal septum	03	0.62
E	Lymphocytic hyperplasia	05	1.04
Other			
A	Delayed puberty	27	5.6
B	Oviduct cysts	02	0.41
	Grand Total	217	45.21

Cystic endometrial hyperplasia is a pathological lesion that occurs during dioestrus and predisposes for the development of pyometra. A 9% incidence of CEH-pyometra was reported (Ewald, 1961), but its real frequency is difficult to determine because the incidence increases with age and can also be artificially induced with hormonal compounds. Twenty five of the insured dog population developed pyometra (Egenvall *et al*., 2001).

Transmissible venereal tumour (TVT) is a disease present throughout the world but most commonly found in tropical and subtropical regions where large population of free roaming dogs exist (Rogers, 1997). A 15.3% prevalence of TVT has previously been reported in a study of stray bitches in Yucatan, Mexico (Ortega-Pacheco *et al.*, 2007). It is almost similar to the pesent study (13.12%). The prevalence of TVT was up to 37% when the density of stray dogs was high (Batamuzi *et al*., 1992). It is due to factors like uncontrolled breeding.

In mongrel bitches, puberty occurred between 9 and 14 months of age, i.e. earlier than in purebred bitches reared in the same colony (Hancock and Rowlands, 1949). In the present study, low ovarian weight and absence of structures that indicated previous ovarian activity, plus low uterine weight and body size with respect to age, were indicators of delayed puberty.

Acknowledgements

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MINERALS PROFILE OF LACTATING MARATHWADI BUFFALOES

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ABSTRACT

Sixty apparently healthy lactating Marathwadi buffaloes yielding 1.75 to 3.5 litres/day, 1.5 to 3.5 months post-partum and maintained solely on dry fodder with no/ small quantity of concentrate and mineral supplementation were subjected to serum mineral analysis. The serum macro-mineral analysis results revealed maximum occurrence of phosphorus deficiency in 51.67% animals followed by magnesium 28.33%, calcium 21.67% and chloride deficiencies in 15% animals, whereas among micro-minerals deficiency, the iron deficiency was noticed in 11.67% and zinc deficiency in 5% animals were noticed.

Key words: Minerals profile, Marathwadi buffalo, Minerals deficiency.

Introduction

Serum minerals values significantly and constantly above or below normal concentration or physiological ranges provide suggestive but not conclusive evidence of dietary excess or deficiency of particular mineral (Underwood, 1981). Milk producing animals are more vulnerable to clinical or subclinical minerals deficiency disorders as they are constantly being depleted of their valuable minerals reserves by virtue of loss in milk. Therefore, an investigation was undertaken to study mineral status of lactating Marathwadi buffaloes during summer season.

Materials and Methods

Sixty apparently healthy lactating Marathwadi buffaloes yielding 1.75 to 3.5 litres/day and 1.5 to 3.5 months post-partum were selected for the present study. All the buffaloes were dewormed before start of the experiment. The buffaloes selected were not receiving any mineral supplementation and were maintained solely on dry fodder with small quantity of concentrate. No change in feeding regimen, was made throughout the study period. About 15-20 ml of blood from jugular vein of animal was collected for separation of serum. The serum macro-minerals such as calcium, phosphorus, magnesium, sodium, potassium, chloride and micro-minerals such as copper, iron and zinc were estimated on semi automated biochemical analyzer using standard diagnostic kits supplied by Lab-care Diagnostics, Gujarat and Coral clinical systems, Goa.

Results and Discussion

In the present study, serum calcium in lactating buffaloes ranged between 7-11mg/dl with an average value of 8.38±0.13mg/dl. Out of 60 lactating buffaloes, 13 (21.67%) were deficient in calcium when critical level was considered 8 mg/dl. Similar observations have earlier been reported (Lane *et al.*, 1968; Amrith kumar *et al.*, 1973 and Georgievskii *et al.*, 1982). The lower serum calcium values observed in 21.67 per cent buffaloes in present study might be due to drainage of calcium through milk coupled with inadequate supply during lactation (Biswas and Samanta, 2002).

The mean serum phosphorus level in lactating buffaloes was observed as 4.57±0.11mg/dl with range 3-6 mg/dl. In 31 out of sixty lactating buffaloes, serum phosphorus values were found below the critical level (<4.5mg/dl), indicating its deficiency in 51.67 per cent animals. The present findings are in agreement with Bhikane (2000) who reported 38.89 per cent incidence of hypophosphataemia in lactating buffaloes during summer. The higher percentage of phosphorus deficiency in lactating buffaloes may be attributed to sole feeding of dry roughages which are very poor in phosphorus.

Although mean serum magnesium values (2.26±0.09 mg/dl) in lactating buffaloes were higher than critical values (>2 mg/dl), 28.33 per cent (17 out of 60) animals were found deficient in magnesium (<2 mg/dl). The occurrence of hypomagnesemia in present study could be attributed to continuous drainage of magnesium through milk and poor availability of feeds and fodders rich in magnesium (Kawitkar, 2004).

The sodium level ranged between 134-148 mmol/L indicating absence of sodium deficiency in lactating buffaloes. This might be due to common adopted practice of feeding salt in the area under study. The serum potassium was found in the range 5.05-5.15 mmol/L which indicated absence of potassium deficiency in lactating buffaloes of the

area. The present findings support the observations of Sharma *et al.* (2004) who reported that the potassium deficiency usually does not occur under natural conditions because potassium content of forages is generally very high.

In present study, serum chloride level was found in the range of 94-109 mmol/L with mean value of 98.25±0.50 mmol/L. In 9 buffaloes, chloride was found below 95 mmol/L, indicating 15 per cent prevalence of chloride deficiency. It has been reported that the chloride depletion may occur in hot climate when cows are exposed to 40°C for 6-7hrs/ day and under such conditions more chloride is lost through sweat (Sharma *et al.*, 2004).

The mean serum level of copper noted in present study was was 80.07±1.00 µg/dl which was within the normal range 69-100 µg/dl. None of the lactating buffalo was found deficient in copper, where critical level considered was 60 µg/dl. However, copper deficiency in lactating Deoni cows was 13.88 per cent as recorded by Kawitkar (2004). The low copper concentrations in the blood serum during summer have been reported earlier by Patel *et al.* (1967) and Radostits *et al.* (2007).

The serum Fe values ranged between 98 to 116 µg/dl with mean value of 105±0.66 µg/dl in healthy lactating buffaloes. The present findings are in agreement with Georgievskii *et al.* (1982) who reported Fe content in dairy cows to be 100 ìg/dl. In present study, 11.67 per cent lactating Marathwadi buffaloes were found to be iron deficient.

The average serum Zn value recorded was 85.12±0.68 µg/dl which was well above the critical level of 80 µg/dl suggested by McDowell *et al.* (1984). Five per cent buffaloes were found deficient in Zn. Parshad *et al.* (1979) noted the same trend of lower percentage deficiency of Zn in buffaloes. The low serum Zn content noticed in lactating buffaloes may be due to drainage of Zinc through milk as reported in other ruminants (Biswas and Samanta, 2002).

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CONSTRAINTS PERCEIVED BY FIELD VETERINARIANS FOR PROVIDING ANIMAL HEALTH SERVICES IN ARID ZONE OF RAJASTHAN[#]

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ABSTRACT

The constraints perceived of veterinary officers providing animal health services in remote areas of rural Rajasthan (India), have been highlighted. Rank Based Quotient (RBQ) was calculated for each constraint reported by the veterinary doctors. The problem having highest RBQ value emerged as most serious constraint. Inadequate infrastructure facilities available at hospital had highest RBQ value of 98.95, thus reported as most serious constraints by veterinary officers in delivering effective animal health services. Lack of transport facilities in village was considered as second most serious constraint with RBQ value of 92.18. Inadequate supply of medicines in hospital was considered as third most serious constraint with RBQ value of 88.01.Remote and larger area for coverage, more targets of AI, deworming and castration, late reporting of cases at hospital etc. were reported as other common constraints.

Key words: Field veterinarians, animal health services, constraints, pastoralists, Rajasthan.

Introduction

Veterinary services are poorly developed in many developing countries and this situation is more evident in remote and dry land areas inhabited by pastoral and agri- pastoral communities. The large and scattered area, harsh climate, poor infrastructure and relatively small human population are some of the characteristics of such areas. Catley *et al*. (1998) reported that besides, professionals from other ethnic groups were also found reluctant to work in pastoral areas due to unavailability of required facilities including physical facilities, diagnostics, equipments etc. Catley (1999) emphasized that very little research has been conducted on animal diseases under livestock production systems that affect the livestock of pastoralists and relationship between animal diseases and pastoral livelihood. Swift *et al.* (1990) also emphasized the need of providing veterinary services to the pastoralists. Reports from Ethiopia (Godana, 1993); Eritrea (FAO, 1994); Uganda (Catley *et al*., 1998) and Kenya (Tambi *et al.,* 1997) revealed very little progress in the development of veterinary services in pastoral areas during the last twenty years or so. Present study was undertaken to explore the different constraints faced by veterinary officers for providing veterinary services among pastoralists.

Materials and Methods

The data were collected from twelve veterinary officers providing animal health services through veterinary hospitals covering the areas about 350 kms in Bikaner and Jaisalmer district of Rajasthan. Interview schedule and discussion method were used as tools of data collection. Departmental documents, records, reports and other available literature were also consulted to collect secondary data. The collected data were compiled, tabulated and analyzed statistically by using rank based quotient along with descriptive writing. For calculating RBQ value a list of constraints was prepared after informal discussion and RRA method with respondents. Once the constraints were identified, each respondent was asked separately to assign a rank against each of listed constraints according to its perceived severity of impact on delivering effective animal health services. Rank Based Quotient (RBQ) was calculated on the basis of rank assigned by each doctor to each constraint. The problem having highest RBQ value emerged as most serious constraint reported by the veterinary doctors. Thus, each respondent had his own independent opinion regarding the seriousness of the problem faced by him. On the basis of ranks provided by the respondents, rank based quotient (RBQ) for each problem was calculated by using following formula:

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$$RBQ = \sum_{i=1}^{n} \frac{fi\,(n+1-i)}{Nn} \times 100$$

Where,

F_i = the frequency of respondents for the i^{th} rank of the problem

N = the total number of respondents

N = the number of ranks

Results and Discussion

The constraints perceived by Veterinary Officers are presented in Table 1. Effective and efficient service delivery is vital to any animal health systems. However, it depends on various factors, which, when deficient, may be detrimental to the service. Findings indicates that inadequate infrastructure facilities available at hospital had highest RBQ value 98.95, thus reported as most serious constraints by veterinary officer in delivering effective animal health services. Poor water and electricity supply, lack of equipments and instruments available in the veterinary hospital, forced them to refer the case to polyclinic at city or town. Thus, lack of proper instruments and other required facilities in hospital, made the doctors paralyzed to handle emergency cases. Further, lack of transport facilities in village was considered as second most serious constraints with RBQ value of 92.18. It unables the farmers in bringing serious cases at hospital for treatment and also to call doctor for home visit due to non availability of transport facility at veterinary hospital. In this way, lack of transport facilities hindered pastoralists to approach at hospital with diseased animals and also an obstacle for veterinary doctor to visit at livestock owners door step for delivering health services. Inadequate supply of medicines in hospital was considered as third most serious constraint

Table 1: Constraints perceived by veterinary officers (N=12)

S.No.	Constraints	RBQ Values	Ranks
1.	Remote and larger area for coverage	65.62	VI
2.	Political involvement	45.30	X
3.	Lack of mobile unit/office vehicle	54.16	VIII
4.	Lack of transport facilities in village	92.18	II
5.	Low emoluments	7.62	XVI
6.	Inadequate infrastructure and communication facilities at hospital	98.95	I
7.	Inadequate supply of medicines	88.01	III
8.	Frequent transfers	13.00	XV
9.	Risk of personal hazard/injury	26.03	XIII
10.	Lack of adequate inservice training and refresher courses	13.53	XIV
11.	More targets of AI, deworming and castration	78.74	IV
12.	Unwillingness of pastoralists to pay for service	40.62	XI
13.	Demand of medicines by pastoralists from hospital at free cost	46.34	IX
14.	Late reporting of cases at hospital	77.59	V
15.	Lack of equipments and laboratory support	65.07	VII
16.	Poor condition of hospital quarters	34.36	XII

with RBQ value of 88.01. According to veterinary officers, general medicines were generally not being adequately supplied in hospital except during organization of animal health camps during drought/ famine time. Besides, more than required target for AI and castration (78.74), late reporting of case (at morbid and chronic stage) by pastoralists (77.59), larger area for delivering animal health services (65.62), lack of stock vaccines due to absence of refrigerator (65.07), lack of mobile veterinary unit to cover remote area (54.16), free demand of medicines by pastoralists from hospital (46.34), political intervention (45.30), unwillingness of pastoralists to pay for private services (40.42), lack of electricity and water supply at hospitals (34.36), personal hazards while attending the cases (26.03), lack of adequate training and refresher courses in disease diagnosis and treatment (13.53), problem of frequent transfer (13) and low emoluments (7.62) were other constraints perceived by veterinary officers in delivering the effective animal health services in pastoral areas. Odeyemi (1994) also reported that high cost and non-availability of drugs and inputs, lack of transport, poor remuneration and inadequate public awareness were the top major constraints perceived by veterinary officers for veterinary working in Nigeria. However, Cheneau (1985) reported that low morale, specially among young staff, too low salaries, lack of equipments for work and poor transport facilities were the major constraints for veterinary services in Africa. Sasidhar *et al.* (2001) observed that majority of veterinary assistant surgeons in Andhra Pradesh reported inadequate supply of medicines by the department, lack of knowledge and skills of advanced surgical techniques and treatments, lack of guidance by superiors and non cooperation from livestock owners were the major constraints for delivering of veterinary services. The other constraints perceived in order were non-cooperation from the departments, lack of infrastructure to organize training programmes, unnecessary transfers, pending claims, lack of contact with research scientists and inadequate technical resources. Sen (2001) found that weak regulatory framework followed by competition from animal health technicians and lack of diagnostic laboratory support were the top three constraints among private veterinary practitioners in Kolkata. Singh (2004) attributed that illiteracy among farmers (45%), high cost of vaccines (25%), consequence of low milk yield after vaccination (20%) and lack of infrastructure facilities in veterinary hospitals (5%) were the constraints reported by veterinary officers in adoption of foot and mouth disease vaccination in Bareilly district of Uttar Pradesh. Catley (1999) reported animal health delivery service could not meet the envisaged objective in Africa due to some typical problems including drugs shortage, lack of transport and re-emergence of disease of major economic and social importance such as rinderpest and contagious bovine pleuropnenumonia. Turkson (2004) reported that one major challenge identified was the perception of the willingness and ability of animal owners to pay for services. He found that higher proportion of government veterinarians, veterinary technicians and private veterinarians perceived pet owners and livestock farmers as willing and able to pay. On other hand, a sizable proportion of respondents felt pet owners and livestock owners as willing and able to pay for services. DeHaan and Bekure (1991) and Odeyemi (1997) argued that farmers were willing to pay not just for any kind of services, but for quality of service. Most livestock owners were willing and able to pay for services perceived to be beneficial and conveniently located (FAO, 1997).

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GOITRE IN A KID- A CASE REPORT

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The Thyroid is a bilobed gland that lies behind the larynx on either side of the trachea. It is partially embedded in thymus in young animals. The most common causes of enlargement of thyroid gland (goitre) are deficient iodine intake and the consumption of plants containing goitrogens (Menzies and Miller, 1997). Thyroid enlargement appears to be associated with increased TSH output by the anterior pituitary resulting from depressed blood T^4 and T^3 concentrations. Iodine deficiency induced goitre is more common in neonates and has world wide in distribution. Goitrogenic compounds can decrease iodine uptake by thyroid gland and iodination of tyrosine in the metabolic pathway in the thyroxin production. Ruminants that ingest plants in brassica family may exhibit depressed iodine absorption and metabolism because of thiocyanates in these plants. The most common plants that produce anti thyroid compounds include the mustard family (Kale and Rape), the legume family (pea nut, soybean, white clover), the prune family (cherries, apricots) and some grains (sorghum). Goitrogenic compounds (thiourea, thiouracil) can decreased iodine uptake by the thyroid gland and decreases the iodination of tyrosine in the metabolic pathway for the thyroxin production.

Case history and observations

A 75-days old kid, weighing about 5 kg, was referred from Veterinary polyclinic Chittoor to the Department of Veterinary Surgery and Radiology, college of Veterinary Science, Tirupati, Andhra Pradesh with the history of reduced appetite, dullness and swelling below the larynx. The swelling was observed by the owner for the past 20 days and increasing in size continuously. Physical examination of the neck revealed bilobed enlarged thyroid gland just below the larynx. The enlarged mass was soft and painless on palpation. The temperature, heart and pulse rates as well as haematological values were within physiological limits. Radiological examination revealed enlarged thyroid gland (Fig.1). It was decided to perform thyroidectomy.

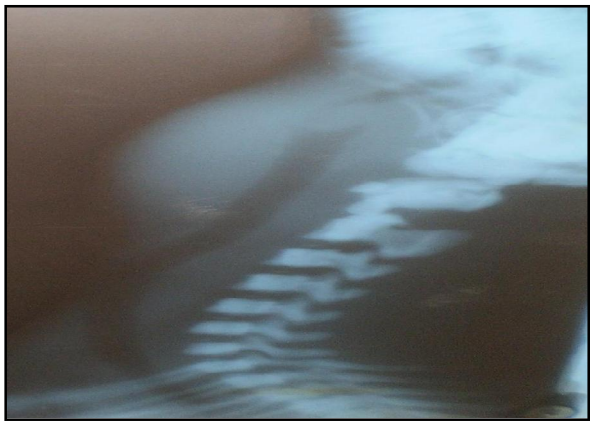

Fig.1: Enlarged thyroid gland

Treatment and Discussion

After aseptic preparation of the site, kid was sedated with xylazine @ 0.05 mg/kg b.wt. intramuscularly and anaesthesia was induced with Ketamine @ 5.0 mg/kg b.wt. i/v. Animal was positioned in dorsal recumbency with the neck slightly hyperextended. Skin incision was made from the larynx to the manubrium. Sternohyoid and sternothyroid muscles were bluntly separated and retracted and thyroid gland was exposed. Thyroid gland was removed along with its capsule after complete ligation of cranial and caudal thyroid arteries. Skin incision was closed routinely. Post operatively animal was given Amoxicillin and Cloxacillin @ 20 mg/kg b.wt. i/v and Meloxicam 0.3 mg/kg b.wt. i/v for 5 days. Wound was dressed with povidone iodine ointment. Animal made an uneventful recovery 10 days after surgery.

Neonatal hypothyroidism has been described in angora goats (Bath *et al,* 1979). Adequate level of selenium is needed for proper functioning of thyroid hormones in peripheral tissues (Pugh, 2002) therefore if selenium is chronically deficient, decreased production may ensue but may not result in primary thyroid dysfunction.

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TOXASCARIOSIS ASSOCIATED MORTALITY IN A BUFFALO CALF

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Introduction

Toxocara vitulorum, is a common parasite of neonatal cattle and buffalo calf and a major cause of calf mortality in many countries (Bhatia, 1992; Roberts, 1993). It is found in around 15.2% of cattle in India (Gupta *et al*., 1985). The infected animals show anaemia, diarrhoea, reduction in body weight gain, anorexia and even death (Akyol, 1993; Altýnöz *et al*., 2000). The acute signs of the disease are caused by migration of immature worms through the parenchymatous organs, by perforation or blockage of the small intestine (Radostits *et al.,* 2000). The calf acquires the infection from mother by transfer of larvae which are present in great numbers in colostrum 2-5 days after calving. Toxascariosis is reported to be an important cause of mortality in buffalo calves in India and South east Asia (Radostits *et al.,* 2000).

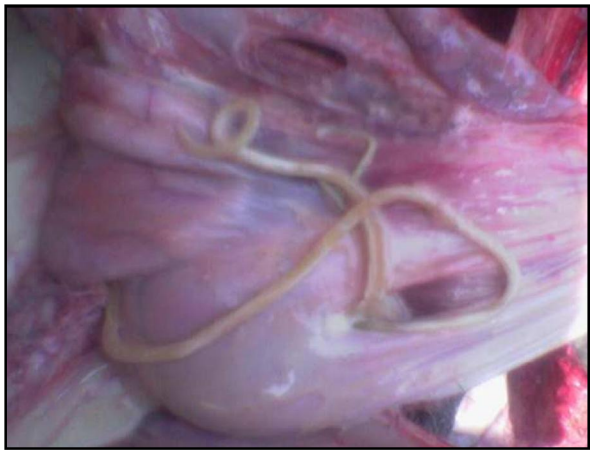

Fig. 1: *T. vitulorum* worms in the GIT of the buffalo calf

Fig. 2: Haemorrhage in intestine of the affected buffalo calf.

Fig. 3: Lungs showing congestion and pneumonic changes.

Case history and discussion

A male buffalo calf aged around one and half month was presented to the Veterinary Teaching Hospital of the college with the history of diarrhoea, reduced milk intake, reduction in body weight gain for the past several days. The calf was treated with some indigenous medicines for a week without any significant improvement. On clinical examination, the calf appeared weak, emaciated, dull, dehydrated with rough hair coat. The calf had severe respiratory distress, foetid diarrhoea with subnormal temperature (100°F) and pale mucous membranes. The animal was unable to bear weight on its legs and preferred lateral recumbency. Blood and faecal samples were collected for laboratory examination and a prompt fluid therapy was started with 5%

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dextrose normal saline @ 50 ml /kg b.wt. i/v. The calf was also prescribed with multi vitamins, gut acting antibiotics and anti-diarrhoeals but animal collapsed before therapy could be started. The post-mortem examination of the calf was undertaken with a view to confirm the cause of death. Coprological examination by standard modified Mc Master technique revealed eggs of *Toxocara vitulorum* (EPG-10500). Haematological examination revealed TEC 6.5 x 10^6/mm^3, Hb 11g/100 ml, PCV38 %, TLC 7.9x 10^3/mm^3 and DLC (Lymphocytes 61%, Neutrophils 31%, Monocytes 3%, Basophil 0% and Eosinophils 5%). On post-mortem examination large numbers of long, cylindrical, semi-transparent worms were found in intestine (Fig. 1). These worms were identified as *T. vitulorum* as per their morphological characters (Soulsby, 1982). The liver appeared dark and hard petecheal haemorrhages were observed in the intestine (Fig. 2). The endocardial haemorrhage in the heart and pneumonic changes in lungs were also recorded on necropsy (Fig. 3). On the basis of history, necropsy and laboratory findings, the cause of mortality in the buffalo calf was attributed to Toxascariosis.

Calf mortality due to *T. vitulorum* in the present case is in agreement with the findings of earlier workers (Gupta *et al.,* 1985; Wen, *et al*., 1986). When the cow is pregnant, the larvae migrate from the liver to the mammary gland and calves pick up infection through milk (Roberts, 1990, 1993). The larvae of *T. vitulorum* undergo migration that inflicts great damage to many organs, especially the lung, liver and the intestine. The migratory larvae through pulmonary bed may cause oedema and damage of blood vessels of the lungs. The resulting accumulation of fluids in the lungs may result in "verminous pneumonia" which can be fatal. The heavy infestation with adult worms also presents problems, especially if the worms physically block the gastrointestinal tract (Omar and Barriga, 1991).

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CANINE PYOMETRA COMPLICATED WITH *EHRLICHIA CANIS*: DIAGNOSIS AND THERAPEUTIC MANAGEMENT

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Pyometra, literally meaning the accumulation of purulent secretions like pus in the uterine lumen of sexually intact bitches, with open (open pyometra) or closed cervix (closed pyometra). Canine pyometra is usually diagnosed from 4 weeks to 4 months after oestrus (Smith, 2006). Uterus under the influence of progesterone is susceptible to bacterial infections, as progesterone stimulates the growth of the endometrial glands and their secretory activity, along with cervical closure and the suppression of myometrial contractions (Cox, 1970). In addition, progesterone has an inhibitory effect on the leucocytes in the uterus, adding support to a bacterial infection (Sugiura *et al.,* 2004). The present report deals with a septicaemic case of open pyometra, its diagnosis and therapeutic management.

Case history and observations

A five years old Spitz bitch was presented to Small Animal Medicine OPD of Referral Veterinary Polyclinic, IVRI with the history of mucopurulent vaginal discharge having mild foetid odour for last 4-5 days, anorexia since 2-3 days, polyuria, polydipsia, vomition etc. Animal had history of normal pregnancy before hand. Physical examination revealed animal in lateral recumbency, dehydrated, pale mucus membrane, distended abdomen etc. Clinical examination showed subnormal temperature (100.2ºF), toxaemia, heart rate of 100 bpm, normal lymphnode, non-palpable liver etc. Haematology revealed Hb 10.2 g%, PCV 32%, TLC 55.10 x 10^3/µl, TEC 3.36x10^6/µl and DLC: N 77%, L 15%, M 07%, E 01%. Blood smear examination revealed presence of *Ehrlichia canis* infection. Serum biochemistry showed SGOT 28 IU/L, SGPT 63 IU/L, BUN 26.42 mg/dl, creatinine 1.48 mg/dl and total bilirubin 0.25 mg/dl.

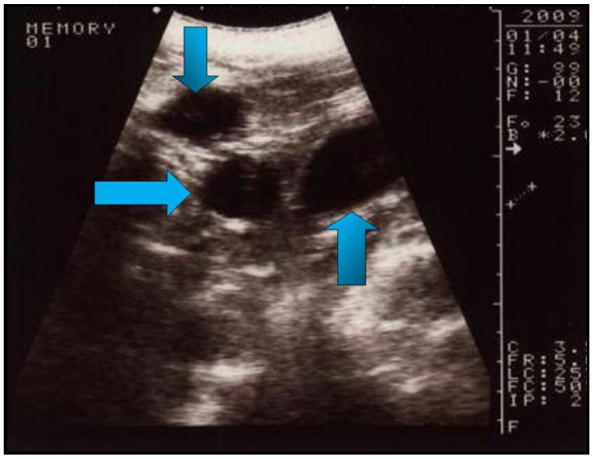

Fig. 1: Uterine sacculations filled with anechoic material (Sagittal plane) in bitch.

A tentative diagnosis of open pyometra was made based on history and clinical signs like the presence of foul smelling vaginal discharge. There was also concurrent infection of *Ehrlichia canis* complicating the condition which was confirmed by blood smear examination. Ultrasonography of abdomen revealed enlarged uterus and uterine horns. The uterine sacculations were filled with homogeneous and anechoic luminal contents. The uterine wall thickness varied from very smooth and thin to thick and was also irregular (Fig. 1) . However, no ovarian changes could be visualized.

Therapeutic Management

The therapeutic regimen was aimed at stabilizing the patient with i/v balanced electrolyte infusion (350 ml of 10% Dextrose and 300 ml Ringer's lactate) b.i.d supplemented with B complex @ 2 ml i/m o.d. for 5 days. Along with that, broad spectrum antibiotic (Amoxycillin with Sulbactum @ 20 mg/kg b.wt. o.d. i/v combination) was prescribed for first 5 days, followed by oral dosing of Doxycycline @ 10 mg/kg o.d. for next 15 days to combat ehrlichiosis. Intrauterine therapy was advocated with Ciprofloxacin-Tinidazole combination @ 10 ml o.d. for 4 days.

Discussion

Favourable response was observed within three days of institution of therapy with all vital parameters coming to normalcy and normal vigour. Appetite regained on the fifth day post therapy. Vaginal

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discharge was decreased with no discharge observed by eighth day post therapy. During dioestrus (luteal phase), progesterone from corpus luteum prepares the endometrium for pregnancy by promoting glandular development and secretion as well as hyperplasia of endometrium. This can result in the development of cystic endometrial hyperplasia with fluid accumulation in the endometrial gland and uterine lumen (Nelson and Couto, 1998). Progesterone decreases myometrial activity and suppresses the immune response of the uterus. Pyometra results when bacteria colonize the uterus via an ascending infection through the cervix or a haematogenous route.

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PREVALENCE OF GASTROINTESTINAL PARASITES AFFECTING PIGS IN JAMMU DISTRICT OF JAMMU AND KASHMIR

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ABSTRACT

Prevalence of gastrointestinal parasitism affecting pigs in Jammu district was studied during rainy season from September, 2003 to September, 2006. A total of 310 fresh faecal samples of pigs (maintained under semi-intensive system of management) were examined for the presence of different ova of parasites. The overall prevalence of infection recorded was 80.64% (young-86.29% and adults-70.79%). Predominated spp. detected were strongyles (35.48%), coccidian oocysts (34.83%), ascarids (30.96%) followed by trematodes (Fasciolopsis buski and Gastrodiscoides hominis) (14.83%), Strongyloides (10.32%) and Trichuris spp. (10.32%). Mixed infection was observed in 41.61% of the total animals examined. When compared age-wise, trematode infection was higher (35.93%) in older animals (>6 months to 2 years of age) than young lot (3.04%) (< 6 months of age) whereas coccidian infection of (39.59%) was higher in young group than older animals (24.54%). Nematodes infection was slightly higher in younger group viz., strongyles 38.57%, Strongyloides 11.67%, Trichuris spp. 10.15% whereas corresponding figures in older group were 30.08, 7.96 and 6.19%, except ascarids (28.93% in young group and 34.51% in older group). Comparatively lower level of infection in older group could be due to the presence of natural resistance in them.

Key words: Gastrointestinal parasite, incidence

Introduction

Rearing of pigs is gaining momentum in the plain belt of Jammu region, specially Jammu district as it serves as an important source of income to the economically weaker sections of the rural masses and as such is the main occupation of landless and weaker sections of the society in India with the concept of zero input. Further the habit and habitat of pigs make them prone to many diseases and one of the most important among them is the parasitic problem which causes huge economic losses to the farmers due to morbidity, mortality, reduced feed conversion and weight gains and condemnation of affected organs after slaughter.

Prevalence of parasites in pigs has been reported by many workers (Weng et al. 2005; Dutta et al., 2005; Borthakur et al., 2007 and Katoch et al., 2008). The present study was undertaken to find out the prevalence of parasites in plain belt of Jammu district.

Materials and Methods

In the present study, a total of 310 faecal samples were collected from different places viz. R.S.Pura, Chatha, Balol, Khod, Gadigarh, Satwari, Bishnah and Bantalab w.e.f. September, 2003 to September, 2006, during rainy season as there were lot of field reports of mortality and morbidity among pigs during this season every year. The samples were brought to the laboratory under cold conditions and were examined for the presence of different ova of parasites by direct smear method and standard sedimentation and floatation techniques (Soulsby, 1982).

Results and Discussion

The overall prevalence of infection recorded during the month of June, July, August and September was 80.64 per cent. In young pigs below 6 months of age the infection rate was higher (86.29%) as compared to adults (70.79%). Kumari Sangeeta et al. (2002) reported 78.67% prevalence of parasitic infection in pigs in Bihar during rainy season whereas Dutta et al. (2005) reported 65.66% prevalence of parasites in pigs in West Bengal during rainy season. However Borthakur et al. (2007) reported that prevalence of infection during monsoon was 25.35% and post monsoon was 44.44% in pigs at Aizawal reared under Indigenous system of management.

Predominant species detected were strongyles (35.48%), oocyst coccidia (34.83%), ascarids (30.96%), trematodes (14.83%), Strongyloides (10.32%) and Trichuris spp. (8.70%) (Table 1) whereas the corresponding figures as reported by Dutta et al. (2005), during rainy season from West

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Bengal were 58.23, 38.05, 34.64%, 22.27 and 18.32 per cent. Weng et al. (2005) reported from China the prevalence of different parasites in pigs viz. Trichuris suis (5.70%), Ascaris spp. (5.20%), Coccidia (24.90%) and Oesophagostomum spp. (2.5%).

Mixed infection with more than one species was 41.61% in the present study. Borthakur et al. (2007) recorded 66% of mixed infection in pigs at Aizawal. Mixed infection was higher in young lot (44.67%) as compared to adults (36.25%).

When compared age wise, trematode infection was higher (35.39%) in older animals (6 months and above) than younger ones (below 6 months of age) (3.04%) whereas coccidia infection (39.59%) was higher in young animals than older ones (24.54%). Dutta et al. (2005) reported 23.49 and 4.39% of trematode infection and 44.70 and 69.19% cyst Eimeria spp. infection in pigs, in the age group of 6 months to 2 years and below 6 months respectively from West Bengal.

Nematode infection was slightly higher in young lot (strongyles-38.57%, Strongyloides-11.67% and Trichuris-10.15%) than older group whereas corresponding figures were 30.08, 7.96 and 6.19%, except ascarids (28.93%) in young group and 34.5% in older group animals. Almost similar type of findings were recorded by Dutta et al. (2005), Borthakur et al. (2007) and Katoch et al. (2008).

Table 1: Parasites of pigs recorded in Jammu district during monsoon season (June-September months)

S. No.	Age group	Samples examined	Samples positive	Parasites recorded						
				Trematodes	Ascarids	*Trichuris*	Strongyles	*Strongyloides*	Cyst coccidia	Mixed infection
1	Young	197	170 (86.29)	6 (3.04)	57 (28.93)	20 (10.15)	76 (38.57)	23 (11.67)	78 (39.5)	88 (44.67)
2	Adults	113	80 (70.79)	40 (35.39)	39 (34.51)	7 (6.19)	34 (30.08)	9 (7.96)	30 (34.54)	41 (36.28)
	Overall	310	250 (80.64)	46 (14.83)	96 (30.96)	27 (8.70)	110 (35.48)	32 (10.32)	108 (34.83)	129 (41.61)

Figures in parenthesis indicate percentage values.

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SEROPREVALENCE OF INFECTIOUS BOVINE RHINOTRACHEITIS IN CATTLE

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ABSTRACT

A total 200 serum samples of cattle were screened for IBR in which 15 (7.5 per cent) samples were found to be positive by avidin-biotin ELISA. The highest seroprevalence of IBR was recorded in Bikaner (10 per cent) while in Jaisalmer lowest seroprevalence (4 per cent) was recorded. In cattle, the animals of 3-6 years age group showed highest seroprevalence (12.5 per cent) and lowest seroprevalence was recorded in 0-3 years age group (2.5 per cent). Breed-wise analysis of data showed highest seroprevalence of IBR in Holstein-Friesian breed (11 per cent) while Rathi cows (6.45 per cent) and non-descript local cattle showed comparatively lower seroprevalence (3.1 per cent) of disease.

Key Words: Seroprevalence, infectious bovine rhinotracheitis, IBR, Cattle

Introduction

Infectious bovine rhinotracheitis (IBR) caused by BHV-1 of family Herpes viridae is an important emerging disease of cattle in India. The BHV-1 is responsible for a variety of clinical conditions in cattle, including infectious bovine rhinotracheitis (IBR), infectious pustular vulvovaginitis (IPV), infectious pustular balanoposthitis (IPB), conjunctivitis and generalized disease in neonates. Thus it causes great economic losses to the livestock industry (Gibbs and Rweyemamu, 1977). Because of losses in terms of drop in milk yield, abortion and repeat breeding, it has been considered as an economically important disease of cattle (Kataria and Rai, 1992). The morbidity and case fatality rate in dairy cattle are about 100 and 2-12 per cent respectively (Danner et al., 1999). The present study deals with survey conducted to detect the seroprevalence of IBR in cattle in Dausa, Bikaner and Jaisalmer districts of Rajasthan state.

Materials and Methods

A total of 200 sera samples were collected randomly from apparently healthy female cattle in three districts of Rajasthan namely Dausa (50), Bikaner (100) and Jaisalmer (50). Samples were collected from cattle of different age group and breeds. Collected samples were stored in deep freeze at -20° C till analyses. The smooth lipopolysaccharide (S-LPS) based avidin-biotin ELISA (AB-ELISA) kit developed by Project Directorate on Animal Disease Monitoring and Surveillance (PDADMAS), Bangalore were used in the present study. Already BHV-1 antigen coated flat bottom ELISA plates were taken. The wells of ELISA plates were filled with test and control sera (1:100 dilutions). The plates were then kept on shaker at 37°C for one hour. After washing, the plate biotinylated antibovine IgG was added and returned to incubator at 37°C for one hour. The plates were washed again and avidin HRP conjugate was added to each well. After incubating for 20 minutes, the plates were washed and treated with substrate/ chromogen solution for 6 to 10 min at room temperature. The reaction was then stopped by adding 100 µl of stopping solution. The results were read on ELISA reader at wavelength of 492nm. Per cent Positivity (PP) of test serum was then calculated. The PP value greater than 45 per cent in test wells was considered as positive.

Results and Discussion

Out of 200 screened serum samples of cattle for IBR, 15 (7.5 per cent) were found positive by avidin-biotin ELISA. Jain et al. (2006) also reported almost similar seroprevalence (10.75) of IBR in Uttaranchal in cattle. Ata et al. (2006) reported 11.94 per cent seroprevalence of IBR in cows. District-wise 6, 10 and 4 per cent samples were found positive for IBR by AB-ELISA test from Dausa, Bikaner and Jaisalmer respectively

The cattle of 3-6 years age group showed highest seroprevalence (12.5 per cent) while lowest seroprevalence was recorded in 0-3 years age group (2.5 per cent). Rajesh et al. (2003) reported that 3-5 year age group cattle showed 12.06 per cent seroprevalence of IBRI. Koppad et al. (2007) also reported that cattle of 3-4 years age group showed maximum prevalence of IBR (39.5 per cent). Thus at puberty and peak reproductive age, higher prevalence of IBR was recorded and at later age the virus probably attains latency and disease is not exhibited.

Interestingly, non-descript local cattle showed low prevalence of disease (3.125 per cent) indicating the comparative resistance of local indigenous cattle for the disease. Singh et al. (1985) also concluded that prevalence was higher in Holstein-Friesian (50.35 per cent) than in Jersey (35.48 per cent) and in indigenous cattle (22.22 per cent). Koppad et al. (2007) reported the prevalence rate of IBR as 21, 17.8 and 7.4 per cent in Holstein-Friesian (HF), Jersey and non-descript cattle, respectively. Rajesh et al. (2003) reported the prevalence rate of IBR in crossbred Holstein-Friesian as 18.09 per cent.

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FADING PUPPY SYNDROME: AN OVERVIEW

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ABSTRACT

In fading puppy syndrome (FPS), a newborn pup born apparently healthy fails to thrive despite all possible nursing care and therapy. Clinical symptoms first appear usually few days after birth and include improper body growth despite good appetite, dullness, rough hair coat and distended belly. In severe cases, pup may cry and show restlessness, diarrhoea, breathing problems, tympanic abdomen and convulsions followed by death. Etiology is diverse and includes cold/heat stress, managemental defects, genetic factors, bacterial and viral infections and heavy parasitic burden. Losses due to FPS can be minimized by adopting good pre-partum nutrition and proper deworming and vaccination of dam, adequate colostrum feeding of pups, good sanitary and managmental practices and regular monitoring of health status of pups.

***Key words*:** Fading puppy syndrome, neonatal mortality, pup, dog

Introduction

Fading puppy syndrome (FPS) is a condition in which a newborn pup born apparently healthy fails to thrive. This is a common problem encountered by many dog breeders in which high neonatal mortality occurs despite all possible treatments and nursing care. Symptoms first may appear a day after birth or at the age of 2 to 10 days. The affected pup loses interest in suckling, cries and stays aloof of other pup mates (Freshman, 2005). Such pup usually dies within 2-3 weeks of age or may sometimes survive up to 9 weeks of age (Indrebo *et al*., 2007).

Clinical signs

Knowledge about normal growth pattern and physiology of a pup is essential for early identification of clinical signs related to FPS. Usually body weight of a healthy pup becomes double to their birth weight in the first 7 to 10 days and then again it doubles within next 3 weeks. A normal newborn pup starts curling up or stretching out when picked up and placed on the palm in belly up position after 3 to 4 days of birth. Pup crawls, suckles and sleeps most of the time during first 2-3 weeks. A healthy pup likes to huddle with pup mates and cries only for a brief period at a time when awaken. In between first and second week of life, eyelids separate the ear canal opens and pup starts showing response to external stimuli like sound and motion. After 10 days, forelimbs can support the pup and locomotion starts at 3 weeks of age (Kustritz, 2004).

Any deviation from above mentioned normal growth pattern and behaviour, even in absence of overt signs of sickness, is alarming and demands clinical examination by an experienced veterinarian. Clinical signs of FPS are often confusing and non-specific and vary with severity of the disease. In less severe cases, one can notice that the pup is not growing or gaining weight despite of good appetite and feeding. The affected animal appears dull with poor body condition, rough hair coat and distended belly. Severely affected pup does not show any response when disturbed or may show constant crying, restlessness, diarrhoea, breathing difficulties, distended tympanic abdomen, low body temperature and convulsions (Freshman, 2005; Indrebo *et al*., 2007).

Etiology, diagnosis and therapy

Etiology of PFS is diverse. Exact diagnosis of the root cause may therefore be a difficult task or even impossible specially under field conditions. Multiple etiologies in a given case may also be possible. Common etiological factors are mentioned hereunder:

a. Hypothermia or cold stress

Puppies up to two weeks of age are unable to maintain their body temperature themselves. When surrounding temperature is low, external warmth provided either by bitch curled up around them or by bedding and cuddling activity of pup mates helps in maintaining the body temperature. Exposure to cold at this age can result into hypothermia that is manifested in form of low heart rate, decreased activity of cardiopulmonary and respiratory system that may even collapse leading to death of the puppy (Fox, 2008). A new born healthy pup have a lower body temperature of 36.5 to 37^0 C, but it begins to increase after one to two weeks of age to maintain a higher body temperature of 37.5˚C to 38˚C. By the age of two weeks, pup starts generating heat from increased metabolism and shivering activity (Davidson, 2003). Pups up to one week of age are

also very much susceptible for high environmental temperature since panting ability is acquired after that age. However, hyperthermia or heat stress is a less common cause of FPS and neonatal mortality (Freshman, 2005).

b. Managemental factors

Just after birth, the bitch breaks the placental membrane and naval cord by chewing and cleans nostrils and other body parts of pup by licking. Human assistance, sometimes, may be essential since occasionally a young bitch may show little interest in pups. Improper cleaning may lead to hypothermia or cause pneumonia due to inspiration of placental fluid. Some bitches may refuse to stay with pups, permit suckling specially when milk production is low or littler size is too large. Some bitches that are over weight may even crush the pups by mistake or apathy. Adequate intake of colostrum within first 24 hours after birth is essential to acquire good passive immunity (Andersen, 1957). Colostrum deprived pups are more prone for various infections that may be acquired from the contaminated surroundings or even from apparently healthy mother or other dogs living in the house. Therefore, survival rate of colostrum-deprived pups is low and even if they survive, the growth rate remains low despite provision of best feeding and managemental practices. In some cases, compromised immune function in old bitches may result low immunoglobulins concentration in colostrum and lower inherited or acquired passive immunity in pups despite of adequate colostrum feeding (Tizard, 1996).

c. Genetic factors

Highly inbred pups have poor growth rate and chances of survival (Van-der-beek *et al*., 1999). Congenital abnormalities of mouth, anus, skull and heart occur in high frequency. Low birth weight is another important cause of poor survival rate in pups (Davidson, 2003). Therefore, while planning the breeding programme it should be ensure that genetic diversity is maintained in pups.

d. Infectious causes

Because of poorly developed immune system, pups are highly susceptible to different infectious diseases. There are several routes through which infection can occur. Placenta, respiratory tract, gastrointestinal tract, skin abrasions and eye conjunctiva are thought to be easy portals of entry for different infectious agents (Davidson, 2003).

Bacterial infections

Bacterial infections are common and potential health hazard for puppies below one to two weeks of age. Pup is born apparently healthy but after bacterial infection condition quickly deteriorates and death may occur within 2 to 5 days. Pathogenic bacteria can enter into pup even in the womb, birth canal or through the naval stamp after birth. It may also be possible that the bacteria like *Staphylococcus* spp., *Streptococcus* spp., *Klebsiella* spp. and *E coli* are present in uterine horn of bitch to cause low grade unapparent infection, and these bacteria later on settle in the digestive system of pups present in womb (Davidson, 2003; Fox and Haynes, 2008). Such infected pups are usually born weak and soon start fading. When infection flares up, septicaemia develops and condition deteriorates quickly within 12-24 hours. Appetite is lost, vomition and diarrhoea may occur. The most significant sign is rapid development of abdominal distension and constant crying (Davidson, 2003). The naval cord often becomes reddish and more prominent. Broad-spectrum antibiotic like Ceftiofur sodium @ 2.5 mg/ kg body weight s/c every 12 hourly can be given. Other antibiotics like Ceftriaxone, penicillins, lincomycin and cotrimazole can also be tried. Survival rate in cases of bacterial infections is poor, and treatment is effective only when diagnosed and treated at an early stage.

Viral infections

Many viruses present in the environment can cause serious disease in new born pups. Infected but immune mother is often the source of viral infection to pup. Canine herpes virus is an important cause of FPS. Clinical signs of herpes virus infection in pup include lethargyness, crying and mucoid discharges from nose and eyes (Greene and Kakuk, 1984). The infection is common in kennel where puppies remain enclosed in a smaller area. The infection occurs under one week of age and death may occur within two to three weeks. Post-mortem findings in pup died of herpes virus infection includes haemorrhages over liver surfaces, inside gastrointestinal tract and throughout kidney parenchyma. Multifocal petechial haemorrhages on the kidney surface are the pathognomonic change observed in the pup died of the disease (Greene and Kakuk, 1984). Confirmatory diagnosis is based upon polymerase chain reaction (Evermann, 1989). No specific treatment is available and only good nursing and supportive therapy is recommended.

Canine parvovirus type-I is another common cause of FPS. Puppies get infection in uterus, if bitch is infected and after birth they show rapid onset of crying, vomition, breathing difficulties and failure to suckle. Death usually occurs within 1 to 3 weeks post partum. In-utero infection with canine parvovirus type-II can also cause myocarditis and sudden death in neonates, but the diseae is less common under natural conditions (Davidson, 2003). Canine distemper virus can also cross placenta and can cause congenital infection and FPS (Pandher *et al*.,

2006). Type-II Coronavirus infection can also cause fatal disease in pups (Zappulli *et al*., 2008).

Parasites

Toxoplasma gondii and *Neospora caninum* are reported to cause neonatal death in pups that acquired infections by transplacental route. However, they are rarely diagnosed and thought to be uncommon under natural condition (Davidson, 2003). Hookworms and roundworms can cross the placenta and cause congenital infections. Dam's milk can also act as a source for Toxocara infection (Transcolostral transmission). Infected pup shows pot bellied appearance, poor digestibility, increased/ reduced appetite, diarrhoea and failure to grow or even death may occur if treatment is not given (Fisher, 1982). Regular deworming of the breeding bitch should be done to avoid losses due to Toxocara infection in pups.

Preventive measures and supportive therapy

Good prepartum nutrition and proper deworming and vaccination of dam are essential for getting healthy puppies. Incidence of viral diseases can be minimized in pups by adopting proper vaccination schedule in dam. A pregnant bitch, even regularly vaccinated, should be given a booster dose of multivalent viral vaccines between 4 to 6 weeks prior to whelping. This will increase colsotral antibody concentration and better protection in pups to common viral diseases. If a puppy fails to suckle, 8-16 ml of pooled serum, collected preferably from mother, should be given subcutaneously or orally 12 hours post partum. This minimizes neonatal mortality and prevents FBS (Indrebo *et al*., 2007).

Weight of pups should be recorded daily for the first two weeks and then every 3rd day for next two weeks. Pups may loose body weight (<10%) during first 24 hours. But thereafter, it should gain weight by 5 to 10% per day, doubling their birth weight by 10-12 days of age (Kirk, 2001). If gain in body weight is less despite of proper suckling then examine thoroughly for FPS. Deworm pup with a broad spectrum non-toxic anthelmintic like pyrental palmoate @ 5 mg/ kg orally at 3 weeks of age and thereafter every 14 days up to 12 weeks of age. Monitor room temperature with the help of room thermometer placed at the level of bedding. For first week of life, a floor temperature should be around 30˚C and around 25˚C to 27˚C for older puppies (Davidson, 2003). Room heaters or electric bulbs can be used in winters, but care should be taken to avoid accidental injury to pups and dam. Adequate ventilation and hygienic bedding and feeding utensils should be provided. A pup showing acute illness symptoms should be brought to veterinarian immediately. Proper nursing care is essential since newborn pups have little body reserves of nutrients. Keep the affected pup warm and put few drops of honey on the tongue every one to two hourly interval. Try bottle-feeding of milk if possible. Affected pup should be separated from rest of puppies to avoid chances of spreading infection. Dry the naval cord and apply diluted liquid iodine solution regularly. Since a pup has very limited energy reserves, it becomes hypoglycemic (blood glucose level <30-40 mg/dl) soon after food deprivation. Such pups should be given 10% dextrose solution @ 2 to 4 ml/ kg intravenously. Alternatively 5% dextrose solution may be given by subcutaneous route @ 1 ml per 30 g body weight every 12 hourly (Davidson, 2003). Rehydration solution containing glucose and electrolyte (5 g glucose plus a pinch of electrolyte mixture mixed in 100 ml water) can be given orally with a baby-nursing bottle attached with a nipple when suckling reflex is present or with an eyedropper in case pup is not able to suckle. Wrap the puppy in a small towel and pick up gently and carefully with head held upright while giving rehydration mixture. At a time 5 ml of this solution/100 g body weight every 6 to 8 hourly can be given.

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Van der Lende, T. *et al.* (1992) *Animal Reproduction Science.* **28**:179-185.

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