



Disorders of forestomach in cattle and buffaloes of Haryana

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ABSTRACT

The study was conducted on 5,689 animals (2,163 cattle; 3,526 buffaloes) during July 2016 to June 2017 to understand the epidemiological features of forestomach disorders in cattle and buffaloes. Diagnosis was made on the basis of history, clinical, haemato-biochemical and radiographic examinations. Overall annual incidence of forestomach disorders was 17.82%, significantly more in buffaloes (19.11%) compared to cattle (15.71%). Impaction was the major forestomach disorder with overall annual incidence of 11.37%, with significantly higher incidence in buffaloes (12.16%) than cattle (10.07%). Different forestomach disorders and their respective incidence were: simple indigestion (SI) (2.6% – 2.45% in cattle and 2.69% in buffaloes), colic (0.49% – 0.64% in cattle and 0.39% in buffaloes), tympany (0.79% – 0.87% in cattle and 0.73% in buffaloes), Lactic acidosis (0.38% – 0.55% in cattle and 0.28% in buffaloes), Traumatic pericarditis (1.12% – 0.69% in cattle, 1.38% in buffaloes), foreign body syndrome (FBS) (0.68% – 0.41% in cattle, 0.85% in buffaloes) and diaphragmatic hernia (DH) (0.59% – 0.0% in cattle and 0.59% in buffaloes). Forestomach disorders mainly occurred during summer and rainy season. Impaction, SI and colic cases were mainly observed in initial lactations whereas cases of tympany were higher in between 4th to 6th lactation. DH and FBS were significantly higher in buffaloes compared to cattle (particularly upto third lactation). The present study indicated that impaction, SI, FBS and DH are most prevalent forestomach disorders in Haryana leading to significant production losses. Hence, research on responsible etiological factors and preventive measures is warranted.

Keywords: Buffaloes, Cattle, Forestomach disorders, Prevalence

Haryana is home to best buffaloes and cattle population comprising 6.08 million and 1.8 million, respectively (19th Livestock census 2012) contributing an annual yield of 9.81 million tonne of milk. The most common earliest reported problems of dairy animals which occupy the center stage of large animal internal medicine are forestomach disorders which mainly include rumen impaction, colic, simple indigestion, tympany, lactic acidosis, traumatic pericarditis etc. and more than 15% of all the natural deaths in dairy and beef animals are due to abomasal diseases and resulting peritonitis (Sharma *et al.* 2015). Increase in incidence of forestomach disorders is mainly due to changes in agriculture, animal production and feeding practices (Hussain and Uppal 2015). These disorders lead to huge economic losses to dairy farmers in terms of mortality and production losses.

There are many factors which leads to the various forestomach disorders, viz. non-availability of feed and fodder under free-range system of husbandry, sudden change in feed and feeding regime, greedy feeding and over eating, under feeding, feeding of damaged grains

(Gnanaprakasam *et al.* 1992, Radostits *et al.* 2010).

As the occurrence of forestomach disorders is a constant problem of large ruminants in the state and their diagnosis is a challenging task, so, the present investigation was planned to study annual case incidence of various forestomach disorders in Haryana state based on clinical data which would help to adopt effective prevention strategies.

MATERIALS AND METHODS

Study area, selection of animals and study design: The study involved retrospective analysis of 5,689 bovine cases (comprising 3,526 buffaloes and 2,163 cattle) presented to Regional Centre, LUVAS, Uchani, Karnal during the period from July 2016 to June 2017.

In all these animals, detailed history was taken from animal owners and clinical as well as special examination including rectal examination was performed. All the animals were subjected to routine haematology and peripheral blood smear examination, biochemical analysis which include liver and kidney function test, total protein analysis, blood electrolyte analysis. Animals were also subjected to rumen function tests, radiographic examination of reticular area for the proper diagnosis and treatment of animals. The animals were divided into different groups on the basis of diagnosis.

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Table 1. Month-wise forestomach disorders in cattle and buffaloes

Month	Total OPD Cases		Total no. of Forestomach cases			Impaction		Simple Indigestion		Colic		Tympany		Lactic Acidosis		T.P		FBS		DH
	C	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	B	C	B	
Spp.	220	296	29	36	20	26	4	2	4	1	4	3	3	2	1	1	1	0	0	0
July	213	399	25	57	17	40	11	3	11	2	11	2	1	1	1	0	1	0	1	1
August	222	501	30	80	12	42	22	7	22	1	22	5	5	2	0	3	7	0	4	0
Sept.	126	336	55	76	38	51	13	14	13	0	13	0	1	0	1	2	7	1	1	2
Oct.	127	275	23	41	12	30	6	4	6	2	6	1	0	3	2	1	1	0	0	0
Nov.	130	245	20	39	12	20	7	4	7	0	7	0	2	1	0	1	1	2	4	3
Dec.	125	220	20	38	14	23	4	0	4	3	4	0	0	0	1	2	5	1	2	2
Jan.	120	199	18	39	10	16	5	2	5	2	5	2	5	0	0	1	3	1	6	3
Feb.	189	228	23	36	11	15	7	5	7	1	7	2	3	1	0	2	2	1	2	4
Mar.	199	213	15	46	11	29	4	2	4	1	4	0	0	0	1	0	6	1	3	3
April	267	363	43	102	33	79	2	4	2	1	2	3	5	0	3	1	4	1	4	3
May	225	251	39	84	28	58	10	6	10	0	10	1	1	2	0	1	11	1	3	0
June	2,163	3,526	340	674	218	429	95	53	95	14	95	19	26	12	10	15	49	9	30	21
Overall	91.5**	81.2**	74.6**	88.7**	49.9**	18.9	13.7	18.9	12.16	20.2*	13.7	18.9	12.16	13.7	10.2	8.4	32.6**	8.7	22.0*	21.4*
χ^2 value																				

P<0.01, **Significance at 1% level within column; P≤0.05, *Significance at 5% level within column (C, Cattle; B, Buffalo), numerical values indicates no. of respective cases.

During this study, a questionnaire was used for recording individual animal information such as age, species, month, parity, pregnancy, lactation and husbandry practices including rearing system, feeding practices like type of wheat straw, i.e. whether thresher made or reaper machine made, availability of green fodder/concentrate. The χ^2 -test was performed to compare the mean of different variables between the different groups.

RESULTS AND DISCUSSION

There are very few epidemiological studies particularly from India which mainly focused on the incidence of forestomach disorders in cattle and buffaloes. Output of the studies of various researchers (Hussain *et al.* 2013a, Hussain *et al.* 2014, Hussain and Uppal, 2014) reported that SI, impaction, TP, FBS and DH were the major forestomach disorders in cattle and buffaloes. The present study revealed that overall annual incidence of forestomach disorders was 17.82% (Table 2) and was significantly (P<0.01) more in buffaloes compared to cattle (Table 3) which is in association with the findings of Hussain and Uppal (2015) who reported 13.67% annual incidence of forestomach impaction with 17.77% in buffaloes and 9.11% in cattle. The current study also divulged that most of the forestomach disorders occurred during summer and rainy season coinciding with the period of green fodder scarcity and practice of feeding of wheat straw mainly during this period (Table 2). Another reason is that in this part of state, combined harvester is used for wheat harvesting due to which straw is fine and also due to the low height of the machine blades from the ground, it introduces more dust/soil particles into feed which results in impaction and other forestomach disorders. Various studies (Toor and Saini 2008, Hussain *et al.* 2013b, Hussain and Uppal 2015, Sharma *et al.* 2015) stated the similar findings.

Impaction: Out of the total forestomach disorders reported, majority of the cases (63.8%) were of impaction with annual incidence of 11.37% (Table 2) which were significantly (P<0.05) higher in buffaloes as compared to cattle (Table 1). Most of the impaction cases were reported during May to October; in both the species under study. This trend of the forestomach disorders correlates with the findings of Hussain and Uppal (2015) and Sharma *et al.* (2015). According to Llewellyn (1976) and Mitchell (1991), impaction cases were more in winter season and in stall-fed and confined animals in western countries whereas in India incidence was highest in south-west monsoon season (Chakrabarty *et al.* 1974).

The mean age of affected animals was 6.5±1.21 years (Table 4). When categorization was done on the basis of lactation number, higher incidence of impaction was observed in first to third (53.7%) lactation followed by fourth to sixth lactation (27.3%) and heifers (11.7%) with mean lactation number 4.5±1.32 (Table 4).

Simple indigestion: Incidence of cases of simple indigestion was second major forestomach disorder (14.6%)

Table 2. Month-wise retrospective incidence (cattle and buffaloes combined) of forestomach disorders

Month	Total OPD cases	Total no of forestomach cases	Impaction	Simple indigestion	Colic	Tympany	Lactic acidosis	TP	FBS	DH
July	516	65 (12.59%)	46 (8.91%)	6 (1.16%)	2 (0.38%)	6 (1.16%)	3 (0.58%)	2 (0.38%)	0	0
Aug.	612	82 (13.39%)	57 (9.31%)	14 (2.28%)	3 (0.49%)	3 (0.49%)	2 (0.32%)	1 (0.16%)	1 (0.16%)	1 (0.16%)
Sept.	723	109 (15.07%)	54 (7.46%)	29 (4.01%)	1 (0.13%)	10 (1.38%)	1 (0.13%)	10 (1.38%)	4 (0.55%)	0
Oct.	462	131 (28.35%)	89 (19.26%)	27 (5.84%)	0	1 (0.21%)	1 (0.21%)	9 (1.94%)	2 (0.43%)	2 (0.43%)
Nov.	402	64 (15.92%)	42 (10.44%)	10 (2.48%)	4 (0.99%)	1 (0.24%)	5 (1.24%)	2 (0.49%)	0	0
Dec.	375	58 (15.46%)	32 (8.53%)	11 (2.93%)	2 (0.53%)	2 (0.53%)	0	2 (0.53%)	6 (1.6%)	3 (0.8%)
Jan.	345	59 (17.1%)	37 (10.72%)	4 (1.15%)	4 (1.15%)	0	2 (0.57%)	7 (2.02%)	3 (0.86%)	2 (0.57%)
Feb.	319	59 (18.49%)	26 (8.15%)	7 (2.19%)	3 (0.94%)	7 (2.19%)	2 (0.62%)	4 (1.25%)	7 (2.19%)	3 (0.94%)
March	417	59 (14.14%)	26 (6.23%)	12 (2.87%)	4 (0.95%)	5 (1.19%)	1 (0.23%)	4 (0.95%)	3 (0.71%)	4 (0.95%)
April	412	60 (14.56%)	40 (9.7%)	6 (1.45%)	1 (0.24%)	0	0	6 (1.45%)	4 (0.97%)	3 (0.72%)
May	630	145 (23.01%)	112 (17.77%)	6 (0.95%)	3 (0.47%)	8 (1.26%)	3 (0.47%)	5 (0.79%)	5 (0.79%)	3 (0.47%)
June	476	123 (25.84%)	86 (18.06%)	16 (3.36%)	1 (0.21%)	2 (0.42%)	2 (0.42%)	12 (2.52%)	4 (0.84%)	0
Overall	5689	1014 (17.82%)	647 (11.37%)	148 (2.6%)	28 (0.49%)	45 (0.79%)	22 (0.38%)	64 (1.12%)	39 (0.68%)	21 (0.36%)
χ^2 value		98.4**	110.7**	42.6**	13.9	26.2**	13.9	25.5**	25.6**	19.3

P<0.01, **Significance at 1% level within column; P≤0.05, *Significance at 5% level within column.

Table 3. Overall retrospective incidence of forestomach disorders

Spp.	Total OPD cases	Total no of forestomach cases	Impaction	Simple indigestion	Colic	Tympany	Lactic acidosis	TP	FBS	DH
Cattle	2,163	^a 340 (15.71%)	^a 218 (10.07%)	53 (2.45%)	14 (0.64%)	19 (0.87%)	12 (0.55%)	^a 15 (0.69%)	^a 9 (0.41%)	^a 0
Buffaloes	3,526	^b 674 (19.11%)	^b 429 (12.16%)	95 (2.69%)	14 (0.39%)	26 (0.73%)	10 (0.28%)	^b 49 (1.38%)	^b 30 (0.85%)	^b 21 (0.59%)
χ^2 value		10.55**	5.8*	0.31	1.71	0.34	2.55	5.84*	3.72*	12.93**
P-value		0.00	0.02	0.58	0.19	0.56	0.11	0.02	0.05	0.00

P<0.01, **Significance at 1% level within column; P≤0.05, *Significance at 5% level within column.

reported in the present study with annual incidence of 2.6% (Table 2). Similar trends were seen in cattle and buffaloes with no significant difference in annual incidence rate among both the species (Table 3). In contrast to the present study, much higher incidence had been reported by various workers, viz. Joshi (1970), Mishra *et al.* (1972), Biswal *et al.* (2016) who reported more than 40% incidence of simple

indigestion in cattle and buffaloes. Prasad *et al.* (1972) reported incidence of simple indigestion was more in buffaloes as compared to cattle. Most of the cases were observed in between months of June to October which is in agreement with the findings of Chakravarty *et al.* (1974) and Joshi and Mishra (1974). Mean age group of the animals affected with simple indigestion was 7.05±2.31 years with

Table 4. Incidence of forestomach disorders with regard to age and lactation number

Group	Age (mean±SE)	Lactation number/parity				Mean
		Heifer (%)	1 st to 3 rd (%)	4 th to 6 th (%)	>6 th (%)	
Impaction (647)	6.5±1.21	11.70	53.7	27.3	7.10	4.5±1.32
SI (148)	7.05±2.31	16.20	52.7	24.3	6.75	3.45±1.02
Colic (28)	6.12±1.51	21.40	42.8	25.0	10.70	3.35±0.43
Tympany (45)	7.52±1.78	17.70	26.6	40.0	15.50	4.13±1.25
LA (22)	7.05±0.45	9.09	63.6	18.1	9.09	3.18±0.37
TP (64)	4.04±0.64	14.06	50.0	28.1	7.80	2.45±0.82
FBS (39)	5.98±0.29	7.69	79.4	12.8	0	2.15±0.19
DH (21)	6.69±0.40	9.52	80.9	9.52	0	2.33±0.25

higher incidence in first to third lactation (52.7%) followed by fourth to sixth lactation (24.3%) with mean lactation number 3.45±1.02 (Table 4).

Colic and tympany: Annual incidence of colic and tympany cases were 0.49% (28/5689) and 0.79% (45/5689), respectively (Table 2). In both these disorders, there is no significant difference in incidence rate in cattle (tympany, 0.87%, 19/2163; colic, 0.64%, 14/2163) and buffaloes (tympany, 0.73%, 26/3526; colic, 0.39%, 14/3526) (Table 3). Reports of various workers (Joshi 1970, Prasad *et al.* 1972) stated higher incidence of tympany in cattle and buffaloes. This divergence in incidence may be due to the large sample size of the present study. Overall cases of tympany were highest in 4th to 6th lactation (40%) whereas colic cases were highest in first to third lactation (42.8%) followed by 4th to 6th lactation (25%) and in heifers (21.6%). Average age of the animals affected with colic and tympany were 6.12±1.51 years and 7.52±1.78 years, respectively (Table 4).

Traumatic pericarditis and lactic acidosis: Principally, incidence of T.P were maximum in the month of June (2.52%) followed by January (2.02%) and October (1.94%) whereas incidence of lactic acidosis was highest in the month of November (1.24%) (Table 2). The annual incidence of T.P in buffalo (1.38%, 43/3526) was significantly higher than cattle (0.69%, 15/2163) ($P<0.05$) while no significant difference was observed in annual incidence of lactic acidosis among the species under study (Table 3). In contrast to this, Hajighahramani and Ghane (2010) represented 8.6% incidence of TP in cattle; 4.04±0.64 years and 7.05±0.45 years is the average age group of the animals affected with T.P and lactic acidosis. In both the diseases, the incidence was highest in 1st to 3rd lactation group and decrease in the incidence rate with increase in parity was observed which corresponds with the findings of Grohn and Bruss (1990) (Table 4). Singh *et al.* (2018) shown 16.22% of prevalence of ruminal acidosis in and around Jammu region with decreased prevalence with increase in lactation number which was in agreement with the outcomes of present study.

FBS and DH: The incidence of FBS was highest in the month of February (2.19%) followed by December (1.6%) and April (0.97%) with an overall annual incidence of 0.68% (Table 2). However, it was observed that cases of FBS were seen round the year except in month of July and November.

In DH cases, incidence was high in the month of March (0.95%) and February (0.94%) which is mainly a sequel of FBS with an annual incidence of 0.36% (21/5689) (Table 3). The findings of very low incidence of FBS and DH in the current study were in agreement with the outcomes of Cramers *et al.* (2005) who reported <2% incidence of foreign body in routine slaughtered dairy animals and Hussain and Uppal (2015) who reported 0.78% and 0.34% incidence of FBS in cattle and buffaloes. No case of DH was observed in cattle round the year whereas in buffalo incidence rate was 0.59% (21/3526). FBS cases were significantly more in buffaloes as compared to cattle (Table 2). Cases of FBS and DH were higher in the age group of 5 to 10 years particularly up to third lactation with mean lactation number 2.15±0.19 and 2.33±0.25, respectively (Table 4).

Present study indicated that overall incidence of forestomach disorders is endemic in dairy animals of Haryana, significantly more in buffaloes than in cattle. Incidence was mainly high in summer and rainy season. Impaction, simple indigestion and foreign body syndrome are the most prevalent forestomach disorders of large ruminants in Haryana state. The present study is a call that preventive steps especially amelioration of animal husbandry and feeding practices should be taken to minimize the incidence of these disorders.

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