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A Study on the Prevalence and Some Epidemiological Features of Gastrointestinal Impaction Disorders in Cattle and Buffaloes of Punjab Area

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ABSTRACT

This study to document the prevalence and some epidemiological features of gastrointestinal impaction in cattle and buffaloes was conducted by undertaking key informant interview (interviews of farmers and visits to dairy farms), case study analysis (observation of cases registered under randomly selected state veterinary hospitals and polyclinics) and retrospective study in various parts of Punjab state. Interview of farmers and visits to dairy farms revealed, overall prevalence of gastrointestinal impaction in cattle and buffaloes to be 0.58 percent (cattle - 0.31%, buffaloes - 1.16%) with significantly ($p < 0.01$) lower prevalence in organised dairy farms as compared to unorganised farms. The annual case incidence of gastrointestinal impaction among cases referred to veterinary hospitals and polyclinics of Punjab was 4.88 percent (cattle - 6.82%, buffaloes - 3.83%) being significantly higher during the month of May (10.44%), April (7.62%) and June (7.61%) attributable to scarcity of green fodder, feeding of wheat straw along with hot and dry climate. Through retrospective analysis of cases admitted at Veterinary Teaching Hospital, Guru Angad Dev Veterinary and Animal Sciences University, the annual case incidence was found to be 13.67 percent (17.77% in buffaloes and 9.11% in cattle) with majority (58.0%) of gastrointestinal impaction cases associated with foreign body syndrome, and its sequel like diaphragmatic hernia and reticular abscess. The data so generated would be a basis for further research.

Keywords: Buffalo, Cattle, Gastrointestinal impaction, Foreign body syndrome.

With the recent changes in the agricultural, animal production and feeding practices, there is increase in incidence of gastrointestinal disorders particularly, impaction syndrome in dairy animals. Impaction is accumulation of ingesta in gastrointestinal tract and is one of the major causes of mechanical dysfunction of forestomach that leads to high economic loss to the farmers owing to reduced milk production and mortality many a times. Lack of suitable epidemiological data of an area further adds to problem. In India and abroad various studies have been undertaken on clinical, haematological, biochemical and rumen liquor alterations, and medical and surgical management of forestomach impaction in cattle and buffaloes. However, epidemiological studies of these conditions seem to have received little attention especially from Indian workers and as a result

there is no comprehensive information on prevalence of gastrointestinal impaction disorders in cattle and buffaloes. This study was thus designed to document the prevalence, annual case incidence and some epidemiological features of gastrointestinal impaction in cattle and buffaloes in the state of Punjab.

MATERIALS AND METHODS

Study area

The data related to prevalence were collected by way of interviewing farmers and visits to dairy farms pertaining to five years (2005-2009). To find out the annual case incidence of gastrointestinal impaction disorders at veterinary hospitals, data were collected from various



randomly selected civil veterinary hospitals and polyclinics of different districts of Punjab pertaining to the year 2009, While data of Large animal clinics of Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) Ludhiana was retrospectively evaluated for the year 2009 to calculate annual case incidence at this referral facility.

Methodology

The data were collected by following methods and approaches:

Key informant interview

In this method interviews of farmers were conducted, with visits to dairy farms. A total of 102 farmers were directly interviewed from different districts of Punjab in addition to visits at 12 dairy farms situated in various districts of Punjab *i.e.* [Ludhiana (3), Barnala (2), Jalandhar (2), Fategarh Sahib (1), Moga (1), Patiala (1), Ropar (1) and Sangrur (1)]. For this purpose an exhaustive questionnaire was prepared and information about the herd such as herd size, species, type of feed used (green fodder, wheat straw, concentrate) and cases of gastrointestinal impaction during the last five years (2005-2009) was collected. The farmers (both interviewed and visited) were divided into four groups according to the number of animals owned by them. Farmers having less than 25 animals constituted Group I, farmers having 26 to 50 animals constituted Group II, farmers having 51 to 100 animals constituted Group III and farmers having more than 100 animals constituted Group IV. Group III and IV comprised of organised dairy farms while group I and group II comprised of unorganised dairy farms.

Case study analysis

This method included collection of information about cases registered under various state veterinary hospitals and polyclinics. Data were collected from randomly selected eleven civil veterinary hospitals and polyclinics of the state for year 2009 from 11 districts (one hospital from each district) of Punjab namely Bathinda, Mansa, Gurdaspur, Sangrur, Ropar, Fategarh Sahib, Hoshiarpur, Jalandhar, Ferozepur, Moga and Muktsar. Since, detailed data was not available, hence data related to total number of cases, number of gastrointestinal impaction cases, type

of disorder, season, species, and general treatment adopted by field veterinary officers were collected.

Retrospective study

This method aimed at collecting and interpreting data, in a retrospective manner for the year 2009 about the clinical cases of cattle and buffaloes presented at Large Animal Clinics of Veterinary Teaching Hospital, Department of Teaching Veterinary Clinical Complex, GADVASU, Ludhiana. For the purpose the outdoor patient cards were screened to find out total number of cases, number of GIT impaction cases, species, month of presentation, radiographic findings and diagnosis of the cases.

The significance of prevalence between different groups was determined using χ^2 – test. The differences were regarded significant if p-value was <0.05 .

RESULTS AND DISCUSSION

Key informant interview revealed the annual prevalence of gastrointestinal impaction to be 0.31 percent in cattle and 0.16 percent in buffaloes respectively, with an overall prevalence of 0.58 percent (Table 1). In group I, majority of animals were being fed green fodder and wheat straw while in group II, III and group IV majority of animals were being fed silage or combination of green fodder (berseem, sorghum, bajra, jowar or cherry) and concentrate. It was interesting to note that in both cattle and buffaloes the prevalence decreased with increase in herd size although it decreased significantly ($p<0.05$) in buffaloes only. The total number of cases in unorganised (group I and Group II) and organised (Group III and Group IV) farms were 19/1043 and 3/1516, respectively. This overall percentage prevalence of gastrointestinal impaction was significantly ($p<0.001$) lower in organised dairy farms than unorganised farms. The significantly higher incidence in unorganised farms especially group I animals may be due to feeding of wheat straw. In Punjab state, the harvesting of wheat is mainly done by combined harvester, so the straw is fine and contains more soil particles because of low height of machine blades from the ground which introduces dust into feed. The fine straw and soil may have got entrapped in omasal leaves leading to impaction. The coarse nature of straw may have also contributed to impaction. Earlier studies also implicated the finely cut machine made wheat straw (Toor and Saini, 2008; Hussain *et al.*, 2013b) and

Table 1. Prevalence of gastrointestinal impaction in cattle and buffaloes through key informant interview and feeding pattern in various farmer groups (2005-2009)

Farmer type	Cattle			Buffaloes		Overall		Feeding pattern at various farms
	No. of farmers	Total no. of animals	No. of cases	Total no. of animals	No. of cases	Total no. of animals	No. of cases	
Group I	78	415	4 (0.96) ^b	360	10 (2.78) ^b	775	14 (1.81) ^c	GW=50, G=27, S=1
Group II	24	628	2 (0.32) ^{ab}	166	3 (1.81) ^b	794	5 (0.63) ^b	S=7, GC=11, GCW=6
Group III	6	406	1 (0.25) ^{ab}	40	-	446	1 (0.22) ^{ab}	S=5, GC=1
Group IV	6	1110	1 (0.09) ^a	640	1 (0.16) ^a	1750	2 (0.11) ^a	S=6
Total	114	2559	8 (0.31)	1206	14 (1.16)	3765	22 (0.58)	GW=50, G=27, S=19, GC=12, GCW=6

In a column the values with at least one similar superscript do not differ significantly

The numbers in parenthesis indicate percent prevalence; GW, green fodder + wheat straw; G, green fodder; S, silage; GC, green fodder + concentrate; GCM, green fodder + concentrate + mineral mixture; GCW, green fodder + concentrate + wheat straw

coarse feed (Radostitis *et al.*, 2010) as a possible cause of impaction.

Overall Annual case incidence through case study analysis, in cattle and buffalo came out to be 4.88 percent, being significantly higher ($p < 0.05$) in cattle (6.82 percent) as compared to buffaloes (3.83 percent) (Table 2 and 3). Higher case incidence in cattle may be due to small sample size of cattle (5645) as compared to buffaloes (10464). The overall case incidence was significantly ($p < 0.01$) higher for Jalandhar (7.11%), Moga (6.58%) and Bathinda (6.27%) districts as compared to other districts of Punjab (Table 2). The annual case incidence in cattle was significantly ($p < 0.05$) higher during the month of May (13.82%) followed by April (10.06%) and June (8.21%) whereas in buffaloes case incidence was significantly ($p < 0.01$) higher in the month of May (8.62%) followed by June (7.25%) and April (6.25%). The overall case incidence was significantly ($p < 0.01$) higher during the month of May (10.44%) followed by April (7.62%) and June (7.61%) (Table 3). The prevalence of these disorders may actually be higher, owing to the fact that all gastrointestinal impaction cases are not being presented to the civil veterinary hospitals and polyclinics because majority of the impaction cases are being treated at the door step of the farmers. A general view of all the veterinary officers was

that gastrointestinal impaction disorders were associated with feeding of wheat straw, especially the machine made, and maximum numbers of cases were reported to them during green fodder scarcity period (April-June). Also, with scarcity of green fodder there is feeding of wheat straw in a climate which is hot and dry. This corroborated with the findings of Joshi (1970), though impaction has also been reported to occur throughout year (Prasad and Rekib, 1979). Llewellyn, 1976; Mitchell, 1991 reported that in western countries impaction has been reported to be more common in stall fed and confined animals in winter season while in India incidence was reported to be high during southwest monsoon season (Chakrabarty *et al.*, 1974). In present study cases of impaction were reported throughout the year but with higher prevalence during summer season (i.e. April to June). The case incidence of foreign body syndrome during this study in cattle and buffaloes was 0.78 percent and 0.34 percent, respectively being significantly higher in cattle (Table 2 and 3). However, low prevalence of foreign body syndrome may be attributed to the fact that data related to this disorder was not available at most of the hospitals, as the diagnostic facility like radiography was not available at field level and instead exploratory laparo-rumentomy could only be done. Similar to the present study, Grohn and Bruss (1990)

Table 2. District wise annual case incidence of gastrointestinal impaction in cattle and buffaloes through case study analysis of 11 hospitals

District	Cattle				Buffaloes				Overall			
	Total OPD cases	Impaction	FBS	Total impaction cases	Total OPD cases	Impaction	FBS	Total impaction cases	Total OPD cases	Impaction	FBS	Total impaction cases
Bathinda	584	52(8.90)*	23 (3.94)*	75 (12.84)*	2683	114(4.25)*	16 (0.60)	130(4.84)*	3267	166(5.08)*	39(1.19)*	205(6.27)*
Mansa	303	11 (3.63)	0(0.0)	11 (3.63)	1216	24 (1.97)	0(0.0)	24 (1.97)	1519	35 (2.30)	0(0.0)	35 (2.30)
Gurdaspur	328	17 (5.15)	0(0.0)	17 (5.18)	1930	44 (2.58)	0(0.0)	44 (2.28)	2258	61 (2.70)	0(0.0)	61 (2.70)
Sangrur	146	12 (8.22)	0(0.0)	12 (8.22)	688	22 (3.27)	0(0.0)	22 (3.19)	834	34 (4.08)	0(0.0)	34 (4.08)
Ropar	546	24 (4.39)	5(0.92)	29 (5.31)	473	20 (4.22)	4 (0.85)	24 (5.10)	1019	44 (4.32)	9(0.88)	53 (5.20)
Fategath sahib	152	13 (8.55)	1(0.66)	14 (9.21)	560	23 (4.11)	1 (0.18)	24 (4.28)	712	36 (5.05)	2(0.28)	38 (5.34)
Hoshiarpur	442	11 (2.49)	14 (3.17)*	25 (5.65)	598	17 (2.84)	11 (1.84)*	28 (4.68)	1040	28 (2.69)	25(2.40)*	53 (5.10)
Jalandhar	2051	139 (6.78)	0(0.0)	139 (6.78)*	213	22 (10.33)*	0(0.0)	22(10.33)*	2264	161 (7.12)*	0(0.0)	161(7.11)*
Ferozepur	766	46 (6.01)	0(0.0)	46 (6.01)	336	17 (5.05)*	0(0.0)	17 (5.06)	1102	63 (5.71)	0(0.0)	63 (5.72)
Moga	137	13 (9.49)*	0(0.0)	13 (9.49)*	562	33 (5.77)*	0(0.0)	33 (5.87)*	699	46 (6.58)*	0(0.0)	46 (6.58)*
Muktsar	190	3 (1.58)	1(0.53)	4 (2.11)	1205	29 (2.40)	4 (0.33)	33 (2.74)	1395	32 (2.29)	5(0.36)	37 (2.65)
Over all	5645	341(6.04) ^a	44 (0.78) ^a	385(6.82) ^a	10464	365(3.49) ^b	36 (0.34) ^b	401(3.83) ^b	16109	706(4.38)	80(0.50)	786(4.88)

*Differ significantly within a column (excluding the values of last row); the values in last row with different superscript differ significantly ($p<0.01$) for each corresponding value ; Numbers in parentheses indicate percent incidence; FBS, foreign body syndrome

Table 3. Month wise annual case incidence of gastrointestinal impaction in cattle and buffaloes through case study analysis of 11 hospitals

Month	Cattle			Buffaloes			Overall		
	Total OPD cases	Impaction Cases	FBS cases	Total OPD cases	Impaction cases	FBS cases	Total OPD cases	Impaction Cases	FBS cases
January	407	27 (6.63)	2 (0.49)	737	17 (2.31)	2 (0.27)	1144	44 (3.85)	4 (0.35)
February	397	18 (5.34)	1 (0.25)	729	9 (1.24)	2 (0.27)	1126	27 (2.40)	3 (0.27)
March	430	27 (6.28)	3 (0.69)	835	11 (1.32)	5 (0.60)	1265	38 (3.00)	8 (0.63)
April	457	43 (9.41)*	3 (0.66)	816	47 (5.76)*	4 (0.49)	1273	90 (7.07)*	7 (0.55)
May	499	58 (11.62)*	10 (2.0)*	928	75 (8.08)*	5 (0.05)	1427	134 (9.39)*	15 (1.05)*
June	573	41 (7.12)*	6 (1.04)	965	64 (6.63)*	6 (0.62)*	1538	105 (6.82)*	12 (0.78)
July	506	31 (6.13)	6 (1.19)*	1033	35 (3.39)	4 (0.39)	1539	66 (4.29)	10 (0.65)
August	481	27 (5.61)	7 (1.05)	950	40 (4.38)	3 (0.31)	1431	67 (4.67)	10 (0.69)
September	500	29 (5.61)	4 (0.80)	960	26 (2.71)	4 (0.42)	1460	55 (3.77)	8 (0.55)
October	440	13 (2.95)	2 (0.45)	900	11 (1.22)	1 (0.11)	1340	24 (1.79)	3 (0.22)
November	461	14 (3.04)	0 (0.0)	790	17 (2.15)	0 (0.0)	1251	31 (2.48)	0 (0.0)
December	494	12 (2.43)	0 (0.0)	821	13 (1.58)	0 (0.0)	1315	25 (1.90)	0 (0.0)
Total	5645	341 (6.04) ^a	44 (0.78) ^a	10464	365 (3.49) ^b	36 (0.34) ^b	16109	706 (4.38)	80 (0.50)

*Differ significantly within a column (excluding the values of last row); the values in last row with different superscript differ significantly (p<0.01) for each corresponding value ; Numbers in parentheses indicate percent incidence; FBS, foreign body syndrome

**Table 4.** Month wise retrospective case incidence of GIT impaction in cattle and buffalo suffering from GIT dysfunction at GADVASU clinic for year 2009

Month	Cattle		Buffaloes		Overall	
	Total no. of Cases	No. of GIT Impaction cases	Total no. of Cases	No. of GIT Impaction cases	Total no. of Cases	No. of GIT impaction cases
January	42	5 (11.90)	92	8 (8.69)	134	13 (9.70)
February	67	4 (5.97)	69	14 (20.29)	136	18 (13.24)
March	95	7 (7.37)	94	12 (12.77)	189	19 (10.05)
April	96	4 (4.17)	73	9 (12.33)	169	13 (7.69)
May	89	22 (24.72)*	96	16 (16.67)	185	38 (20.54)*
June	106	11 (10.38)*	121	42 (34.71)*	227	53 (23.35)*
July	104	9 (8.65)	138	41 (29.71)*	242	50 (20.66)*
August	133	13 (9.77)	144	20 (13.89)	277	33 (11.91)
September	173	7 (4.05)	159	23 (14.46)	332	30 (9.04)
October	119	8 (6.72)	123	18 (14.63)	242	26 (10.74)
November	67	10 (14.93)	99	15 (15.15)	166	25 (15.06)
December	72	6 (8.33)	86	12 (13.95)	158	18 (11.39)
Total	1163	106 (9.11) ^a	1294	230 (17.77) ^b	2457	336 (13.67)

*Differ significantly within a column (excluding the values of last row); values in last row with different superscript differ significantly ($p < 0.05$) for each corresponding value ; Numbers in parentheses indicate percent incidence; FBS, foreign body syndrome ; Numbers in parentheses indicate percent incidence

The case incidence of present study may be actually higher than in general population of cows and buffaloes, owing to inclusion of only those cows and buffaloes which were confirmed to have gastrointestinal dysfunction in an epidemiological study on 61,124 Ayrshire dairy cattle came out with a traumatic reticuloperitonitis lactational incidence risk of 0.6 percent while Maddy (1954) found that three fourth of the dairy cattle slaughtered had some evidence of perforation of reticulum.

Annual case incidence through retrospective study indicated that 106 cattle and 230 buffaloes were suffering from gastrointestinal impaction out of cases presented during the year 2009 *i.e.* 1163 cattle and 1294 buffaloes (Table 4). Observations revealed 13.67 percent overall

incidence of these disorders which was in contrast to Toor and Saini (2008) who reported higher (33%) incidence of impaction in hospital admitted cases. The higher prevalence in previous study may possibly be due to less sample size. The case incidence of gastrointestinal impaction in buffaloes (17.77%) was significantly higher as compared to cattle (9.11%) with overall highest case incidence during the month of June (23.35%) followed by July (20.66%) and May (20.54%). The higher incidence in months of May, June and July corroborated the findings of Prasad and Rakieb (1979). The case incidence of present study may be actually higher than in general population of cows and buffaloes, owing to inclusion of only those cows and buffaloes which were confirmed to have gastrointestinal dysfunction.

The 336 cases of gastrointestinal impaction comprised of diaphragmatic hernia (68, 20.3%), reticular abscess (19, 5.7%), traumatic reticulitis (47, 14%), peritonitis (50, 14.9%), forestomach impaction (134, 39.9%) and late pregnancy indigestion (18, 5.4%) (Table 5). Earlier case studies have also reported these disorders as important cause of gastrointestinal dysfunction in cattle and buffaloes (Hussain *et al.*, 2013a; Hussain *et al.*, 2014; Hussain and Uppal, 2014). Radiographic findings of reticular area were available for 207/336 animals suffering from gastrointestinal impaction. Foreign bodies were observed in 120/207 (58.0%) animals, being multiple (20.3%), potential (21.3%) and non-potential (16.4%) (Table 6). The overall number of foreign body syndrome associated cases was significantly ($p < 0.01$) higher than cases not associated with foreign body syndrome. So, majority of these disorders were associated with presence of foreign bodies in the reticulum. It was also evident that diaphragmatic hernia and reticular abscess occur mainly as a sequel to foreign body syndrome. Other workers have also encountered metallic objects (Saini and Mahajan 2001), cloths (Venu *et al.*, 2001) and polythene bags (Narasimha *et al.*, 2001) in gastrointestinal tract of ruminants causing obstruction and occlusion.

CONCLUSION

The study revealed 0.58 percent overall prevalence of gastrointestinal impaction in cattle and buffaloes being significantly higher in unorganised dairy farms indicating relationship with feeding of wheat straw. The case study analysis for the year 2009 revealed 4.88 percent annual case incidence of referred cases to veterinary hospitals

Table 5. Month and condition wise retrospective case incidence of gastrointestinal impaction in cattle and buffalo at GADVASU clinic for year 2009

Month	TNGC	DH	RA	TR	P	FI	LPI
January	13	5 (38.5)	4 (30.8)	3 (23.1)	0 (0.0)	1 (7.7)	0 (0.0)
February	18	8 (44.4)	2 (11.1)	1 (5.6)	4 (22.2)	3 (16.7)	0 (0.0)
March	19	6 (31.6)	2 (10.5)	5 (26.4)	0 (0.0)	6 (31.6)	0 (0.0)
April	13	1 (7.7)	0 (0.0)	3 (23.1)	5 (38.5)	4 (30.8)	0 (0.0)
May	38	5 (13.2)	2 (5.3)	3 (7.9)	2 (5.3)	25 (65.8)	1 (2.6)
June	53	8 (15.1)	0 (0.0)	7 (13.2)	10 (18.9)	26 (49.1)	2 (3.8)
July	50	9 (18.0)	0 (0.0)	3 (6.0)	6 (12.0)	24 (48.0)	8 (16.0)
August	33	7 (21.2)	2 (6.1)	3 (9.1)	7 (21.2)	11 (33.3)	3 (9.1)
September	30	5 (16.7)	2 (6.7)	6 (20.0)	4 (13.3)	11 (36.7)	2 (6.7)
October	26	5 (19.2)	2 (7.7)	5 (19.2)	4 (15.4)	8 (30.8)	2 (7.7)
November	25	6 (24.0)	3 (12.0)	1 (4.0)	5 (20.0)	10 (40.0)	0 (0.0)
December	18	3 (16.7)	0 (0.0)	7 (38.9)	3 (16.7)	5 (27.8)	0 (0.0)
Total	336	68 (20.3)	19 (5.7)	47 (14.0)	50 (14.9)	134 (39.9)	18 (5.4)

Numbers in parentheses indicate relative percent incidence; TNGC, Total number of gastrointestinal impaction cases; DH, diaphragmatic hernia; RA, reticular abscess; TR, traumatic reticulitis; P, peritonitis; FI, forestomach impaction; LPI, late pregnancy indigestion

and polyclinics of Punjab, being highest during the month of May (10.44%), June (7.25%) and April (6.25%). Retrospectively at Teaching Veterinary Hospital of GADVASU, the annual case incidence was found to be 13.67 percent and majority (58.0%) of the cases were associated with foreign bodies. Therefore, G I impaction, especially in summers in milch animals is an important disease and a veterinarian must keep this in mind while dealing cases of GI dysfunction.

Table 6. Radiographic findings of reticular area in various groups of gastrointestinal impaction presented at GADVASU clinic for year 2009

Group	No. of animals radiographed	Foreign bodies in reticulum on radiography				
		Multiple (%)	Potential (%)	Non-potential (%)	Total (%)	Absent (%)
Diaphragmatic hernia	56	19 (33.9)	8 (14.3)	14 (25.0)	41 (73.2)**	15 (26.8)
Reticular abscess	17	2 (11.8)	10 (58.8)	3 (17.6)	15 (88.2)**	2 (11.8)
Traumatic reticulitis	38	15 (39.5)	23 (60.5)	0 (0.0)	38 (100)**	0 (0.0)
Peritonitis	26	6 (23.1)	3 (11.5)	6 (23.1)	15 (57.7)	11 (42.3)
Fore-stomach impaction	67	0 (0.0)	0 (0.0)	11 (16.4)	11 (16.4)	56 (83.6)
Late pregnancy indigestion	3	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (100)
Total	207	42 (20.3)	44 (21.3)	34 (16.4)	120 (58)	87 (42.0)

**Significant difference at $p < 0.01$ for comparison between foreign body syndrome associated and non- foreign body syndrome associated cases

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