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Studies on occurrence of rumen impaction in cattle

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Abstract

Rumen impaction with plastics is one of the emerging threats to stray cattle populations typically in urban and semi-urban areas. The present study was carried out to record the occurrence of rumen impaction in cattle presented to the college hospital in two years. Among 1,248 cattle presented, 40 cows were diagnosed to be suffering from rumen impaction. The overall occurrence of rumen impaction was found to be 3.20%, sixteen (1.28%) cows underwent rumenotomy and plastics were found in seven (0.56%) cases. Holstein-Friesian breed cattle were at more risk comprising 65% of all impacted cases and adult cows of 4 – 8 years age were more affected by rumen impaction with plastics. Physiologically, half of the cows were in milch and non-pregnants and all of them were suffering for the last 10 – 12 days. The majority of them were of medium body condition followed by a good and medium condition. The cows presented in monsoon followed by spring season were found to be more affected by rumen impaction. It is to conclude that, though stray cattle were having more risk of plastic impaction, the clinical cases presented to the dispensaries or college hospitals were less. This is because of commercialization of dairy industry at urban areas like Bengaluru.

Keywords: cattle, rumen impaction, plastics, occurrence studies

1. Introduction

Disorders of the forestomach were routinely encountered in cattle [1-3], of these, ruminal impaction was one of the most common and important gastro-intestinal disorder that could degrade the body condition there by the economy of the farmer by a reduction in milk yield or loss of the animal. In different studies, the incidence of ruminal impaction with plastics in cattle ranged from 3.72% [4] to 5.96% [1] with a high prevalence in adult cattle aged above ten years [5]. The prevalence was found in many of the slaughter house studies [6-8] as the presence of plastics could be identified at the time of slaughter or during post-mortem examination. The occurrence of plastic impaction is gradually increasing over the years, especially in urban areas due to indiscriminate feeding habits of cattle, population explosion, industrialization prompting people to use more plastics. The plastics are indigestible and will stay till the animal die or subjected to rumenotomy. They leach some toxins like PCBs, Dioxins and Phthalates into rumen liquor and finally enter the fatty tissues including udder and leak into milk. Our aim of the study was to quantify those toxins. As a part of this, an occurrence study was undertaken.

2. Materials and Methods

As a part of the research work on plastic impaction in bovines, the occurrence study regarding rumen impaction and plastic impaction was carried out among the cattle presented to the Dept. of Veterinary Surgery and Radiology, Veterinary College Hospital, Hebbal, Bengaluru, Karnataka. The occurrence of ruminal impaction was recorded for a period of two years from October, 2018 to September, 2020. The occurrence was recorded as per breed, sex, age, season, physiological status, body condition of the animals and duration of illness. The details are given hereunder and discussed as follows.

3. Results and Discussion**3.1 Occurrence of rumen impaction**

A total of 1,248 bovines were presented to the college hospital in the period of two years from October, 2018 to September, 2020. Among these, 40 (3.20%) were confirmed to have been

suffering from ruminal impaction based on various diagnostic analyses and seven (0.56%) cattle were having plastics in the rumen (Table 1).

Rumen impaction in bovines reared in-doors of rural areas are least expected [9]. But, it was quite opposite in cows of urban or semi urban areas like Bengaluru which had very less grazing areas and more access to plastic waste material and hence could result in more number of cases. But, surprisingly, only 0.56% (n = 07) occurrence of plastic impaction was observed in our study, among 40 were (3.20%) diagnosed with rumen impaction out of 1,248 cows. This may be due to a very less number of cases presented to the hospital and also the commercial mind sets of the cattle owners in and around Bengaluru. Usually, many of the owners cull such animals

and hence, less number of animals was reported in our study for a period of two years. The majority of the plastic impaction cases go unnoticed as they lately express the signs of impaction and could be identified at slaughter only. Nobody reported such a low incidence of rumen impaction except Boodur (2008) [4] who reported an overall incidence of 0.44% in clinical cases in a retrospective study over ten years and he also observed gradual increase in its incidence as years pass on. But, values nearer to our findings, occurrence of 5.96% [1], 7.51% [10], 8.6% [11] and 13.22% [12] was reported. Contrary to our results, a very high incidence of indigestible foreign bodies, viz., 56.88% [6], 41.8% [7], 23.4% [13] were published earlier. However, all these were slaughter house studies and hence, the occurrence could be very high.

Table 1: Overall occurrence of rumen impaction in bovines:

Total bovines registered at Department in two years	Bovines diagnosed with ruminal impaction	Bovines that underwent rumenotomy	Number of bovines found positive for foreign bodies
1,248	40 (3.20%)	16 (1.28%)	07 (0.56%)

3.2. Breed wise occurrence of rumen impaction:

Preponderance of ruminal impaction was observed in Holstein-Friesian breed (n = 26, 65%) followed by Jersey crossbred (n = 06, 15%), Jersey (n = 04, 10%), Holstein-Friesian crossbred (n = 02, 5%) and non-descript (n = 02, 5%) cattle (Table 2, Fig 1). Among seven cows retrieved with plastics, three belonged to Holstein-Friesian, three were Jersey cross and one belonged to Holstein-Friesian crossbreed.

Cattle owners in and around Bengaluru are very much interested in rearing HF breed which are high yielders and are more suited to the local climate also and correspondingly the occurrence was highest in HF breed cattle. The results corroborate with earlier results published by some authors [11, 14-16]. But, Bwatota *et al.* (2018) [17] recorded a higher incidence in crossbred cattle. Cattle breed prevalent in that area would be affected more [4].

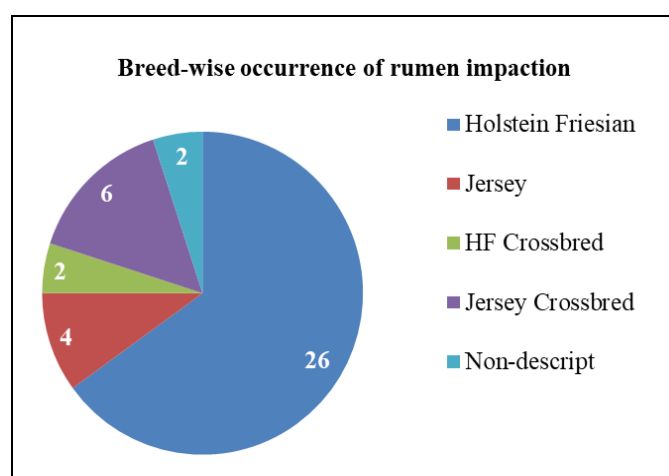


Fig 1: Breed wise occurrence of rumen impaction in bovines

Table 2: Breed wise occurrence of rumen impaction in bovines:

Breed	No. of animals diagnosed with ruminal impaction	No. of animals found positive for foreign bodies
Holstein Friesian	26 (65%)	03
Jersey	04 (10%)	01
HF Crossbred	02 (5%)	-
Jersey Crossbred	06 (15%)	03
Non-descript	02 (5%)	-
Total	40	

3.3. Sex wise occurrence of rumen impaction

In the present study, all 40 bovines affected with ruminal impaction were found to be females and no males were presented to the clinic with impaction. As the dairy industry became more commercial and the availability of artificial insemination services even to rural areas, importance has been given to females only and male calves are being culled at an early age. Many authors [8, 16, 18-20] also published similar findings.

3.4. Age wise occurrence of rumen impaction

All ages of cattle were affected, however, occurrence of ruminal impaction was found frequently in 4 – 6 yrs age group cattle (n = 14, 35%) followed by 6 – 8 yrs (n = 12, 30%), 2-4 yrs (n = 05, 12.5%), 0 – 2 yrs and 8 – 10 yrs (n = 04 each, 10% each) and more than 10 yrs (n = 01, 0.25%)

(Table 3, Fig 2). Among the seven animals diagnosed with plastic impaction three were in 4 – 6 yrs, three in 6 – 8 yrs and one in more than 10 yrs age group.

Adult cattle above eight years were commonly affected by rumen impaction as informed in earlier reports [12, 21, 22] as it would take more time to feed on garbage and accumulate plastics in their bodies. Contrary to this, medium aged (4-8 yrs) cattle were found to be affected more in our study, though some authors annotated that plastic impaction was disease of old animals [24]. Because of increase in stray cattle population and non-availability of pastures in cities for longer periods made them to survive predominantly on garbage and unconventional feeds make them prone to accumulate more indigestible foreign bodies at an early age itself [25, 26]. This indicates the severity of the condition and the indiscriminate feeding behaviour of animals.

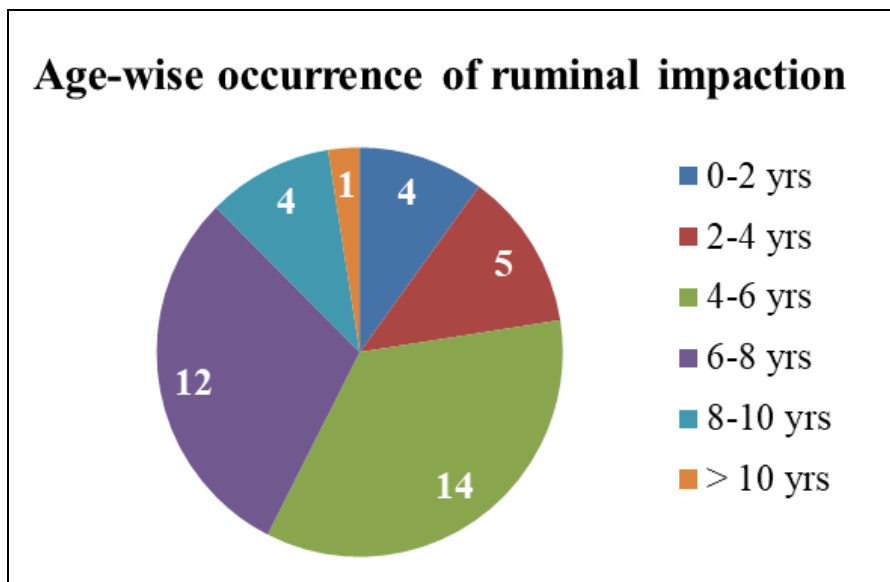


Fig 2: Age-wise occurrence of rumen impaction in bovines

Table 3: Age wise occurrence of rumen impaction in bovines:

Age of bovines	No. of animals diagnosed with ruminal impaction	Number of animals found positive for foreign bodies
0-2 yrs	04 (10%)	-
2-4 yrs	05 (12.5%)	-
4-6 yrs	14 (35%)	03
6-8 yrs	12 (30%)	03
8-10 yrs	04 (10%)	-
> 10 yrs	01 (2.5%)	01
Total	40	07

followed by pregnant and dry cattle (n = 11, 27.5%), both pregnant and in milch (n = 05, 12.5%) and non-pregnant and dry animals (n = 04, 10%) (Table 4, Fig 3). Out of seven cows with plastic impaction, six were in lactation and non-pregnants and one cow was non-pregnant and dry. Our study revealed that non-pregnant animals in milch and pregnant dry cows were more suffered from rumen impaction. This might be ascribed to the fact that the animal in milch and pregnancy require more balanced nutrition and hence, feed more indiscriminately leading to faster accumulation of indigestible foreign bodies [15, 27]. Several authors also recorded higher incidence of rumen impaction in milch animals [3, 15, 28, 29]. Contrary to this, Sharma *et al.* (2015) [19] published the occurrence of rumen impaction in pregnant animals that were in their last trimester.

3.5 Physiological (Pregnancy/ Milch) status of the animal
Among the total 40 cattle diagnosed with ruminal impaction, majority were in milch and non-pregnants (n = 20, 50%),

Table 4: Physiological (Pregnancy/ Milch) status of the bovines diagnosed with rumen impaction

Physiological Status of bovines	No. of animals diagnosed with ruminal impaction	Number of animals found positive for foreign bodies
Pregnant and in Milch	05 (12.5%)	-
Pregnant and dry	11 (27.5%)	-
Non-pregnant and in Milch	20 (50%)	06
Non-pregnant and dry	04 (10%)	01
Total	40	07

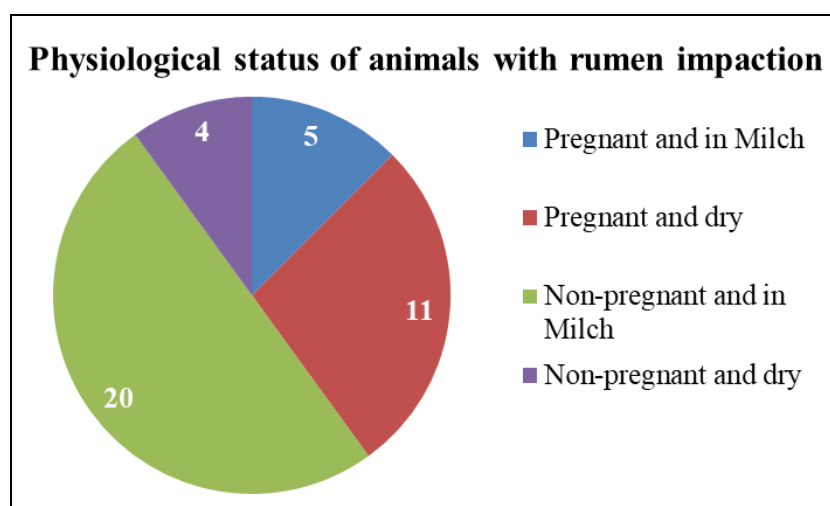


Fig 3: Physiological status of bovines affected with rumen impaction

3.6. Duration of illness

History revealed that the cattle presented were ailing for the last two days to two months. Duration of illness was from one to ten days in 32 cattle (80%), between ten days and one month in seven cows (17.5%) and more than one month in one cow (2.5%) (Table 5). Out of seven cows with plastic impaction, six were ailing for less than ten days and one cow for the last 12 days.

In the present study, the history revealed that the cattle presented were ailing for the last two days to two months. The

majority of them were not chronic sufferers showing signs for the last 10 days or less. Usually, plastic impaction is an asymptomatic chronic disease of stray cattle which could be identified at the fag end only^[5]. Similarly, Athar *et al.* (2010)^[1] and Khose *et al.* (2010)^[31] recorded a mean duration of illness as 5.20 ± 1.39 days and one month respectively in cattle diagnosed with rumen impaction. However, Ismail *et al.* (2007)^[15] reported a longer mean duration of 3.7 ± 4.6 months ranging from 0.5 to 24 months.

Table 5: Duration of illness recorded in bovines diagnosed with rumen impaction

Duration of illness	Number of animals found positive for foreign bodies	Number of animals found positive for foreign bodies
1-10 days	32 (80%)	05
10 days – one month	07 (17.5%)	02
More than one month	01 (2.5%)	-
Total	40	07

3.7. Body condition

Animals in medium body condition (n = 21, 52.5%) were found to be affected more with impaction followed by animals in good (n = 11, 27.5%) and poor body conditions (n = 08, 20%) (Table 6). Among the seven cows with plastic impaction, three were in medium; three were in good and one in poor body condition.

The chronicity of the disease and accumulation of plastics in rumen would hamper the volatile fatty acids production and thus the energy requirements of the animal. This leads to protein loss and animal gradually goes down in condition^[9]. But, if the animals were well fed with lush greens, protein

feeds and concentrates, etc., they would maintain the body condition and which might be the reason for the medium and good body condition of cows in our study. Among the seven cows with plastic impaction, three were in the medium; three were in good and one in poor body condition. The poor body condition of the animals was resultant of low nutrition levels, mineral imbalance, anaemia, prolonged anorexia, etc.^[20, 32]. Rumen was the source of about 80% of the energy supplements in ruminants and if that microbial environment was altered, it leads to energy imbalances and animals ultimately become lean and poor in body condition^[33].

Table 6: Body condition of the bovines diagnosed with rumen impaction

Body condition	No. of animals diagnosed with ruminal impaction	Number of animals found positive for foreign bodies
Poor	08 (20%)	02
Medium	21 (52.5%)	04
Good	11 (27.5%)	01
Total	40	07

3.8. Season-wise occurrence of rumen impaction

Preponderance of rumen impaction was recorded among the cows presented in monsoon season (July to September) (n = 12, 30%) followed by spring (February to March) (n = 11; 27.5%), winter (December and January) and summer (April to June) (n = 07 each; 17.5% each) and autumn (October and November) (n = 03; 7.5%) (Table 7).

Higher occurrence in monsoon (30%) and spring (27.5%) seasons in our study. This could be ascribed to the reduced availability of pastures throughout the year as dry period was less compared to areas that reported prolonged dry periods (Tiruneh and Yesuwork, 2010; Mekuanint *et al.*, 2017;

Priyanka and Dey, 2018). Change in the seasons did not show much effect on the rumen impaction and our findings were contradictory to reports of many authors (Adewunmi *et al.*, 2004; Akinrinmade and Akinrinde, 2014; Mekuanint *et al.*, 2017) who reported a high incidence of rumen impaction in summer months and attributed that to the pica caused by feeding on mineral deficient pastures that grew in phosphorus deficient soils (McDowell, 1992). Prolonged dry periods and concurrent low water intake also might have predisposed the impaction. In dry seasons, hardly animals get lush greens and so would have depended on indigestible foreign bodies in the nearby areas (Bwatota *et al.*, 2018).

Table 7: Season-wise occurrence of rumen impaction in bovines

Season	No. of animals diagnosed with ruminal impaction	Number of animals found positive for foreign bodies
Monsoon	12 (30%)	03
Spring	11 (27.5%)	03
Winter	07 (17.5%)	01
Summer	07 (17.5%)	-
Autumn	03 (7.5%)	-
Total	40	07

4. Conclusion

It is concluded that rumen impaction by foreign bodies in cattle was not much prevalent as expected in and around Bengaluru though it is a metro city. Adult non-pregnant milch

cows presented in monsoon season were at higher risk as inferred by the study.

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