

A Review on Foreign Bodies with Special Reference to Plastic Pollution Threat to Live Stock and Environment in Tirupati Rural Areas

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I. INTRODUCTION

Rumen tympanic due to metallic or non metallic (mostly polythene material) are among the most common cause of gastro intestinal disorders in ruminants (Radostatis et al, 1994). Plastics can be termed as wide range of chemical materials either synthetic or semi synthetic solid materials like polyethylene, polyvinyl chloride, polysterine largely used in plastics manufacturing industry which pose a threat to livestock and environment. Plastic garbage continuous to increase in two days modern world, more concentrated in cities and towns. Rapid industrialization and Mechanization of Agriculture have further increased the incidence of foreign bodies threatening the life of poor deprived dumb animals at the cost of intelligent human beings. This paper reviews the factor attributed to its incidence, etiology, clinical findings/observation, complications, diagnosis, bio-chemical profile, rumen profile and measures to counteract the plastic menace to livestock.

mousami, 2010), Adewunmi *et al* (2004) carried out an abattoir survey revealed astonishing facts that 77% of sheep and 20.7% of goats had in digestible garbage in sudan.

The factors that are responsible for higher incidence of non- metabolic foreign bodies is due to rapid industrialization, increase in the garbage disposal mostly in plastic bags, more urbanization, higher rise in deficiency of minerals like calcium and Phosphorus and other micronutrients in the soil along with the management of animals in towns by letting the animal loose for grazing, insufficient feeding of the animals by the owners, deprived appetite, increase in the number of animals on the existing land space etc, increase in the construction activity in cities and towns, besides the indiscriminating habit of animals. The absence of recycling industries Vs the number of units producing the plastics, frequent droughts force the animal to graze down closer to ground leading to increased incidence during the period, in appropriate disposal of wastes by humans, increased pollution of grazing land by plastic of some form at the road point near to highways has worried the situation.

Clinical findings\ observations: Depression, anorexia, restlessness, tympany, ruminal atony, decline in milk production, displacement of abomasum. Off feed, reduced dung quantity evacuation, rumen doughy in consistency, suspended rumination, dehydration, distended left para lumbar fossa, impacted rumen, contipated faeces in rectum. Vanithal *et al* (2010) reported that clinical rumen indigestible foreign body impaction was characterized by pale mucous membrane, complete cessation of rumination, reduced rumen motility, absence of stratification, hard pellet mucous coated dung and in appetite.



Incidence: The incidence of non-metallic foreign bodies (mostly polythene material) was explored by various investigators mostly in cattle (Mehandale *et al* 1998 Sharma And Pankajkumar 2006, Kohli 1998, Satish kumar *et al* 2003, Boodura *et al*, 2010, Khore *et al* 2010. Ishmail *et al* 2007, Raviraidurg 2010) buffalo (Singh *et al*, 1993, Singh and Sohti 1998, Semika 2010, Athar *et al* 2010, Narasimha Rao *et al* 2001, Ramprathu *et al* 2003). Small ruminants (Hailat *et al* 1995, Hailat *et al* 1997, Hailat *et al* 1998, Adewunmi *et al*, 2004, Balkhi, 2008, Mohammed, 2004, Pitroda *et al*, 2010 Debaris and



II. DIAGNOSIS

Physical examination: The foreign body syndrome can be diagnosed by palpation on both sides of abdomen and with a stethoscope for evidence of grunt (Begg,1950). With test by pinching withers to cause depression of back and eliciting grunt is effective diagnostic tool usually heard 2-3 seconds before primary ruminal contraction can be felt through the left flank (William,1956) Athar *et al*, 2010 reported that peritoneal fluid analysis has considerable potential as supplementary to the haematology and clinical findings of abdominal disorders.

III. CLINICO – HAEMATOLOGICAL AND RADIOGRAPHICAL DIAGNOSIS

SujathaTurkar *et al* (2010) reported that tympanic sounds were heard on percussion with simultaneous auscultation of para lumbar fossa. Boodur *et al* (2010) reported that main diagnostic sign noticed was bilateral sunken flank region with doughy on hard impaction of rumen (kohli *et al* 1998) Boodur *et al* (2010) reported that alkaline pH can be important diagnostic tool and field condition for early detection of plastic indigestion cases. Dakshinkar (2005) and Sen *et al* (2005) opined that the plastic indigestion cases shows alkaline PH. Oehme (1989) and Oehme and Noorby (1970) reported that volume of the peritoneal fluid, cellularity, protein characteristics gives an indication of inflammatory changes in peritoneal cavity. Tripathi *et al* (2010) observed low pitched reticular sounds audible on auscultation at 7th to 8th rib on left side with severe distention in left para lumbar fossa and slight distention in right flank for diagnosis in foreign body associated with plastics in 4 year old crossbred cow. Grymes and Ames (1981) observed that rectal palpation is one of the most reliable methods of diagnosing the rumen impaction in cattle.

Hematological findings:

Kohese *et al* (2010) reported severe neutrophilia (shift to left) on blood serum examination. Tripathi *et al* (2010) observed that hematological examination showed a Hb-12.6%, PCV 28%, TLC- 7×10^3 /cumm, DLC- Neutrophil 35%, Lymphocytes 60%, Monocytes 3%, Eosinophils 2%. Amel and Bukhiet (2008) reported that sheep with non-metallic foreign bodies had high WBC count and low RBC counts, PCV and Haemoglobin concentration. The MCV, MCH and MCHC value were high. Sujatha Turkar *et al* (2010) observed that haemogram depicted anaemia and neutrophilic-leucocytosis (Hb-6.8gms)

Total Leucocyte count- 20.0×10^3 /ml, Differential Leucocyte count- 68% Lymphocyte count- 28%, Monocyte- 4%, Eosinophils- 0%, Basophils 1% and adequate platelets in a cross bred cow. Athar *et al* (2010) reported that mean haemoglobin (10.44±1.31g) with elevated packed cell volume of 41.2±2.0% but total leucocyte differential count were within the normal range. This finding coincides with observations of Nagarajan and Rajamani 1973, Misra and Singh (1974).

Ultrasonography:

Athar *et al* (2010) reported that ultrasonography was performed in about 6 cases and observed that reticular motility gave a good sign of diagnosing the foreign body. Pitroda

et al (2010) diagnosed the rumen impaction due to plastic material in a goat by B mode ultrasonography performed in standing non sedative goat using (7.5HKg) probe placed directly in the canal with acouste gel by positioning the transducer 7th to 11th left intra central space. Pitroda *et al* (2010) reported that on ultrasonographic diagnosis a well distributed diffuse echogenic mass within the rumen just below the distinctly echogenic ruminal wall was observed in a goat ingested with plastic material.

Rumen profile:

Naviraidurg (2010) reported that rumen liquor examination revealed a pH of 7.0 and nil protozoal motility. Rohi *et al* (2008) reported that the rumen pH of 7.88 to 8.81 with low protozoal counts in bovines. Athar *et al* (2010) reported that the mean rumen motility was found to be 0.83±0.31 contractions per 2 minutes

Biochemical studies:

Athar *et al* (2010) reported the mean value of plasma protein, albumin and A/G ratio as 7.6±0.31g/dl, 3.04±0.13gm/dl and 0.67±0.02 respectively in cattle. Turkar (2004) reported mean plasma albumin concentration of 3.10±0.18gm/dl in cows. Boodur *et al* (2010) reported that the animals affected with rumen impaction due to indigestible plastic material showed mild hypocalcemia and hypophosphatemia. He further observed that plasma glucose, total serum proteins and aspartate aminotransferase levels improved significantly on 15th day after removal of plastic material from the rumen.

Methylene Blue Reduction test (MBRT):

Boodur *et al* (2010) observed that increase in the MBRT in animals affected with rumen impaction due to plastics. The MBRT of 22.2±1.16 was observed in animals before the treatment which improved to 4.80±0.37 after removal of plastics. The MBRT of 19.16±0.47 before treatment of animals was improved to 8.2±0.48 after 15 days after rumenotomy with supplementation of symbiotics shows an aid for diagnosis the condition.

Sedimentation activity test:

Boodur *et al* (2010) observed increase in the sedimentation activity time range 18.8±0.8 to 20.66±1.11 which improved to 5.8±1.8 to 7.8±0.31 after the treatment shows that sedimentation activity time be one more tool for diagnosing the condition.

Total Volatile fatty acids:

Boodur *et al* (2010) observed that significant increase in range of total volatile fatty acids 32.8±1.28 to 8.83±1.49 before removal of plastics from rumen to a range 68.2±1.61 to 51.4±61 after removal of plastic showing the test as a diagnostic laboratory test for detection of foreign bodies.

Necropsy findings:

Debaris Jana and Mousami Jana reported that rumen was shrunken, appeared as if the ruminal wall was adhering to the whole faeces of strangulated plastics, polythene material, rubber material, pieces of leather, nylon, and synthetic fibers. sign of ruminitis of ruminal pillars with congestion of ruminal mucosa and ulceration.

IV. TREATMENT

Emptying the rumen by rumenotomy is considered a rapid and quick method of relieving the problem of the animals. Rumenotomy along with transplantation of fresh ruminal cud is the best technique for restoration of ruminal function at fluid level for ruminal impaction due to plastics in cattle and buffaloes (Boodur *et al*,2008).

Boodur *et al* (2010)opined that the probiotic, prebiotic and growth stimulants act as an adjunct to rumenotomy for improved survival and reversal of rumen ecology.

Debaris Jane and Mousami Jane(2010)reported that stray animals which are not fed properly deficient and malnutrition animals show more tendency for ingestion of polythene and subsequent impaction.

Boodur *et al* (2010)observed that PH of the ruminal fluid was 8.0 ± 0.28 in ruminotomy performed animals and 8.5 ± 0.13 in ruminotomy with supplementation of symbiotic preparations. The pH reduced towards normal in both groups but more improvement (7.44 ± 0.08)was observed in ruminotomy with supplemented group from 15 day after administration of symbiotics.

V. DISCUSSION

Tripathi *et al*(2010)reported that indiscriminate feeding habit of animal coupled with insufficient feeding by the owner is forcing the animal to eat indigestible foreign material.Progressive toxicity due to ingestion of foreign bodies is proposed as one of the cause of death(Fouad *et al*,1980)Lack of dietary discrimination mostly in cattle ,buffaloes and to less extent in sheep and goats is leading to the ingestion of foreign materials causing the ruminal impaction. The ingested polythene hinder the process of fermentation and mixing of the contents leading to indigestion. The polythene and other plastic material do not degrade in the rumen \reticulum and remain as causing hindrance in orifice .This whole process also affects the rumen micro flora leading to indigestion of feed (Athar *et al* ,2010)Hypo motility of rumen may be caused by either a reduction in excitatory drive to the gastric centres or an increase in inhibitory inputs (Leek,1969). The quantity of the plastic material removed by rumenotomy in different animals varied from 15 kg to 55kg .The smaller sized heifers contained lesser quantity of plastics but the severity of clinical sign were similar to larger animals containing ingested plastics (Boodur *et al*,2010). Boodur *et al* (2010)opined that removal of plastics from the rumen is not enough but restoration of the normal rumen ecology is important for speedy recovery of animals..

Reddy *et al* (2004) reported that indigestible material entangled to form a big lump forming difficulty during evacuation and resulting in chronic recurrent ruminal tympany which sometimes is leading to death of the animals .Mohammed (2004)reported that soft foreign bodies cause life threatening adverse effects as grazing land is pollutedwith plastics ,,hoof, wool, hair, posing a major problem for grazing animals. DebarisJana and Mousami Jana (2010) reported that congestion of the ruminal mucosae and ruminitis might be due to chemical reaction of polywastes or due to rubbing on ruminal wall. Shrunken rumen is due to replacement of air and water volume

of rumen by the foreign materials . Zumpt(1971)reported that the tightly impacted rumen stops working because there are no contractions of sufficient force to move the contents forward along the normal digestive course nor to regurgitate them from chewing the cud.

VI. MEASURES TO COUNTERACT THE FOREIGNBODY (POLYTHENE BAGS) MENACE

1. Vegetable waste \kitchen waste should not be disposed off in the plastic bags as the animals are forced to consume the plastic bags along with the vegetable waste.

2. Rearing of the livestock in urban and semi-urban areas near to market places ,roadsides are is to be discouraged as they attempt to eat foul and vegetable waste thrown in plastic bags.

3.Dietary ruminal impaction is usually encountered in animal fed in straw and poor quality hay with limited water access needs to be addressed and proper balanced ration is to be provided to the animals to reduce\avoid the incidence.

4. Pollution of the grazing lands with plastic bags, hair ,hoof, wool, is to be avoided and awareness level among the livestock keepers is to be increased.

5. Farmers \livestock owners should be cautioned against unsupervised grazing of animals as there in danger of accidental ingestion of polythene bags.

6. Popularise the slogan "**No to carry bags when you can carry things in your hand**" can be another way to avoid the incidence of the problem.

7.The municipal authorities in cities and townsand periurban areas should provide covered disposal bins for polythene materials seperatelyto avoid ingestion by the animals.

VII. CONCLUSION

The Non-metallic foreign body syndrome (polywastes ,rubber, plastics ,and leather materials ,ropes ,cement bags etc)in emerging as a silent killer disease affecting mostly bovines(cattle and buffalo)followed by sheep and goats as per the incidence of the cases examined. The incidence is observed more in animals fed with ration containing a substantial part of poor quality straws and hays during the months of feed scarcity.The diagnosis of the problem should have a holistic approach starting with physical examination, Clinical sign\observations ,Haematological ,Biochemical profile, Ultrasonography etc. The problem can be reduced\avoided by strictly following not to dispose of the vegetable waste\kitchen waste in plastic bags, sensitizing the livestock owners of accidental ingestion of plastic material in grazing area(high way road,town,cities,semi-urban area ect.)



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Photographs of some Buffaloes and Dairy Cattle consuming plastic and garbage from dustbins in Tirupati City.







