Prevalence and therapeutic management of indigestion in milch cows in and around Bhubaneswar of Odisha, India

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ABSTRACT
The aim of this study was to investigate the prevalence and therapeutic management of indigestion in milch cows in and around Bhubaneswar, Odisha. Crossbred milch cows (n=257) with the history of anorexia presented to Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, OUAT, Bhubaneswar and in private herds in and around Bhubaneswar were examined for indigestion following standard procedures to identify the type of indigestion leading to decrease in milk yield. Clinical examination, determination of pH, study of rumen protozoa, rumen bacteria were carried out in three different types of indigestion. Amongst the affected animals, 48.33 % (n=58), 21.67 % (n=26) and 30.00 % (n=36) were detected to be affected with simple, acid and alkaline indigestion, respectively. Simple indigestion was higher (p < 0.05) as compared to acid and alkaline and alkaline indigestion (30 %) was found to be the next to simple indigestion. Rumenal movement varied from 1- 4 per 5 min and pH of the rumen fluid ranged from 7.5-8.6 and the idophillic activity of the rumen protozoa was moderate type (+++). Average total count of protozoa was estimated to be $3.5 \times 10^5$ per ml with an average of $4.1 \times 10^5$ per ml of rumen liquor and drugs used in the study were found efficacious to treat the different types of indigestion. Rumen bacteria have played role resulting in production of volatile fatty acids and lactic acid thereby decreasing / disturbing the rumen pH to non-physiological levels, reducing efficiency of rumen microflora.

Key words: Anorexia, Feed, Indigestion, Milch cows.

INTRODUCTION
Dairy cows contribute immensely to human food by transforming products into nutritious human food and the average milk production per cow has increased significantly in last few decades. Indigestion is one of the most common ailments encountered by milch cows in rural and urban areas of India leading to economic loss to the dairy farmers in terms of milk yield (Miller, 2012). The major organ involved in digestion of ruminants is the fore-stomach where modification of materials of plant origin takes place due to microbial activity. Several species of microbial flora and fauna has a designated role to play in fermentation to break down cellulose, hemicellulose, and starch, etc. from plant polymers (Mishra et al. 1972 b) Their population, at any stage, is altered either due to high or low pH of the ruminal liquor, and digestive malfunctions sets in. The ability of ruminants to digest cellulose and fibre-based feed and fodder, is derived from the peculiar anatomical structure and complex physiological character of the digestive system. In the process, the animals not only derive their own nutrition but also produce something extra to sustain the offspring (Allen, 2005; Miller-Cushon and DeVries, 2009). Thus, to maintain normal physiological function at optimum level and to keep pace with the production potential, the milch cows require adequate attention in their feeding and management (Plaizier et al., 2008; Padmaja and Rao, 2012).

Urea feeding is a common practice by the dairy owners to meet the requirement of protein in ruminants and excessive consumption of this non protein nitrogen substance causes ruminal alkalosis. Prevalence of alkaline indigestion in milch cows is on rise due to use of urea as a fertilizer or feed additive (Hazarika et al., 2002; Shah et al., 2013). The management practices with considerable variation depend heavily on the availability of feed and fodder and awareness of farmers as well. The non-availability of feed and fodder under free-range system of husbandry compels the animal to consume non-feed and other inedible stuff to satisfy the urge of hunger (Mirzaei-Aghsaghali and Maheri-Sis, 2011). Other factors which adversely influence digestive functions especially rumen metabolism emanate from dietetic errors viz. sudden change in feed and feeding regime, feeding adulterated feed, greedy feeding and over eating, under feeding, feeding of damaged grains or feed and substances of very rich in carbohydrate or protein content, and in any case, the animal leads to one of the commonest syndrome i.e., indigestion (Gnanaprakasam et al., 1992; Radostitis et al., 2010).

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Information on the clinico-pathological aspects of indigestion in milch cows in the eastern India is scanty and different types of indigestion at an early date need to be corrected to optimize production in milch cows. The present study was designed to study the prevalence and therapeutic management of indigestion in milch cows in and around Bhubaneswar, Odisha.

**MATERIALS AND METHODS**

Crossbred milch cows (n=257) with the history of anorexia, change in pH either side, reduced ruminal motility, and reduced microbial count, presented to Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, OUAT, Bhubaneswar and in private herds were included in the presents study. Randomly selected apparently healthy crossbred milch cows (n=10) were treated as control. The history of the animals was recorded on the basis of feeding, feeding system (either stall-fed or pasture grazing), duration of anorexia, lactation, any previous disease history and treatment practiced. Information about housing, feeding practices, source of drinking water management practices, change of feed or supplementation or new ingredient in the diet were also recorded. Clinical examinations such as auscultation, pulsation and percussion of the rumen were carried out on the left para-lumbar fossa to know the ruminal movement and the nature of the rumen contents. Rumen liquor (200 ml) was collected in a sterilized glass bottle from each cow by a specialized rumen extraction pump (Gnanaprakasam et al., 1992; Hussain and Uppal, 2012) and were brought to laboratory for physical examination, determination of pH, study of rumen protozoa, rumen bacteria and students’ t-test was carried out as per the method of Snedecor and Cochran (1980).

**RESULTS AND DISCUSSION**

Crossbred milch cows (n=257) were used in the present study having illness, dyspepsia, reduced rumen motility and 120 cows were found to be affected with indigestion. Amongst these affected animals, 58 (48.33 %), 36 (30.00 %) and 26 (21.67 %) were detected to be affected with simple (Group 1), alkaline (Group 2), and acid indigestion (Group 3), respectively (Table-1), and the remaining 137 (53.31 %) milch cows were suffering from other illness. Several types of indigestion in bovines have also been reported by earlier workers and documented to be ranging from 34.0 – 45.5 % (Nagaraja and Rajamani, 1973; Petrujkic et al., 2008). Clinical variations exist between the groups where clinical examination of temperature (101.4 – 102.4 °F), pulse (58 - 71 per min), and respiration (16 - 24 per min) in Group-1 indicated a variation with the normal range (Table 1). There was no mouth lesion and in some cases, tongue presented somewhat chalky white appearance. The pH of the rumen fluid ranged from 6.0-7.4. Ruminal atony and doughyness were noticed on palpation in animals and almost all the animals showed symptoms of suspended rumination (Hussain and Uppal, 2012).

There were varied consistency of faeces (hard, soft and watery) but the animals were free from endoparasites. The history collected from the owner of each animal under the study revealed that most of the cows were let out for grazing for 6-8 hours daily till they return in the evening. Milch cows (n=58) with simple indigestion showed sudden inappetence and anorexia, and history of feeding regimen demonstrated that there was abrupt change of feed from hay to concentrate containing ground whole wheat, kulthi and rice bean. The animals were also fed with gruel while some animals were fed with excess quantity of low quality paddy straw and still some were fed with moudly hay (Padmaja and Rao, 2012).

Simple indigestion recorded due to sudden change in feeding components including less water intake, and disproportionate quantities of roughages and concentrates in the present study was in close agreement with Mishra et al. (1972 b); Nagaraja and Rajamani (1973); Boodur et al. (2010) who opined that a change in feed and feeding system is responsible for primary indigestion in cattle. The percentage was seen to be pretty high in acid indigestion which may be attributed due mainly to availability of hotel wastes like boiled rice, baker’s waste, rotten potatoes, turnips, and an increase in ration grain that overwhelms

**Table 1: Prevalence, physical examination and microbial count in milch cows with indigestion (n=120)**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simple indigestion (Group-1) (n= 58)</th>
<th>Alkaline indigestion (Group-2) (n= 36 )</th>
<th>Acid indigestion (Group-3) (n= 26 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence (%)</td>
<td>48.33±4.45*</td>
<td>30.00</td>
<td>21.67</td>
</tr>
<tr>
<td>Temperature °F</td>
<td>101.8 (101.4 – 102.4)</td>
<td>100.8 (100.0 – 102.6)</td>
<td>100.6 (99.2 – 102.6)</td>
</tr>
<tr>
<td>Pulse per min</td>
<td>65±4.22 (58 - 71)</td>
<td>65±4.87 (60 - 88)</td>
<td>88±5.36 (86 - 102)*</td>
</tr>
<tr>
<td>Respiration per min</td>
<td>18±2.69 (16 - 24)</td>
<td>23±3.65 (16 - 33)</td>
<td>34 ± 2.88 (32 - 39)*</td>
</tr>
<tr>
<td>Rumen motility per 5 min</td>
<td>4 (2 - 5)</td>
<td>2 (1-4)</td>
<td>2 (1 - 3)</td>
</tr>
<tr>
<td>pH of rumen liquor</td>
<td>6.7 (6.0 – 7.4)</td>
<td>7.9 (7.5 – 8.6)</td>
<td>5.7 (5.5 - 5.9)</td>
</tr>
<tr>
<td>Rumen protozoal count ( x10^5 per ml )</td>
<td>2.39 ( 1.48 – 3.10)</td>
<td>1.57 (1.25 – 1.97)</td>
<td>0.52 (0.27 – 0.92)</td>
</tr>
<tr>
<td>Rumen bacterial count ( x10^6 per ml )</td>
<td>3.33 (2.12 – 4.0)</td>
<td>2.86 (2.11 – 3.97)</td>
<td>14.40 (13.18 – 16.12)</td>
</tr>
</tbody>
</table>

*p < 0.05
buffering ability of rumen bacteria leading to reduced performance and sometimes death (Nagaraja and Rajamani, 1973; Walia et al., 2011).

Significant quantities of histamine can be produced in cases of rumen acidosis with high concentrations of rumen degradable protein (Pilchhai et al., 2012). Therapeutic trial with Rumigest powder (M/S Alembic Pharmaceuticals Ltd.) @ 40 g daily with gruel for 3 days, and Biotone FS bolus (M/S Karnataka Antibiotics Ltd.) @ 2 boli with gur for 3 days administered orally having anti-anorexic, anti diarrhoeal, antibloat and probiotic properties showed promising and curative effects to bring ruminal activities to normal.

The alkaline indigestion (30.0 %), one of the commonest disease of alimentary tract, was followed by simple indigestion (48.33 %). The reason was more or less due chiefly to rapid change of feed, taking large quantity of urea, oilcakes legumes and decomposed protein diets. The current finding is in consonance with the earlier workers who found alkaline indigestion in 36.35 % milk cows in Bhubaneswar (Mishra et al., 1972 b) with scanty pasty dung and mild distension of abdomen. In the present study, treatment with Rumbion bolus (M/S Indian Herbs Research & Supply Co. Ltd.) @ 2 boli twice daily with gur for four days, acetic acid through oral administration, and transfer of rumen cud improved the rumen motility (1 - 4 per 5 min), protozoal (1.25 – 1.97 x 10^5 per ml) and bacterial (2.11 – 3.97 x 10^5 per ml) activity. This resulted in optimization of appetite and digestion making the rumen to function in a normal manner (Stanton, 1999; Vijayakumar et al., 2010).

Our finding of chalky tongue is also in line with the workers who suggested that most of the animals suffering from primary indigestion exhibited chalky white appearance of tongue in alkaline indigestion (Gnanaprakasam and Kothandaraman, 1986; Walia et al., 2011). Alkaline pH 7.9 (7.5 – 8.6) recorded in alkaline indigestion in some free grazing milch cows (Group 2) were found to have plastic indigestion which can be an important tool in field condition to speculate any presence of plastic or related materials which is in consonance with Boodur et al. (2010), and Reddy and Kumari, (2010).

The affected animals in alkaline indigestion in the present study demonstrated gradual inappetence and anorexia. History of the feeding regimen revealed that these animals were fed with large quantity of low quality paddy straw, urea, oilcakes, legumes and plantain trees which is in agreement with the findings of Nagaraja and Rajamani (1973), and Srinivasan (2004). Pulse (60-88 per min) and respiration (16- 33 per min) showed a wide range of variation but temperature was found to be within normal range. Ruminal movement varied from 1-4 per 5 min and pH of the rumen fluid ranged from 7.5-8.6 which corroborates the finding of Shah et al. (2013). The affected animals manifested the symptoms of dullness, depression, rough body coat, dry muzzle, atony of rumen, diarrhea or constipation and reduction in milk yield. The colour of the rumen fluid was noticed yellowish brown to greenish with aromatic or strongly aromatic odour and was either slightly viscous or viscous.

In the present study, the motility of rumen protozoa was vigorous (+++), and the population was plenty (+++). The idophillic activity of the rumen protozoa was moderate type (+++) which is in agreement with the finding of Shah et al. (2013). Average total protozoal count was estimated to be 3.5 - 4.6 x 10^9 ml with an average of 4.1 x 10^9 per ml of rumen liquor. Bacterial activity expressed as sedimentation activity time (SAT) per min ranged from 27-60 with an average of 37.8; cellulose digestion time (CDT) per hour ranged from 48-80 with an average of 63.6; and methylene blue reduction test (MBRT) ranged from 15-20 with an average of 17.5. The present study demonstrates that in acid indigestion, the total bacterial count was found to be 13.18 - 16.12 with an average of 14.40.

Consumption of left outs of hotels, baker’s dough, different types of rotten vegetables and fruits by the milch cows caused acid indigestion (Group 3). Concentrated ground nut, rice bran and chunni fed to the cows in the present study with very less amount of grass and straw without sufficient water was one of the causes of acid indigestion as these animals remained outdoor for most of the time. Group 3 animals evinced temperature (99.2-102.6 °F), pulse (86 - 102 per min), and respiration (30-39 per min) within normal range (Table 1). It is noteworthy to mention that the affected animals in the present study manifested tilted gait, anorexia, lachrymation, depression, thick nasal discharge and rotund abdomen, and palpation of both the flanks revealed ballotment of water with mild tympany and bulging rumen which is in accordance with the finding of Stanton (1999) and Hussain, and Uppal (2012).

Percussion revealed dull sound on right flank and tympanic sound on the rumen. When acidosis sets in, a few useful bacteria break down the grain leading to an increase in the amount of acid-producing bacteria which cause the rumen to stop producing nutrients from the feed and instead produce lactic acid. As a result, lactic acid attracts fluid into the rumen from the tissues and blood, causing major dehydration, leaving the eyes shrunken and skin. Administration of buffer such as magnesium hydroxide orally and sodium bicarbonate (7.5 %) intravenously in group 3 animals could help the rumen return to normal more quickly. In the present study, ruminal motility varied from 1-3 per 5 min and pH of the rumen fluid was found to be low between 5.5 - 5.9 which is in tune with Petrujkic et al. (2008). Rumen bacteria have played role resulting production of volatile fatty acids and lactic acid thereby decreasing / disturbing the rumen pH to non-physiological levels, reducing efficiency of rumen microflora. Acid indigestion which develops as
the result of inadequate diet in the present study can also contribute to the development of ulcers, as reported by Kureljusic et al. (2013).

Acetic acid and Vitamin-B complex were administered in animals diagnosed with alkaline indigestion as adopted by Vijayakumar et al. (2010). Similarly, laxatives were given in cows showing mild or moderate signs of acid indigestion to encourage defecation and antacids to raise the pH of the stomach (Group 3). In dehydrated animals in the present study, dextrose saline was injected and in severe cases, fermentation in the rumen could only be controlled by immediate removal of the grain by attempting rumen lavage, restricting the water intake, feeding hay or other long-stemmed roughage by and mild exercise. Employment of such therapy was found effective in curing digestive disorders leading to early restoration of normal milk production and normalization of rumen microflora as adopted by Handekar et al. (2010).

It is concluded in the present study that the history of the feeding and manifestation of related symptoms are very important and considered as a diagnostic aid for indigestion which is a very common ailment among milch cows in and around Bhubaneswar city of Odisha State that will be useful to the clinician particularly in the field of large animal practice. With on-set of acidosis, an increase in the amount of acid-producing bacteria was evident and to prevent such indigestion in cattle and other ruminants, the dairy owners in the present study were advised to regulate the feed of the animals carefully, and while switching from forage to grain, the cows need to be gradually introduced to the grain so that their stomachs get time to be adjusted to the new feed. It is inferred that the present study would add a lot in respect of scientific knowledge to practicing veterinarian in educating dairy owners in preventing indigestion in their lactating animals, leading to an improvement in the herd health and augmenting their livelihood.

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