

## Study on Rumen and Reticulum Foreign Bodies in Cattle Slaughtered at Jimma Municipal Abattoir, South West Ethiopia

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**Abstract:** A cross-sectional study was conducted from October, 2011 to March, 2012 at Jimma Municipal Abattoir, Oromia Regional State, Southwest Ethiopia, with the objectives of to assess the prevalence of rumen and reticulum foreign bodies, identifying types of foreign bodies and associated risk factors for the occurrences of foreign bodies. Postmortem examination was employed for the recovery of foreign body from rumen and reticulum. The investigation was carried out in the abattoir. From total of 484 (464 male and 20 female) cattle were examined, 13.22 % (n=64) were found foreign bodies at slaughter. When the prevalence was compared between sex, between breed, among different age groups, among different body condition score and animal originated from different areas, higher prevalence of foreign bodies 80%, 70%, 80%, 72.72%, 25.23% were observed in female, cross breed, age older than 10 years, animal having poor body condition score and animal originate from Agaro, respectively. These aforementioned factors are considered as potential risk factors and found highly significantly associated ( $p < 0.05$ ) with the occurrence of foreign bodies. Rumen harbored mostly plastic materials while reticulum was the major site for the retention of metallic objects. Plastics were recovered as the most common foreign bodies followed by leathers, clothes, ropes, nails and wires. It is concluded that the detection of this level of prevalence of foreign bodies in cattle is the most not only because of its mortality and morbidity but also it contributes a lot for reduced production and productivity.

**Key words:** Abattoir • Cattle • Foreign body • Jimma • Reticulum • Rumen

### INTRODUCTION

Ethiopian's livestock population is often said to be the largest in African. Excluding the Afar and Somali regions there were approximately 45.57 million cattle, 26.1 million sheep, 21.7 million Goats, 2.1 million Horses and mules, 5.6 million Donkeys, 1 million Camel and 39.6 million Poultry. For the later two regions, estimated numbers vary greatly between conventional and aerial censuses, but total less than 15% of the non nomadic regions. Ethiopia has great potential for increased livestock production, both for local use and for export. However, expansion was constrained by inadequate nutrition, disease, lack of support services and inadequate information on how to improve animal breeding, marketing and processing. Thus, the country is not utilizing this huge potential livestock resource and an improvement in this sector. Therefore, has the potential to contribute significantly to national income and to the welfare of the

majority of rural families. The high concentration of animals in the high lands, together with the fact that cattle are often kept for status, reducing the economic potential of Ethiopia livestock [1]. Cattle play significant contribution in Ethiopian economy as source of meat, milk, drought prowler, income and foreign exchange. However, as other livestock in the country their contribution is below their expected potential due to prevalent livestock diseases, poor management system and poor genetic performance [2].

Gastrointestinal foreign bodies are among the most common surgical emergency in veterinary medicine. Sheep and goats are highly selective feeder and ingest significantly less amount of foreign bodies as compared to cattle [3]. Cattle are more susceptible to foreign body syndrome than small ruminants because they do not use their lips for prehension and are more likely to eat chopped feed; lack of oral discrimination in cattle may lead to ingestion of foreign bodies would be rejected by

other species [4]. Ingestion of foreign body in cattle is result a condition of great economic importance and causes severe loss of production and high mortality rate [5]. The ingestion of foreign body is mainly related with nutritional deficiencies and feeding management and cause various problem in different organ of the animal, mainly in rumen and reticulum [6]. The problem that are caused vary with the duration that the foreign body has been present, the location of the foreign body, the degree of obstruction that is caused as well as problems associated with the material of the foreign body. Ruminant are notorious for ingestion of foreign bodies. Ingestion non- dietary materials in mainly related to nutritive deficiency and feeding management of the animals and causes various problems in different organs of the animals glositis, esophagitis, ruminitis, impaction of rumen, traumatic pericarditis (TP) and traumatic reticulo peritonitis (TRP) are the possible health problems which can be caused by the ingestion of foreign bodies by the ruminants. Among these, disease of rumen and reticulum are of great economic importance because of severe losses on productivity of the animals sometimes leading to the death of the animals [5].

Entrance and migration of foreign bodies through the body tissues lead to many complication that differ according to the nature of the foreign body and the way of its entrance in to the tissues [7]. Traumatic reticulo peritonitis (TRP) relatively common disease in cattle caused by the ingestion of foreign bodies in the reticulum swallowed metallic objects such as nail or pieces of wire fall directly on the reticulum or pass into the rumen and subsequently carried over the rumeno-reticular folds into the cranioventral part of the reticulum [5]. If the foreign body has penetrated the diaphragms and pericardium, affected cattle also can have muffled heart sounds, distention of jugular veins, submandibular brisket and ventral abdominal oedema [8].

Non metallic foreign bodies in the reticulo-rumen cause recurrent rumen tympany in adult dairy cattle, trichobezoars (a mass found trapped in the gastrointestinal system) have been found associated with acute rumen tympany in calves and young cattle [9]. Hair balls sometimes occur in ruminants in for stomachs and abomasums [10]. Over a period of time, these materials, form large tight balls inside the rumen leading to anorexia, decreased production and progressive loss of body condition [11].

The presences of foreign bodies in the rumen and reticulum also hamper the absorption of volatile fatty acids (VFA) and consequently reduction in the rate of

animal fattening [12]. The perforation of the wall of the reticulum allows leakage of ingesta and bacteria which contaminates the peritoneal cavity, resulting in local or diffuse peritonitis is the swallowed objects can also penetrate pleural cavity causing pleuritis and pneumonitis and into the pericardial sac causing pericarditis [13].

The condition is serious in our country usually in urban and peri- urban areas where extensive building are carried out and proper plastic material disposal is not conditioned and so thrown on roads and near the fence or anywhere and that is way our dairy cattle are dying mainly associated with foreign bodies [14]. In Ethiopia, information regarding the magnitude and occurrence of forestomach foreign bodies is very limited. The fact that rumen impaction by these foreign bodies is mainly asymptomatic in nature and only diagnosed in live animals if the material is accumulated in large amount and thus, it can be adequately studied in abattoirs. Therefore, this study was carried out to assess the prevalence of rumen and reticulum foreign bodies in cattle slaughtered Jimma Municipal Abattoir, to identify the type of rumen and reticulum foreign bodies and to study the risk factors associated with the ingestion of those foreign bodies in cattle.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Jimma Town at Jimma Municipal Abattoir. The zone is located at the Southwestern part of Ethiopia in Oromia Regional State. The town is located at about 352 km away from Addis Ababa in Southwestern direction. Geographically the town is located at latitude of about 7°13' -8°56' N and longitude of about 35°52' - 37°37' E and at elevation ranging 880-3360 meter above sea level. Ecologically the area lies in wet land ecosystem and area receives a mean annual rainfall of about 1530ml, which comes from the long and short rainy seasons. The annual minimum and maximum temperature is about 14.4 and 26.7°C, respectively. Jimma district have livestock population of 18,354 bovine, 846 caprine, 3,310 ovine and 1,490 equine [1]. But animals for slaughter were coming from different areas surrounding the town (Agaro, Serbo, Chida, Dedo, Seka and Gojeb).

**Study Animals:** The study was conducted on 484 apparently healthy slaughtered cattle at Jimma Municipal Abattoir from October, 2011 to March, 2012. The animals were originated from different agro- ecological zones (Agaro, Chida, Dedo, Seka, Serbo and Gojeb) which have

different management system. Animals were both local and cross breed cattle kept under extensive and semi intensive farming systems. Even though, the study animals were kept under broad range of management, animals in most of the rural areas were kept to graze pasture on grassland and supplementary feedings of crop residue when pasture in scarce especially during long dry season. In Jimma town, semi intensive management system was practiced and animals were feed with concentrate and hay. Most cattle are Holstein Friesian crossed with zebu kept for dairy purpose. The means of transport of animals to abattoir using vehicles and foot.

**Study Design:** A cross sectional study was conducted from October, 2011 to March, 2012 to assess the prevalence of the rumen and reticulum foreign bodies and to identify the types of foreign bodies and their associated risk factors for the occurrence of the foreign bodies. Breed, age, body conditions, sex and origin of the studied animals were considered as risk factor for occurrence of foreign bodies. During the study time the animals were categorized into three as young, adult and old and age of studied animals were estimated based on dentition pattern and their body condition scoring was made based on their origin, animals were grouped into six different districts.

**Sample Size Determination:** As a scientific work the study should have to be carried out by determining the sample size according to Thrusfield [15] for an infinite population with 95% confidence level, 5% desired absolute precision by considering expected prevalence of the rumen and reticulum foreign bodies in cattle in the area. Therefore, according to Thrusfield [15], the sample size was as follows:

$$n = \frac{(1.96)^2 P_{\text{exp}}(1 - P_{\text{exp}})}{d^2}$$

Where:

- n = Required sample size
- P<sub>exp</sub> = Expected prevalence
- d = desired absolute precision

There was no previous study on the occurrence of rumen and reticulum foreign bodies of cattle slaughtered at Jimma Municipal Abattoir. The sample size for this work therefore was determined using 50% expected prevalence, 50% expected prevalence and 5% absolute precision at 95% confidence level using the above formula, the

minimum of 384 cattle are intended to be sampled but to generate reliable data and to increase the precision, the sample size was increased and 484 cattle were taken.

**Sampling Methods:** The animals were selected using systematic random sampling using regular interval to study the prevalence and types of the foreign bodies in rumen and reticulum of cattle presented in abattoir for slaughtered selected.

**Antemortem Examination:** Antemortem examination on individual animals was done for assessment of sex, age, breed, body condition and their place of origin. Epidemiological data were also determined including, the main categorization of the animals in the study area (Agaro, Chida, Serbo, Dedo, Seka and Gojeb); sex (female and male) and age was categorized into young (=5 years), adult (5-10 years) and old (=10 years) based on dentition pattern. During Antemortem examination each animals was marked for the identification by writing a code on its gluetal muscle by using unwashable ink.

**Postmortem Examination:** In the postmortem examination rumen and reticulum were examined. Immediately after slaughtered in the evisceration stage, the stomach was carefully removed from the abdominal cavity and open and explored for the prevalence of any foreign non dietary material by visualization and palpation. Any foreign bodies obtained during inspection was washed with water to removing adhering feed material and identified. When the finding is positive, the location and type of the foreign bodies were recorded otherwise recorded as negative in postmortem recorded sheet.

**Data Management and Statistical Analysis:** The data collected were entered and scored in Ms excel worksheet. Before subjected to statistical analysis, the data were thoroughly screened for errors and properly coded. For analysis SPSS Microsoft software Version 17.0 was used. Descriptive statistical analysis such as table was used to summarize and present the data collected. The prevalence of rumen and reticulum foreign bodies were calculated as percentage by dividing total number of cattle positive for foreign bodies to the total number of cattle examined. Pearson chi square ( $\chi^2$ ) test was employed to assess the existence of association between prevalence of the foreign bodies and different potential risk factors considered. For ( $\chi^2$ ) test, p. value < 0.05 were considered significant where as p-value > 0.05 considered non significant.

**RESULTS**

**Occurrence:** From the total of 484 cattle (464 male and 20 female) examined for the presences of any foreign bodies in their rumen and reticulum, 13.22% (64/484) of them were found positive. The types of foreign bodies were nails, wires, plastics, leathers, clothes and ropes. Leathers, plastics and clothes were the most common as observed in 22(34.37%) of the positive cases. Other metallic substances recovered from the reticulum were the nails 2(3.12%) and wires 3(4.68%).

**Occurrence of Foreign Bodies with Regard to Sex:** The total number of animals was 484. Of the 13.22% total prevalence of foreign bodies in cattle, 10.34% and 80% were detected in male and female animals, respectively.

**Occurrence of Foreign Bodies with Regard to Age:** Study animals were grouped into three as young ( $\leq 5$  years), adult (5-10 years) and old ( $\geq 10$  years) From 19, 455 and 10 animals were examined with age in these age groups, 2(3.12%), 50(78.12%) and 8(80%) were found positive, respectively. Foreign bodies were more frequently encountered in old animals than other two groups. The stastical analysis aslo showed that there exist highly significant differences among the three age groups ( $p < 0.05$ ) in the occurrences of foreign bodies (Table 1).

**Occurrence of Foreign Bodies with Regard to Breed:** Among the total 484 animals examined, 464 were local breeds and 20 were cross. In this study foreign bodies

were detected in both breeds. The prevalence of rumen and reticulum foreign bodies was higher in cross breed cattle (70%) than that of the local breeds (10.77%) and there was highly stastically significant difference ( $p < 0.05$ ) as shown in the Table 2 below.

**Occurrence of Foreign Bodies with Regard to Body Condition Score:** Most of the animals brought to Jimma Municipal Abattoir to be slaughtered were comprised good, medium and poor. From 409, 64 and 11 animals examined with good, medium and poor body conditions, 30(7.33%), 23(35.94%) and 8(72.72%) were postive for foreign bodies, respectively of their group. There was highly statistically significant differences ( $P < 0.05$ ) between different body condition score and foreign body distribution in rumen and reticulum (Table 3).

**Prevalence of Foreign Bodies with Regard to Lodgement Site:** From 64 positive cases of foreign body, 49(79.68%) were occurred in rumen while 7(10.93%) in reticulum and 8(12.5%) in both rumen and reticulum. Prevalences of foreign bodies to these sites was highly statistically significant ( $p < 0.05$ ) (Table 4).

**Prevalence of Foreign Bodies with Regard to Animal Origin:** Animals slaughtered in the abattoir were come from six different district (Agaro, Dedo, Seka, Chida, Serbo and Gojeb). The highest frequencies of rumen and reticulum foreign bodies observed in cattle originated from Agaro while the lowest from Seka (Table 5). The result also revealed that there exists highly stastically significant differences ( $p < 0.05$ ) in the prevalence among the origin of animals.

Table 1: Age distribution of rumen and reticulum foreign foreign bodies in cattle at Jimma Municipal Abattoir

Foreign body	Age			Total
	Young	Adult	Old	
Negative for foreign bodies	17(89.47%)	405(87.28%)	2(20%)	422
Wire	-	2(4.00%)	1(12.5%)	2
Nail	-	-	2(25%)	2
Plastics	-	1(2.00%)	-	1
Leathers	1(50%)	3(6.00%)	-	4
Clothes	-	2(4.00%)	-	2
Rope	-	6(12.00%)	-	6
Wire and Nails	-	-	1(12.5%)	2
Plastics and leathers	-	7(14.00%)	-	7
Plastic and clothes	-	6(12.00%)	-	6
Pleastic, Leather and Clothes	1(50%)	18(36.00%)	2(25%)	21
Nail, Plastics and Wire	-	3(6.00%)	2(25%)	5
Nail, plastics and clothes	-	4(8.00%)	-	4
Total	19	455	10	484

$\chi^2 = 269.69, p = 0.000$

Table 2: Breed distribution of rumen and reticulum foreign foreign bodies in cattle at Jimma Municipal Abattoir

Foreign body	Breed		Total
	Local	Cross	
Negative for foreign bodies	414(89.22%)	6(30%)	420
Wire	1(2%)	2(14.28%)	3
Nail	2(4%)	-	2
Plastics	1(2%)	-	1
Leathers	4(8%)	-	4
Clothes	2(4%)	-	2
Rope	5(10%)	1(7.10%)	6
Wire and Nails	-	2(14.28%)	2
Plastics and leathers	7(14%)	-	7
Plastic and clothes	6(12%)	-	6
Pleastic, Leather and Clothes	17(34%)	5(35.71%)	22
Nail, Plastics and Wire	2(4%)	3(21.42%)	5
Nail, plastics and clothes	3(6%)	1(7.10%)	4
Total	464	20	484

$\chi^2 = 150.08, p = 0.000$

Table 3: Association of body condition score and rumen and reticulum foreign bodies in cattle at Jimma Municipal Abattoir

Foreign body	Body condition score			Total
	Good	Medium	Poor	
No foreign body	379(92.66%)	41(64.06%)	3(27.27%)	423
Wire	-	-	2(25%)	2
Nail	-	-	2(18.18%)	2
Plastics	1(3.33%)	-	-	1
Leathers	4(13.33%)	-	-	4
Clothes	1(3.33%)	1(4.34%)	-	2
Rope	3(10%)	3(13.64%)	-	6
Wire and Nails	-	1(4.34)	-	1
Plastics and leathers	6(20%)	1(4.34%)	-	7
Plastic and clothes	6(20%)	-	-	6
Plastics, Leather and Clothes	9(30%)	13(56.52%)	-	22
Nail, Plastics and Wire	-	2(8.69%)	2(25%)	4
Nail, plastics and clothes	-	2(8.69%)	2(18.18%)	4
Total	409	64	11	484

$\chi^2 = 433.70; p = 0.000$

Table 4: Frequency of occurrence of rumen and reticulum foreign body in cattle slaughtered at Jimma Municipal Abattoir.

Foreign body	Location				Total
	No	Rumen	Reticulum	Rumen and Reticulum	
No foreign body	420	0(0%)	0(0%)	0(0%)	420
Wire	-	-	3(42.85%)	-	3
Nail	-	-	2(28.50%)	-	2
Plastics	-	1(2.04%)	-	-	1
Leathers	-	4(8.16%)	-	-	4
Clothes	-	2(4.08%)	-	-	2
Rope	-	6(12.24%)	-	-	6
Wire and Nails	-	-	2(28.50%)	-	2
Plastics and leathers	-	7(14.28%)	-	-	7
Plastic and clothes	-	6(14.28%)	-	-	6
Plastics, Leather and Clothes	-	22(44.89%)	-	-	22
Nail, Plastics and Wire	-	1(2.04%)	-	4(50%)	5
Nail, plastics and clothes	-	-	-	4(50%)	4
Total	420	49	7	8	484

$\chi^2 = 1374.81, p = 0.000$

Table 5: Origin of animals was found determining the frequency of occurrence of rumen and reticulum foreign body in cattle slaughtered at Jimma Municipal Abattoir.

Foreign body	Origin						Total
	Agaro	Dedo	Seka	Chida	Serbo	Gojeb	
No foreign body	80(74.76%)	41(85.41%)	121(94.53%)	77(87.50%)	35(85.36%)	66(91.66%)	420
Wire	3(11.11%)	-	-	-	-	-	3
Nail	(11.11%)	-	-	-	-	1(16.66%)	2
Plastics	-	-	-	-	1(16.66%)	-	1
Leathers	1(11.11%)	-	2(28.57%)	-	-	1(16.66%)	4
Clothes	-	-	-	2(18.18%)	-	-	2
Rope	-	2(28.57%)	-	3(27.27%)	-	1(16.66%)	6
Wire and Nails	1(11.11%)	1(14.28%)	-	-	-	-	2
Plastics and leathers	7(25.92%)	-	-	-	-	-	7
Plastic and clothes	1(11.11%)	-	-	1(14.28%)	3(50%)	1(16.66%)	6
Pleastic, Leather and Clothes	9(33.33%)	3(42.85%)	4(57.14%)	4(57.14%)	1(16.66%)	1(16.66%)	22
Nail, Plastics and Wire	2(7.40%)	1(14.85%)	-	1(14.28%)	-	1(16.66%)	5
Nail, plastics and clothes	2(7.40%)	-	1(14.28)	-	1(16.66%)	-	4
Total	107	48	128	88	41	72	484

$\chi^2=107.90, p=0.00$

### DISCUSSION

The present study revealed an overall prevalence of 13.22 % (n = 64) of rumen and reticulum foreign body in cattle slaughtered at Jimma Municipal Abattoir. Thus this level of prevalence of foreign bodies could bring about paramount economic importance and causes loss of production and even it might cause mortality in animals. Most of the studies on foreign bodies were case reports and their prevalence of foreign bodies is mainly referring sick cattle presented to the clinics with clinical signs that leads to suspicion for foreign bodies. The present prevalence rate of foreign bodies is lower than the report of Rahel [16] 17.07% of prevalence of forstomach foreign bodies in Hawasa Municipal Abattoir, Ethiopia. Similarly, significantly higher prevalence (77.41%) was reported by Ismael *et al.* [17, 18] of adult dairy cattle cases having indigestible foreign bodies suffering from recurrent rumen tympany in Jordan.

Highest prevalence (81.25%) of foreign bodies was detected in cattle greater than 10 year age. This finding is in agreement with the work of Abebe and Nuru [19] who recovered plastics, leather, clothes and ropes at highest prevalence from the rumen and reticulum of old sheep and goats. Rahel [16] also reported (17.85%) of the animals had higher frequency of foreign bodies in rumen and reticulum in the old age. Radostitis *et al.* [5] reported old dairy cattle are the most commonly affected group. Ismael *et al.* [17] from Jordan also reported the metallic foreign bodies were found in 10(32.25%) of the cows from medical records of 31 old dairy cows suffering from the recurrent

rumen tympany. This might be associated with increase of exposure through life and many were found accumulate and lead the undead animals to be positive.

The prevalence was higher in the cross breed cattle (70%) than local breeds (10.77%). The findings agree with the work of Rahel [16] who reported forestomach foreign bodies with the prevalence of (58.82%) in cross breeds. This might be associated with the level of milk yield which requires high demand of nutrition and hence increase exposure for foreign bodies.

The highest frequency of occurrence of rumen and reticulum foreign bodies were detected in animals of poor body condition 8(72.72%) followed by medium (35.95%) and good (7.33%) body condition score animals. Rahel [16] reported a higher prevalence in animal having poor body condition. Poor body condition by itself might be due to the contribution of the foreign body that is the animal loss weight after it has been exposed or it might be due to the interference of foreign body with the absorption of volatile fatty acid (VFA) and thus causes reduced weight gain [16,19,20]. Hairball sometimes occur in ruminant in forestomachs and abomasums [10] and over long period of time, these materials form large tight balls inside the rumen leading to anorexia, decreased production and loss of body condition [11] as such foreign bodies hinders the process of fermentation and mixing of contents leading to poor body condition.

The highest prevalence of foreign body was observed in animals originated from Agaro (25.23%) and the lowest in those originated from Seka (5.46%). Igbokwe *et al.* [12] reported a prevalence of 19.3% in sheep in

Nigeria. In contrast, much higher prevalence rate (97%) was reported in Nigeria sheep and goats brought from urban areas for slaughter [20]. Rahel [16] recorded a prevalence rate of 30.5% in Hawassa which is again from urban area. The difference in the prevalence rate might be due to difference in the origin of animals presented for slaughter and types of waste management system between the sites (Urban and rural). In urban areas pieces of metallic materials from old fences, from construction of buildings and also materials used for rolling and packaging of commodities are left unwisely. Thus animals in from such areas have more chance of acquiring foreign bodies than rural. Ingestion and lodgment of foreign bodies are common in the bovine primarily due to indiscriminate feeding habits [21]. Industrialization and mechanization of agriculture has further had increased the incidence of foreign bodies in these animals [22]. In free grazing system, livestock reared in urban and peri-urban areas often left in market place, road side and near chicken waste. Rahel [16] and Abebe and Nuru [19] had stated that urban and semi-urban areas are polluted with plastics, ropes, hairs, wool and metals are growing problem for grazing animals because of the poor management system and inadequate availability of feed especially during long dry seasons.

Metallic foreign bodies were most frequently recovered from reticulum. Radostits *et al.* [5] reported that in industrialized countries, metallic foreign bodies present in the reticulum up to 90% of normal animals. The reason might be due to retention of these foreign bodies by the honey comb structure of the reticular mucosa and their heavy weight give chance to be attracted to the lumen of the reticulum due to gravitational attraction force of these heavy foreign bodies to the ventral part of the forestomach.

#### **CONCLUSION AND RECOMMENDATIONS**

The present study revealed that rumen and reticulum foreign bodies have great economic significance associated with reduced production and productivity of animals suffering from them. Ingestion of metallic and non-metallic foreign bodies by cattle is the most important not only because of its mortality and morbidity but also it contributes a lot for animals output. Both female and cross breed cattle are the most affected groups compared to that of male and local breed cattle, respectively. Hence, sex, breed, age, body condition score and origin of animals are the considered risk factors for the occurrence of foreign bodies. Therefore, degree of

association is highly statistically significant ( $p < 0.05$ ) for these aforementioned risk factors for the occurrence of foreign body in cattle. Most of the non metallic foreign bodies lodged in rumen while metallic foreign bodies lodged in reticulum. So, it is a problem for individual in particular and the country in general. Thus, based on the above conclusion; awareness for animal owners should be implemented to avoid the risk of foreign body ingestion by their animals, keeping cattle away from the site of new construction and keeping away from old and unclear grazing sites, animal owners should be advised to keep their cattle in intensified manner so that the owners could easily control their accessibility to foreign bodies and Since previous studies about foreign bodies in these areas are very few, further research should be made to emphasize the importance of the problem and address the prevention and control measures were recommended.

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