



Foreign Body Syndrome in Cattle and Owners' Perception Capability in Sulaimani Province (North-East Iraq)

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Abstract

THIS study, based on a questionnaire, examines the treatment and prevention strategies for Traumatic Reticulo-Peritonitis (TRP) among cattle owners in Sulaimani province, located in North-East Iraq. The survey assesses the frequency of practices such as surgical procedures, post-operative care, medication administration (antibiotics and analgesics), specific feeding, and the use of vitamins and minerals as supplements. Analyzed responses from 280 cattle owners were categorized as 'Yes', 'No', or 'Sometimes' to indicate the frequency of each practice. The study shows strong connections between affirmative management measures, including the use of dry food and antibiotics, indicating a broad acceptability of these methods in addressing TRP more than 75% of the respondents confirmed their use. Surgical procedures and the significance of owner care were highlighted as common strategies, emphasizing a comprehensive approach to treating the illness. However, there is significant variations in the implementation of post-operative care and supplementing procedures, as well as a clear sense of 'Careless owner' practices, suggesting differing views on their efficacy. The results highlight the necessity of focused training efforts to encourage evidence-based management methods, particularly for owners with non-traditional perspectives on TRP causes and treatments. The results offer important information for veterinary health authorities to create intervention programs and policy frameworks to improve TRP management and cattle welfare in the region. This emphasizes the need for targeted initiatives to reduce practice variability and enhance cattle health using evidence-based strategies.

Keywords: Cattle, Iraq, Owner's conception, Risk factors, TRP.

Introduction

Traumatic Reticulo-Peritonitis (TRP), also known as Hardware disease or wire disease, is one of the most important internal disorder of ruminants, especially in the outdoor cattle due to ingestion of sharp foreign bodies [1]. Cattles are more likely to ingest foreign bodies than small ruminants since they do not use their lips for selection and are more likely to eat chopped feeds [2, 3]. These foreign bodies present either as a solid mass of non-traumatic bodies or as

sharp objects that penetrate the stomach such as a piece of wire needles or a nails, often of different shapes and lengths [4]. Ingestion of metallic foreign bodies in adult dairy cattle can result in a wide variety of effects and syndromes that can impair rumen and reticular motility [5]. It is relatively a common disease in adult cattle and the majority of affected cattle are dairy cattle older than two years of age [2]. Traumatic reticulo-peritonitis (TRP) is caused by penetration of metallic foreign body

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through the reticular wall, causing acute perireticular inflammation, adhesion and possibly abscesses [6]. In chronic and local peritonitis, the acute clinical signs may abate and be replaced by signs of a more chronic process 24-48 hours after the onset of TRP. The early clinical signs of local and chronic peritonitis may subside and be replaced by symptoms of a more protracted condition. 24-48 hours following the beginning of TRP [7, 8]. Perireticular adhesion may involve the vagal nerve resulting in impairment of reticular motility, although, non-metallic foreign bodies are causing variety of movements [9]. Although indications are typically nonspecific, animals appear rough and in poor health, and gastrointestinal function is decreased [10]. Both observations have led us to the belief that ingestion of such foreign bodies may comprise a large percentage of the causes of recurrent rumen tympani. Although, damaging of the vagal nerve branches have been implicated of the main cause of tympani, as it's commonly associated with vagal indigestion in adult dairy cattle [11]. Owner's awareness for such condition could minimize the occurrence of TRP in outdoors cattle's through explaining the pathogenesis of TRP for the ownerships or the stakeholder peoples working in cattle fields [12]. TRP problem is still present in many Middle East countries, Iraq is still struggling to control such condition through using various techniques and mechanisms such as magnetic, vitamins, indoor rearing and surgical operation. Sulaimani province has the biggest areas for cattle rearing in the North-East Iraq. Few studies have been carried out to cope with this problem. This study aims to identify TRP risk factors and assess owners' perceptions in Sulaimani cattle herds, as well as to investigate the prevalence of TRP, the efficacy of surgical treatments in selected cases, and owner attitudes across various regions within Sulaimani province, Kurdistan-Iraq.

Material and Methods

Animals

Two hundred and eighty cattle with the clinical signs of TRP were examined in the Veterinary Teaching Hospital at the College of Veterinary Medicine, University of Sulaimani and at the Vet-Green private Hospital. In addition to the conservative and the surgical treatments, a questionnaire study was designed to collect general information of the cattle herds such as clinical signs, sex, location, pregnancy and breeds. Many questions were addressed to assess the treatment producer, management practices and farmers feedback in several districts of Sulaimani province. Complete description of questions is provided in table 1, and it was performed by the authors of this study during investigation. Questions about general information of the cattle herds were directly answered by owners or the farmers, although some of these questions were

answered after 4-8 days post operation or slaughter. The cases were examined by clinical examination, body temperature, heart rate, respiratory rate, rumen contraction rate and finally complete blood count (CBC) recommended to estimate the severity of inflammation.

Cases in this study were diagnosed into three groups acute local peritonitis (ALP), chronic local peritonitis (CLP), and acute diffuse peritonitis (ADP) according to the clinical signs (Figure 1), case history, using metal detector (Pledge Agro) and laboratory tests such as complete blood count (CBC) using blood analyzer machine (Mindray) where the leukocytes count was ranged between 11500 - 18000 WBC/mm² which indicate the incidence of inflammatory reaction of the reticular wall. In the current study complete anorexia, decreases milk production, abdominal pain and arched back, fever, decrease rumen contraction and bloat were considered as an acute local peritonitis. Abnormal appetite and milk yield, weak or irregular rumen contraction, stiffness gait and chronic bloat were considered as a chronic local peritonitis. Fever, tachycardia, tachypnea and severe depression and hypothermia were considered as acute diffuse peritonitis. Acute and chronic local peritonitis cases were treated by surgical operation (ruminotomy). The rumenotomy incisions were topically treated with aerosolized antibiotic preparation Oxytetracycline spray (Interchemie). Systemic antibiotic penicillin-streptomycin (Interchemie) and Anti-inflammatory or analgesics such as Castralgin (Interchemie) were injected for up to five consecutive days. Furthermore, the owners were advised to give a light diet to animal for few days after the surgery. The skin stitches were removed 15 days after the operation. Cattle suspected with acute diffuse peritonitis were recommended to undergo slaughter.

Owner's conception

The second part of this study was designed to collect information about the owner's conception for TRP. Number of questions in a form of table were addressed to the cattle owners such as using antibiotics and pain killers, performing operation, using vitamins and minerals before and after the operation (Table 1).

Owners were informed about the nature of the disease and how the foreign bodies were lodged inside the reticular wall due to the conformational structures of the ruminant's stomach. The foreign bodies are possible to lodge in any parts of the stomach but the common location is reticulum. The structural conformation of reticulum aids the small sharp pointed bodies to be seeded into the *Cresti reticuli* (honey comb). Then with the reticular movement and contraction the foreign body is

progressively embedded into the wall of the reticulum, which further continues to move forward till it penetrate the reticular wall and reach into the peritoneal cavity. Unfortunately, the owners were not having sufficient information about the mechanism of foreign body penetration. Therefore, the main point of happening of this condition was referred to the careless to those cattle, where the owners did not pay attention to the nutritional and behavioural situation.

Statistical analysis

The responses were categorized as 'Yes', 'No', and 'Sometimes'. Statistical analyses were performed using IBM SPSS Statistics Version 25. Using a significance level of 0.05. A Multinomial test was used to assess the importance of the responses to each question. Chi-square tests were conducted to evaluate the relationships between the questions by analyzing the response frequencies. A Bonferroni correction was used to identify the statistical significance between each question due to the numerous comparisons made across different practices.

Results

In this study, 280 cattle were examined in different areas around Sulaimani province and in the Veterinary Teaching Hospital belonging to the College of Veterinary Medicine, University of Sulaimani and at the Vet-Green Private Hospital. From the total of 280, only 45 cases were undergoing rumenotomy through routine left flank laparotomy (Figure 1). All of them were had a history of ingesting foreign bodies such as nylon which confirmed by the owners.

During evacuation of the rumen, various foreign bodies were found such as large amount of nylon, bones of chicken, wires, pieces of glasses, nails, screws, and some other various metals. In few of them sharp metals or nails penetrated into the wall of the reticulum and some other internal organs such as liver and spleen (Figure 2). Interestingly, in many cases the rumen was filled with a large solid ball shaped foreign body of an about 25 kg that composed of nylon, clothes and ropes. These large balls foreign bodies were cutting into small pieces inside the rumen and then taken out from the rumen. The physical statuses of many cases were normal in activity, locomotion, drinking, feeding, urination, defecation and the body temperature. However, postoperative complications were observed in several animals. After 15 days the skin stitches were removed.

Interestingly, the owners were surprised about this situation, however, they were denied to be careless about their animal's concerning managements and providing a good supplementary food. Although, the owners were not having enough knowledge about the animal behavior, seasonal effects on the nutritional

status of the animals and how the nutritional deficiency advance such condition, even though, they were believed that the white salt (NaCl) is sufficient to prevent mineral deficiency.

The results of the second part of this study were summarized in (Table 1). Cattle that participated in this study were fed wheat hay, bakery bread, dry alfa-alfa, corn silage and grasses. Several cases had clinical signs of heart failure such as muffled heart sound, jugular vein distention and pulsation, and they were sent to slaughterhouse. As well as, sudden death was also seen in some animals with acute pericarditis. although, adhesion of the visceral organs such as reticulum, parts of the rumen and spleen were observed during the operations. All the chronic cases with TRP were recommended for slaughtering because of the economic costs and difficulties in post-operative care. Surprisingly, it was recorded that 120 cattle (42.85%) were examined and diagnosed for TRP in last trimester of pregnancy.

Owners who believe in surgery see no statistical differences between individuals who have surgical procedures and those who consume vitamins and minerals. The final two groups of owners do not have statistical significance with those who care for the cows following the surgery. On the contrary, another group of owners use dry food, antibiotics, and painkillers, which show no significant differences. Both groups exhibit statistical significance when compared to all other groups. Owners that neglect their animals are statistically significant compared to other groups.

Most responders (162) frequently choose to conduct surgery on their cattle, probably because they believe it can correct TRP. A significant percentage either abstain occasionally (68) or never (50). The negligent owners received that the majority of votes (161 'Yes'), while some do not (92 'No') or do so sometimes (27), indicating diverse opinions on its usefulness. There is a clear preference for undergoing surgeries, as indicated by 142 respondents who answered 'Yes'. A smaller number of participants, 80 and 58, occasionally or never choose surgical intervention, demonstrating a proactive management strategy for TRP. Most respondents (127) give post-operative care, which aligns with the frequent number of operations. The responses 'Sometimes' (83) and 'No' (70) indicate potential discrepancies in opinions regarding the need for or the availability of resources for this type of treatment. A high frequency of 211 'Yes' responses indicate that general approval of using antibiotics and painkillers for TRP. Some individuals either take (53) or do not use (16) these drugs. Furthermore, a substantial number of owners (220 'Yes') exhibit specific eating patterns, indicating a strong faith in nutritional measures for regulating TRP, although not statistically significant. 48 of owners follow specific feeding habits, whereas 12 do

not. Using vitamins and minerals: 151 owners supplement with them, 70 owners occasionally do, and 59 owners do not. This suggests a widespread belief in the advantages of supplements, but not as broadly acknowledged as antibiotics (Figure 3&4).

Table 1 presents the information on how cattle owners in Sulaimani province, North-East Iraq, respond to different approaches for managing TRP, which is likely a big health issue in cattle. The report contains the count and proportion of replies classified as 'Yes', 'No', and 'Sometimes', as well as the Chi-square statistic and associated P-value for each question. These values assess the null hypothesis of independence of questions and the owners' responses.

From the total, 162 owners (57.9%) support surgery for TRP, 50 owners (17.9%) oppose it, and 68 owners (24.3%) are occasionally like it. The statistical study shows a considerable variation in beliefs regarding the effectiveness of surgery for TRP. Out of all, 161 owners (57.5%) believe that carelessness in ownership contributes to TRP, 92 owners (32.9%) do not share this belief, and 27 owners (9.6%) sometimes think carelessness is a reason. The statistical research indicates a notable correlation between owner negligence and TRP results. Out of 142 owners, 50.7% perform operations in response to TRP, 20.7% do not, and 28.6% sometimes perform them. The statistical analysis shows a significant difference in the post-operative care practices among owners: care is provided by 127 owners (45.4%), not provided by 83 owners (29.6%), and sometimes provided by 70 owners (25.0%). The statistical analysis indicates a notable disparity in post-operative care practices. Using of antibiotics and painkillers is predominantly favored, with 211 owners (75.4%) using them, 16 owners (5.7%) abstaining from their use, and 53 owners (18.9%) occasionally using them. The statistical study indicates a substantial association between using these medications and managing TRP. Out of 220 owners, 78.6% use dry food for TRP management, whereas 4.3% do not use it, and 17.1% sometimes use it. The statistical research shows a significant correlation between the use of dry food and TRP management methods. Out of 151 owners, 53.9% use vitamins and minerals, 25.0% do not, and 21.1% sometimes use them. The statistical research indicates a notable disparity in the use of supplements for TRP.

Owners who agree with practical TRP management concepts are more likely to support the use of dry food, antibiotics, and medications. On the other hand, a reluctance to implement certain TRP management strategies may indicate a weaker connection with certain methods among the participants. The response 'Sometimes' suggests a moderate stance towards TRP management techniques, reflecting a diverse approach among

proprietors choosing this option. The concept of a 'Careless owner' is significantly different from other related ideas, indicating a peripheral or distinctly separate view of TRP management practices, or it may highlight a unique model in owners' comprehension of TRP causes and intervention methods.

The close relationship between 'Belief in surgical intervention, 'post-operative care,' and 'Engagement in surgical procedures' indicates a shared understanding among owners. This suggests that supporting surgical solutions for TRP is linked to a dedication to the surgical procedure and the care that follows. This alignment supports the idea that owners who support surgical procedures are more likely to be actively involved in both the surgery and the post-operative care (Figure 5).

The correspondence analysis visually shows the clear connection between owners' beliefs about TRP causes and treatments and their reported management actions. Owners that have a tendency towards specific activities, like using antibiotics or providing dry food, are more likely to express satisfaction with these practices. This diagram illustrates the complex relationship between different concepts and practices, emphasizing the strong connection between specific techniques, and pointing up 'Careless owner' as a possibly unique perspective in the dataset. Analytical insights provide a good platform for exploring the motivations and reasons behind different TRP management techniques among cattle owners.

Various risk factors had been attributed to the occurrence of TRP based on the questionnaires, including, inappropriate ideal management, nutritional imbalance, and improper herd control. Although, sex, age and milk yield were not considered due to not having correct information, particularly in the outdoor cattle.

Different types of foreign bodies were found during operative surgery, including wire, ropes and bond of hay, nail and sharp penetrating objects, and nylon bags that were used by different household peoples. These foreign bodies were found in different configuration, the sharp objects were penetrating the wall of the reticulum and few of them were found penetrating though the heart, liver and spleen. The ropes and the nylon were found either individually or combined and created a big ball of foreign bodies that were stacked and not passing out through the rumenotomy incision. These large round bodies were severed in to small parts and then exteriorized.

Discussion

TRP is considered as a non-infectious disease, that has economic impact in dairy cattle, and it occurs as a results of foreign bodies ingestion, which can result in a wide variety of syndromes concerning

rumen mobility and indigestion [5]. In this study, it was found that TRP was not uncommon and the prevalence of the disease was influenced by various factors such as age, nutritional deficiencies, and inappropriate control, because these factors were increases the rate of foreign bodies ingestion [13]. Although, no significant differences were found between age and types of peritonitis. Cross breed cattle make up the majority of the cattle population in this area, hence more cross breeds were investigated. As a result of more cattle being fed outdoors throughout the summer and spring, there were more TRP cases assessed during different seasons.

A significant number of TRP were diagnosed in pregnant cattle within the last trimester, this might be due to increased size and the weight of the gravid uterus that apply physical pressure on the rumen and the reticulum, which consequently restricting the foreign bodies and ease in penetration [14]. In the current study, researchers were determined an acute, chronic local and diffused operitonitis on the bases of their clinical and laboratory parameters. Cattle with diffuse peritonitis have more severe and obvious clinical sings than local peritonitis, and they had elevated heart rate (80-100 beats/mn), fever, more gastrointestinal sings and decrease milk yield and appetite. Complete blood count (CBC) may or may not be useful in the diagnosis of TRP because many cases had normal CBCs, as well as no sings clinically. Thus, an alternative method must be considered, and researchers suggested the most useful tests are reticular radiography and abdominal ultrasonography [15]. Anorexia, weight loss, chronic tympani, decrease milk yield, poor hair coat and changes in defecation and rumen dysfunction were the best sings of local chronic peritonitis, this is based on clinical findings [16]. Moreover, in the agreement with the results of other studies, licking the ground has a very crucial role in cattle suspected to TRP in the region [16]. It was observed that, more cattle with TRP were feeding outdoor, this is probably due to the fact that cattle are not selective in feeding, and they feed everything when they feed out door [17]. Most TRP cases were treated routinely by conservation treatment and magnet administration as the best prophylactic procedure to prevent TRP in this study region.

In the second section of this study, it was documented the evidence of owners' disregard for their animals, particularly when they came to calves and feeding outside. A total of 161 owners (75.5%) have neglected their animals. One of the best locations to influence cattle using TRP would be here. The post-operative care is another crucial component of the procedures. Only 127 owners (45.3%) were attentive with the cattle following the procedure, demonstrating that the owners' care was insufficient. As a result of complications including

tympani and rumen fistula, instances frequently end in death.

Understanding the cattle behaviour with their mechanism of foreign bodies ingestion and subsequent TRP occurrence, they have the impact on the economic issues. Although a significant number of owners they were answered by yes but still a considerable number of owners still they did not have a positive response on how to control TRP, or they were in doubt to believe surgery. Although, if the owner's perspective of the sickness changes, the rate of operation will also change and this will take us to a better result. In a study [17], they were found the fact on the heels of the government-gazetted plastic paper bag ban may mean that the ban is not showing any positive results, while the non-biodegradability of plastics it means the same plastics that were already present in the aged animals are still there. Definitely, a wider follow-up assessment study of the effects of the plastic paper ban on the environment in the study area is recommended [18]. Similarly, in other study they were concluded that the occurrence of indigestible foreign bodies in cattle at Morogoro Municipality indicates that there is a widespread use of plastic bags. Due to a poor disposal system of solid wastes, it may contribute to a significance loss in livestock production. Therefore, the public should be encouraged to use biodegradable materials for packaging of different items [18]. Persistence of improper managements, it has significant cause of losses in livestock production. Facilities must be supplied to the owners for understanding and restricting the occurrence of this condition, even slaughter facilities do not restrict the economical loses because of the livestock health limitations with public health consideration.

Conclusion

Addressing TRP in cattle herds requires a multifaceted approach involving veterinary care, owner education, and environmental stewardship. Improved diagnostic techniques, treatment protocols, and owner compliance are essential for reducing the economic burden of TRP and enhancing animal welfare in the region.

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Declaration of Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical of approval

All the surgical operation were conducted in consent with the owners according to the approved principles of ethics by the College of Veterinary Medicine Research Committee, University of Sulaimani, Kurdistan Regional Government, Kurdistan/ Iraq.

TABLE 1. Survey questions on TRP risk factors and owner perceptions in cattle herds in Sulaimani province, north-east Iraq.

	Response			Chi square value [P – value]
	Yes	No	Sometimes	
Believing surgery	162 [57.9%]	50 [17.9%]	68 [24.3%]	77.5 [0.001]
Careless owner	161 [57.5%]	92 [32.9%]	27 [9.6%]	96.2 [0.001]
Performing operation	142 [50.7%]	58 [20.7%]	80 [28.6%]	40.6 [0.001]
Post-operative care	127 [45.4%]	83 [29.6%]	70 [25.0%]	17.1 [0.001]
Using antibiotics and pain killers	211 [75.4%]	16 [5.7%]	53 [18.9%]	229.8 [0.001]
Using dry food	220 [78.6%]	12 [4.3%]	48 [17.1%]	264.8 [0.001]
Using vitamins and minerals	151 [53.9%]	70 [25.0%]	59 [21.1%]	54 [0.001]

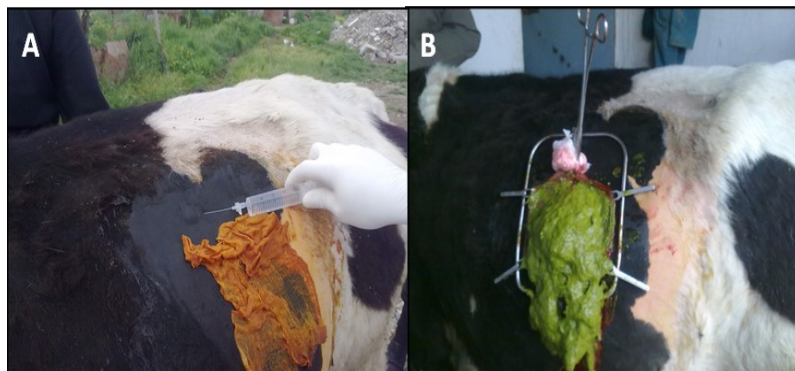


Fig. 1. Showing preparation of an affected cattle with TRP for rumenotomy in the field. A: left flank preparation and inverted L-block anesthesia using lignocaine. B: Rumenotomy and evacuation of the ruminal content.

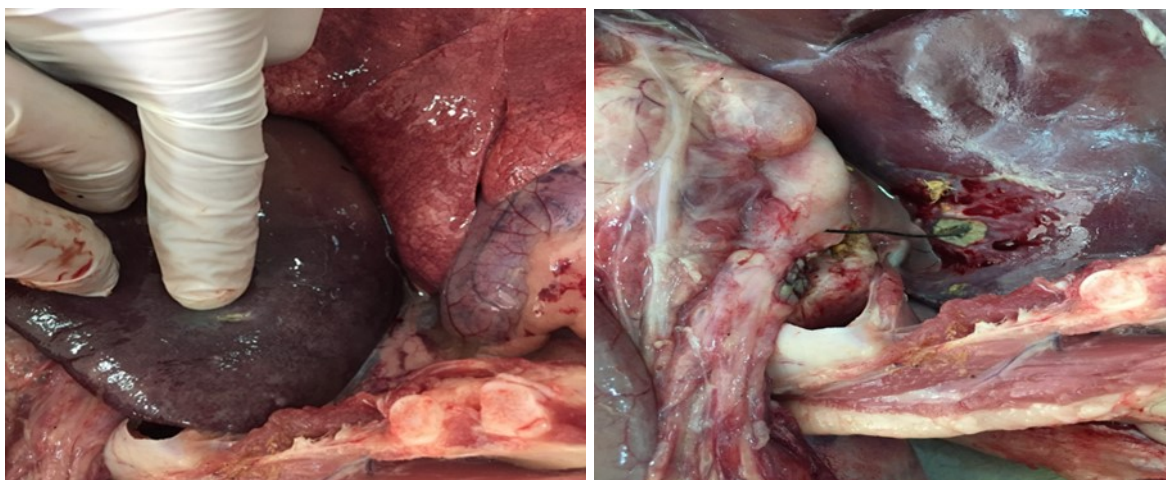


Fig. 2. Liver was penetrated by sharp objects found in one of the cases after surgical operation.

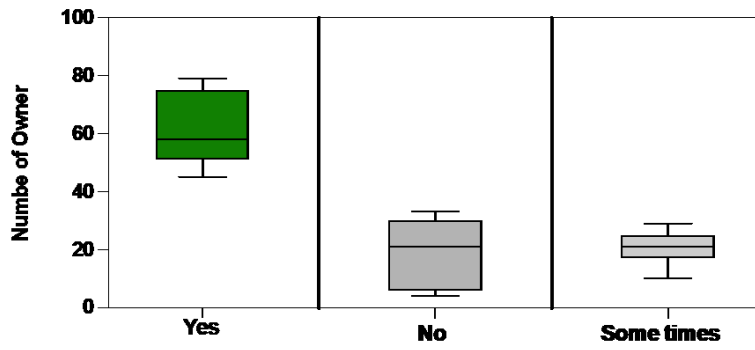


Fig. 3. Showing the total significant response of the owners for understanding the TRP situation and their methods of controlling the problem.

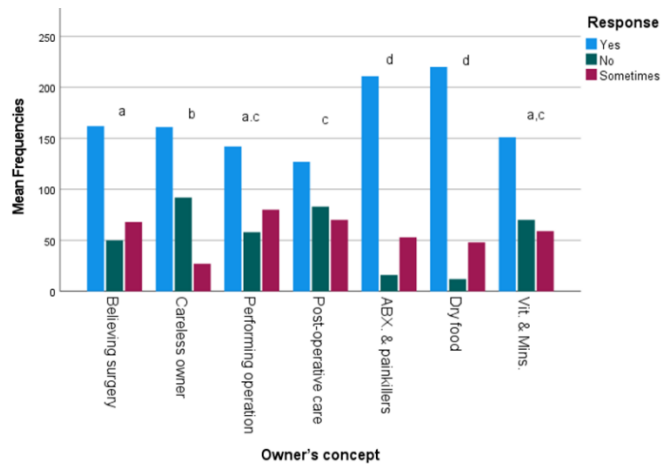


Fig. 4. Shows Sulaimani province cattle herd owners' reactions to TRP management techniques.

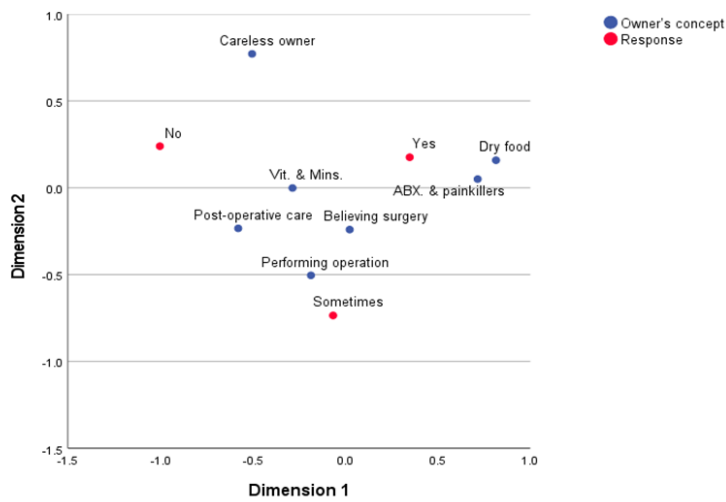


Fig. 5. Evaluation of cattle owners' responses to TRP management strategies in Sulaimani Province.

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دراسة ميكروبيولوجية تفضيلية على صدر وفخذ لحم الديك الرومي المجمد المعرض للأسواق

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الملخص

هذه الدراسة، التي تقوم على استطلاع رأي، تبحث في طرق علاج ووقاية الأبقار من التهاب الشبكية والبريتون الناتج عن الصدمات (TRP) لدى مربّي الأبقار في محافظة السليمانية بشمال شرق العراق. تقوم الدراسة بتقييم مدى شيوع الممارسات كالعلاجات الجراحية، العناية بعد الجراحة، تقديم الأدوية (المضادات الحيوية والمسكنات)، التغذية المخصصة، واستخدام الفيتامينات والمعادن كمكملات غذائية. تم تصنيف الإجابات المجمعة من 280 مربّي أبقار إلى فئات 'نعم'، 'لا'، أو 'أحياناً' للدلالة على مدى تكرار كل ممارسة. تكشف الدراسة عن وجود علاقات قوية بين إجراءات الإدارة الإيجابية واستخدام الأغذية الجافة والمضادات الحيوية، ما يدل على تقبل واسع النطاق لهذه الأساليب في معالجة TRP، حيث أكد أكثر من 75% من المشاركين في الاستطلاع استخدامهم لها. تم التأكيد على العمليات الجراحية وأهمية العناية من قبل المالك كاستراتيجيات متبعة، مما يبرز أهمية النهج الشامل في علاج المرض. ومع ذلك، توجد تباينات ملحوظة في تطبيق الرعاية بعد العملية والإجراءات التكميلية، بالإضافة إلى تصور واضح لممارسات 'المالك المهمل'، ما يشير إلى وجهات نظر متباينة حول فعالية هذه الممارسات. تسلط النتائج الضوء على أهمية بذل جهود تدريبية مكثفة لتعزيز استخدام طرق الإدارة المبنية على الأدلة، خاصةً بين المالكين الذين يحملون وجهات نظر غير تقليدية حول أسباب وعلاجات TRP. توفر النتائج معلومات قيمة للهيئات الصحية البيطرية لوضع برامج تدخل وإطارات سياسية لتحسين إدارة TRP ورفاهية الأبقار في المنطقة، مؤكدةً على ضرورة المبادرات المستهدفة لتقليل التفاوت في الممارسات وتحسين صحة الأبقار من خلال استراتيجيات مبنية على الأدلة.

الكلمات الدالة: الأبقار، العراق، تصور المالك، عوامل الخطر، TRP