

An unusual cause of traumatic reticulitis/reticuloperitonitis in a herd of Swiss dairy cows nearby an airport

U. Braun¹, A. Milicevic⁴, E. Forster¹, M. Irmer¹, S. Reichle¹, M. Previtali¹, A. Gautschi¹, K. Steininger¹, R. Thoma⁵, S. Zeller², A. Lazzarini⁶, C. Manzoni⁷, S. Ohlerth³

¹Departement für Nutztiere, ²Institut für Veterinärpathologie und ³Bildgebende Diagnostik der Universität Zürich, ⁴Tierarztpraxis, 7514 Sils Maria, ⁵Amt für Lebensmittelsicherheit und Tiergesundheit Graubünden, 7001 Chur, ⁶Landwirt, 7503 Samedan, ⁷Engadin Airport AG, 7503 Samedan

Summary

This report describes the findings in five cows from one dairy herd, in which all 31 cows were slaughtered or euthanased because of traumatic reticuloperitonitis. All the cows had numerous thin sharp pieces of metal attached to a magnet in the reticulum, giving the magnet a hedgehog-like appearance. Investigation revealed that the cattle had eaten forage harvested from a field immediately adjacent to an airport. The snow was cleared from the airport runways with a machine that had a wire-bristle brush attachment. Mechanical wear resulted in numerous wire bristles breaking and these were blown with the snow onto the field in question. The wire then became accidentally incorporated into the hay and grass silage at harvest the next summer and was ingested by the cattle in the fall and winter. To prevent further cases, approximately 200 tonnes of hay and grass silage contaminated with wire were discarded and 30 hectares of the 50-hectare field were cultivated and re-sown. The wire-bristles of the snow plough were replaced with plastic bristles. The cost of this and the livestock loss was several hundred thousand Swiss Francs.

Keywords: cattle, traumatic pericarditis, runway-cleaning machine

Ungewöhnliche Ursache einer Reticulitis/Reticuloperitonitis traumatica in der Nähe eines Flughafens

In der vorliegenden Arbeit werden 5 Kühe aus einem Betrieb beschrieben, in welchem alle 31 Kühe wegen Reticuloperitonitis traumatica geschlachtet oder euthanasiert werden mussten. Jede Kuh wies eine Vielzahl von feinen, spitzen und sperrigen Drähten in der Haube auf, die zwar am verabreichten Magnet hafteten, aber igelartig abstanden und deshalb trotzdem stachen. Die Nachforschungen ergaben, dass die Kühe Futter von einer Wiese gefressen hatten, welche neben einem Flughafen gelegen war. Der Schnee auf der Flughafenpiste war im Winter mit einer Pistenräumungsmaschine geräumt worden. Von den Drahtbürsten dieser Maschine waren durch die mechanische Belastung unzählige Drähte abgebrochen. Diese wurden mit dem geräumten Schnee in die angrenzenden Wiesen geblasen und waren dann nach der Schneeschmelze in das Gras gelangt. Als das Gras im Frühsommer gemäht, siliert und im darauf folgenden Herbst/Winter verfüttert wurde, erkrankten die Kühe an Reticuloperitonitis traumatica. Um weitere Erkrankungen zu verhindern, mussten 200 Tonnen Heu und Grassilage vernichtet werden. Darüber hinaus wurden 30 der insgesamt 50 Hektaren Wiesen im Bereich des Flughafens geeggt und neu angesät. Die Drahtbürsten des Kehrblasgeräts wurden durch solche aus Kunststoff ersetzt. Die Kosten für diese Massnahmen und die Tierverluste liegen im Bereich von mehreren hunderttausend Schweizer Franken.

Schlüsselwörter: Rind, Reticuloperitonitis traumatica, Pistenräumungsmaschine

Introduction

Traumatic reticuloperitonitis is one of the most common gastrointestinal diseases in cattle and is often the result of ingested foreign bodies such as nails or wire in the feed (Radostits et al., 2007). A common type of foreign body is baling or fencing wire that is picked up by a forage harvester. Postmortem examination of 1400 cases of traumatic reticuloperitonitis revealed the cause to be wire in 59 per cent of the cases, a nail in 36 per cent and various foreign bodies in 6 per cent (Radostits et al., 2007). Contaminated concentrate or grain, dilapidated fences, electrical wiring and barn renovations are other factors that increase the risk of ingesting foreign bodies (Dirksen, 2002). Traumatic reticuloperitonitis caused by ingestion of feed contaminated with tyre wire fragments was recently reported in cattle (Harwood, 2004; Monies, 2004; Cramers et al., 2005). Used tyres are commonly used to hold down plastic coverings on pit silos. Disintegrating or mechanically damaged radial tyres can release pieces of wire, which fall into the silage and are eaten by the cows. This report describes a herd of cows with traumatic reticuloperitonitis caused by ingestion of wire from an airport snow-removal machine.

History

A Swiss dairy farm with 31 cows, seven pregnant heifers and 30 young cattle had a history of signs of traumatic reticuloperitonitis (Dirksen, 2002) in several of the cattle. A magnet was administered *per os* to all the cows, and four that did not respond to treatment were slaughtered. Postmortem examination of the organs revealed suppurative changes with abscess formation in the reticulum, lungs and/or liver. There were numerous pieces of thin sharp wire, 3 to 9 cm long, which formed a dense network and were attached to the magnet in the reticulum of all the cows. Magnets with the same type of wire arrangement were found in the reticulum of another 22 cows that were slaughtered because of poor appetite and decreased milk production. To find the source of the wire, the feed was evaluated. It consisted of a total mixed ration (TMR), concentrate and mineral mix. The TMR consisted of hay, grass silage, corn silage and soy meal. Numerous pieces of wire up to 9 cm long were found in the TMR (Fig. 1). Further investigation revealed that the grass silage and hay in the TMR was derived from land immediately adjacent to an airport, which had purchased a new runway-cleaning machine with combined mechanical and blowing actions, one year earlier (Fig. 2). The snow on the runway was first cleared with a snow plough. Remaining snow was then removed from the runway with an integrated wire-brush attachment (Fig. 3), and blown onto the adjacent meadows. Mechanical wear on the brush attachment resulted in loss of innumerable pieces of wire, which were blown with the snow onto the adjacent fields. In the spring, the

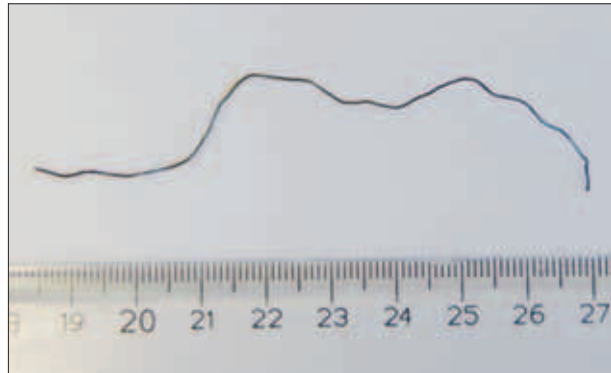


Figure 1: A piece of wire found in the total mixed ration.



Figure 2: Runway cleaning machine with snow plough.



Figure 3: Wire brush attachment from runway cleaning machine.

wire was unknowingly incorporated into the harvested grass silage and hay, which was fed in the following fall and winter, resulting in traumatic reticuloperitonitis in the cattle.

Clinical findings

Five of the ill cattle were referred to the Department of Farm Animals with a history of intermittent abnormal demeanour, poor appetite and decreased milk production. The cows were Swiss Braunvieh 2.5 to 5.0 years (mean, 3.9 years) old and had calved two to four months prior to admission. Four of the five cows had not been re-bred because of endometritis or anestrus, and one was six weeks pregnant. The cows had a moderate to thin body condition (Fig. 4) and weighed 540 to 645 kg (mean, 592 kg). The general condition was mildly abnormal, the rumen content very hard and rumen motility reduced. Testing for reticular foreign bodies included the withers pinch, pole test and percussion of the reticulum, which were negative in three of the cows, and the pole test was positive in the other two. The faeces of four cows were incompletely digested, and the other cow had soupy to watery faeces. The clotting time of the glutaraldehyde test was normal in three cows (> 10 min), reduced in one cow (6 min) and slightly shorter than normal in another (9 min).



Figure 4: Swiss Braunvieh cow with poor body condition caused by traumatic reticuloperitonitis.

Radiographic findings

In all cows, radiographs of the reticulum (Braun et al., 1993, 2003) revealed a magnet with numerous pieces of metal attached, giving it a „hedgehog“ appearance (Fig. 5). There were no free, penetrating or perforating foreign bodies seen. In one cow, a linear, non-penetrating, metal foreign body, approximately 3 cm long, was also attached to the magnet and extended slightly beyond the end of the magnet.

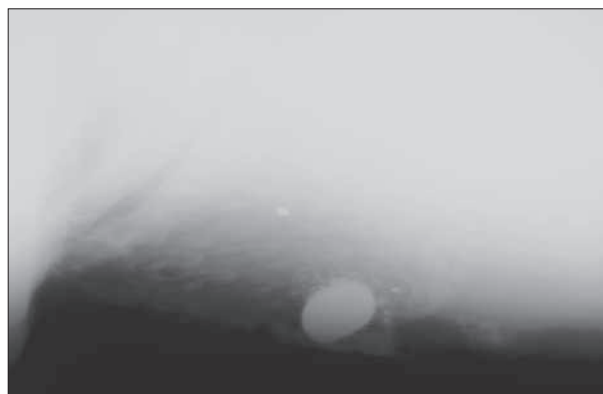


Figure 5: Radiograph of the reticulum of a cow showing a network of small pieces of wire attached to a magnet.

Ultrasonographic findings in five cows

Ultrasonographic examination of the reticulum (Braun and Götz, 1994) and liver (Braun and Gerber, 1994) revealed changes that were characteristic of traumatic reticuloperitonitis in one cow (Braun, 2003). The extent and speed of reticular contractions were less than normal but the frequency was normal with three contractions/three minutes. Fibrinous lesions were seen caudal to the reticulum. The owner requested that the five cows be slaughtered and the organs examined post mortem. A magnet with numerous pieces of wire attached was found in the reticulum of all the cows (Fig. 6). The pieces of wire were very thin and sharp and projected from the surface of the magnet like spines on a hedgehog. The linear metal foreign body attached to a magnet, which was seen on radiographs in one cow, did not appear to penetrate the reticular wall. One cow with ultrasonographic evidence of fibrinous lesions had localised peritonitis between the reticulum and adjacent peritoneum. This was caused by a piece of metal that had perforated the reticular wall so



Figure 6: Magnet with attached wire network from the reticulum of a cow.

130 Fallbericht

that its tip was located approximately 3 cm outside of the reticulum (Fig. 7). Summarizing all findings, four cows suffered from a traumatic reticulitis and one cow from a traumatic reiculoperitonitis.



Figure 7: Reticulum with perforating wire and localised peritonitis.

Measures

To prevent further cases of traumatic reticuloperitonitis, approximately 200 tonnes of feed were discarded and the 30-hectare field was cultivated and re-sown. The wire brush for the runway cleaning machine was replaced with one made of plastic bristles. The cost of this and the loss of cattle amounted to several hundred thousand Swiss Francs.

Discussion

To our knowledge, ingestion of such a large amount of wire resulting in traumatic reticuloperitonitis has not been described in cattle. Administration of a magnet did not resolve the problem because the wire became attached to the magnet and projected from it in a brush bristle-like fashion. The clinical signs observed were in agreement with those described by Dirksen (2000) for the reticulitis traumatica simplex. This disease, in which the reticulum is not perforated by the foreign body, is mainly characterized by reduced appetite and decreased milk yielding. The clinical signs were probably due to the sharp pieces of wire penetrating the reticular wall with each reticular contraction; the reticulum normally contracts 5 to 10 cm once per minute (Braun and Götz, 1994). Localised peritonitis, also visualised via ultrasonography, caused by perforation of the reticular wall by a piece of wire was seen in only one of the cows at necropsy; in this case, the magnet had failed to attract the wire. In the cows euthanased on the farm, the lungs and liver had numerous abscesses, which were most likely caused by pieces of wire perforating the reticulum. It is conceivable that in the one cow with localised peritonitis, the wire had perforated the reticulum before the magnet was administered. It has been calculated that the likelihood of becoming attached to a magnet is 25.7 times greater for a free foreign body located on the ventral reticular mucosa than one that has perforated the reticulum (Braun et al., 2003). The perforating foreign body could not be seen on radiographs even after finding it at necropsy. It is possible that airports in other countries use similar machines to clear snow from airport runways, and hopefully this report will alert others to the associated risks.

References

Braun, U., Flückiger, M., Nägeli, F.: Radiography as an aid in the diagnosis of traumatic reticuloperitonitis in cattle. *Vet. Rec.* 1993, 132: 103–109.

Braun, U., Götz, M., Marmier, O.: Ultrasonographic findings in cows with traumatic reticuloperitonitis. *Vet. Rec.* 1993, 133: 416–422.

Braun, U., Götz, M.: Ultrasonography of the reticulum in cows. *Amer. J. Vet. Res.* 1994, 55: 325–332.

Braun, U., Gerber, D.: Influence of age, breed, and stage of pregnancy on hepatic ultrasonographic findings in cows. *Amer. J. Vet. Res.* 1994, 55: 1201–1205.

Braun, U.: Ultrasonography in gastrointestinal disease in cattle. *Vet. J.* 2003, 166: 112–124.

Braun, U., Gansohr, B., Flückiger, M.: Radiographic findings before and after oral administration of a magnet in cows with traumatic reticuloperitonitis. *Amer. J. Vet. Res.* 2003, 64: 114–120.

Cramers, T., Mikkelsen, K. B., Andersen, P., Enevoldsen, C., Jensen, H. E.: New types of foreign bodies and the effect of magnets in traumatic reticulitis in cows. *Vet. Rec.* 2005, 157: 287–289.

Dirksen, G.: Traumatische Hauben-Bauchfellentzündung. In: *Innere Medizin und Chirurgie des Rindes*, 4. Auflage. Eds. G.

Dirksen, H. D., Gründer, M., Stöber, M.: Parey Buchverlag, Berlin, 2002, 400–412.

Harwood, D.: Alimentary tract perforation in cattle caused by tyre wire. *Vet. Rec.* 2004, 154: 574–575.

Monies, B.: Alimentary tract perforation in cattle caused by tyre wire. *Vet. Rec.* 2004, 154: 735.

Radostits, O. M., Gay, C. C., Hinchcliff, K. W., Constable, P. D.: Traumatic reticuloperitonitis. In: *Veterinary Medicine. A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats*, 10th ed. Saunders Elsevier, Philadelphia, 2007, 337–345.

Korrespondenz

Ueli Braun
Departement für Nutztiere
Winterthurerstrasse 260
CH-8057 Zürich

Fax: +41 44 63 58 904
E-Mail: ubraun@vetclinics.uzh.ch

Manuskripteingang: 19. August 2008
Angenommen: 14. Oktober 2008