INTRODUCTION

The prevalence of sheep-associated malignant catarrhal fever (SA-MCF) in cattle is low in Belgium. Few case reports exist, and all of them involve the head and eye form of the disease (Muylle et al., 1985; Desmecht et al., 1999; Deprez et al., 2004). Recent surveillance reports, however, show an increase in outbreaks of MCF in countries such as England (VLA, 2006) and Scotland (SAC, 2007). SA-MCF is traditionally known as a highly fatal disease in a small number of animals, but over the last decades large outbreaks of the disease have been reported, mainly in countries with a high density of sheep such as Great Britain (Foster, 1983; Sharpe et al., 1987; Bonn, 1990; Holliman et al., 2007), Ireland (Hamilton, 1990; Collery and Foley, 1996), Spain (Yus et al., 1999) and New Zealand (Thompson and Beckett, 1987). Recently, a large outbreak was also reported in the Netherlands (Van Wuijckhuise-Sjouke and Knibbe, 2007). In most outbreaks the clinical presentation of MCF is the typical head and eye form. Outbreaks of the peracute syndrome are rare. In 2005-2006, five outbreaks of the peracute form were reported in the United Kingdom (Holliman et al., 2007). In this article the first large outbreak of the peracute form of MCF in Belgium is described.

ABSTRACT

A large outbreak of the peracute form of malignant catarrhal fever in cattle in Belgium is described. The main symptoms were nervous signs and high fever. Over a four-month period, 13 Belgian Blue yearlings and one cow died. Mortality was 16.3% of the herd. The diagnosis was confirmed by identifying ovine herpesvirus-2 DNA by PCR, both in the affected cattle and in the sheep on the farm. This case report illustrates the increasing importance of malignant catarrhal fever as a herd problem and the occurrence of the peracute form, as also reported in other European countries. It also illustrates the importance of malignant catarrhal fever as a differential diagnosis for nervous disorders in cattle.

SAMENVATTING


INTRODUCTION

The prevalence of sheep-associated malignant catarrhal fever (SA-MCF) in cattle is low in Belgium. Few case reports exist, and all of them involve the head and eye form of the disease (Muylle et al., 1985; Desmecht et al., 1999; Deprez et al., 2004). Recent surveillance reports, however, show an increase in outbreaks of MCF in countries such as England (VLA, 2006) and Scotland (SAC, 2007). SA-MCF is traditionally known as a highly fatal disease in a small number of animals, but over the last decades large outbreaks of the disease have been reported, mainly in countries with a high density of sheep such as Great Britain (Foster, 1983; Sharpe et al., 1987; Bonn, 1990; Holliman et al., 2007), Ireland (Hamilton, 1990; Collery and Foley, 1996), Spain (Yus et al., 1999) and New Zealand (Thompson and Beckett, 1987). Recently, a large outbreak was also reported in the Netherlands (Van Wuijckhuise-Sjouke and Knibbe, 2007). In most outbreaks the clinical presentation of MCF is the typical head and eye form. Outbreaks of the peracute syndrome are rare. In 2005-2006, five outbreaks of the peracute form were reported in the United Kingdom (Holliman et al., 2007). In this article the first large outbreak of the peracute form of MCF in Belgium is described.
CASE REPORT

Case history

In April 2008 two Belgian Blue yearlings were presented at the Ghent University Clinic of Large Animal Internal Medicine. In the past three months the owner had lost 7 yearlings to an aggressive disease characterized by high fever, staggering gait, trembling, conjunctival congestion, lateral recumbency and death within 3-36 hours after onset of the symptoms. The herd consisted of 86 animals (41 cows, 3 bulls, 31 yearlings and 12 calves). In addition to the cattle, 72 sheep (27 adults and 45 adolescents in two separated herds) were present. During the outbreak most of the cattle were housed in one stable, with the yearlings distributed over 12 pens (6-8 animals in a pen). Together with the cattle, a group of adult sheep was housed in a corner pen of that stable. The adolescent sheep remained at pasture and could enter a second barn in which the remaining calves were housed. Direct contact between these sheep and the calves was possible. Only two bulls and one ram had been bought in the past three years; the last purchase had been made one year before. On December 23rd, an 8-month-old bull from the pen adjacent to the sheep pen showed a staggering gait and melena. The animal died the next day. Three days later, a second bull from the same pen had identical symptoms and died. No other animals were sick at that time. The last purchase had been made one year before. On December 23rd, an 8-month-old bull from the pen adjacent to the sheep pen showed a staggering gait and melena. The animal died the next day. Three days later, a second bull from the same pen had identical symptoms and died. No other animals were sick at that time. On January 16th, a third animal became sick within one day. No new cases were seen until the beginning of April, when a bull and a heifer of the same age (8 months) died in the second pen. Four days passed, and on April 4th two animals (one bull and one heifer) became sick again in the first pen. The bull died on the farm and was presented for necropsy. The heifer was still alive upon admission to the clinic. The local practitioner had treated the animals with danofloxacin (Advocin 180®; Pfizer), flunixine meglumine (Finadyne®; Shering Plough), florfenicol (Nuflor®; Shering Plough) and dexamethasone (Rapidex®; Eurovet), though without any improvement. The current status concerning Bovine Viral Diarrhea virus was unknown.

Clinical examination

The Belgian Blue heifer (1 year, 257 kg) was depressed and demonstrated a stiff gait, high fever (40.6°C), tachycardia (120/min) and tachypnea (60/min). The conjunctivae were severely congested, the scleral vessels were clearly visible, and serous lacrimal fluid was present. No corneal opacity was seen. The skin turgor was normal and the lymph nodes were only moderately enlarged. A very small amount of bilateral mucopurulent nasal discharge was seen. Abnormal breathing sounds were prominent on auscultation. Oral inspection demonstrated congestion of the buccal papillae and erosions on the hard palate. There were no petechiae visible on the mucosae. Ruminal contractions were still present and intestinal sounds were heard. The animal had a foul smelling, yellow colored diarrhea and the urine was reddish. Neurological examination showed no cranial nerve deficits. The gait was insecure and slightly uncoordinated. Tremor and a high muscle tone were present in the limbs. Ultrasonographic examination of the abdomen and thorax did not reveal additional information. Leukopenia (2.0 x 10^9/L (6.0-9.0)) and a normal packed cell volume (PCV: 30% (25-35)) were seen on hematology. Biochemistry showed mild hyperbilirubinemia (10 µmol/l (2.5-6)) and a slight increase in creatinine phosphokinase (CPK: 213 U/l (<150)). Semi-quantitative urine analysis with a urine stick (Combur 10 Test; Roche) showed the discoloration of the urine to be caused by hematuria (> 250 red blood cells per µl). Mild glucosuria was also present (50 mg/dl). The next day the animal was found in lateral recumbency and was euthanized on ethical grounds. Two days later the owner reported a new case and a herd visit was performed. A 7-month-old bull, which had become sick in the second pen, was in lateral decubitus and showed tetany and mild opisthotonus (Figure 1). Fever (40.4°C) and tachycardia were present. The animal overreacted on the menace and palpebral reflex during the neurological examination. Oral inspection was impossible due to the tetanic state of the jaw muscles. The tail tone was normal and no diarrhea was seen. Blood for virological examination was taken from this animal, 5 herd mates and 5 sheep. The next morning the animal was found dead and it was transferred to the Department of Pathology. On April 14th, a 3-year-old Belgian Blue cow developed conjunctivitis and petechiae on the buccal mucosae. The animal died within a day.

Necropsy

Necropsy was performed on 4 animals: three youngsters and the 3-year-old cow. The carcasses were moderately dehydrated. In all cases, conjunctivitis was...
evident, presenting as mucopurulent in the cow and catarrhal in the other animals. No corneal opacity was seen. Multiple petechiae and erosions were present on the muzzle and nares and in the buccal cavity. The nasal and laryngeal mucosa were heavily congested and covered with a mucopurulent exudate (Figure 2), which was less pronounced in the trachea. Marked alveolar and interstitial emphysema was seen in the lungs. One animal showed small linear erosions in the cranial portion of the esophagus. There was a generalized hyperemia in the forestomachs. Multiple ulcerative lesions were found in the pyloric region of one animal. Hemorrhagic enteritis, often segmental, was prominent in all animals. Both liver and spleen were mildly swollen. Peripheral and intestinal lymph nodes were moderately enlarged. The urinary bladder mucosa had petechial and ecchymotic hemorrhages with multifocal erosion of the epithelium (Figure 3), and hematuria was present.

Histopathology of the oral lesions consistently showed a perivascular accumulation of mainly mononuclear cells around the walls of medium and small-sized vessels with apoptosis of epithelial cells secondary to ischemia. There was a marked lymphoid cell hyperplasia in the periarteriolar sheaths of the spleen. Perivascular accumulation of mononuclear cells with focal fibrinoid necrotizing vasculitis was present in the portal triads of the liver (Figure 4). In the brain, a nonsuppurative meningoencephalitis with necrotizing vasculitis was present. Cerebral vessels showed fibrinoid necrosis with severe infiltration of predominantly lymphocytes in the vessel wall and adventitia. There was a diffuse edema of the Virchow-Robin space and the meninges were infiltrated by mononuclear cells.

Virology

PCR for Ovine herpesvirus 2 (OvHV-2) on EDTA blood of two youngsters with clinical symptoms was positive (Center for Research in Veterinary Medicine and Agricultural Chemistry, Brussels). PCR for BTV-serotype 8 was negative in these animals. In order to confirm the sheep as the source of OvHV-2 infection 5 sheep (2 adults, 3 yearlings) were sampled. One adult and two yearlings were PCR positive. Of the five apparently healthy bovines, only one animal – from the second pen – was positive in the OvHV-2 PCR. This animal developed identical symptoms and died two weeks later. In addition, 6 youngsters, aged between 6 months and 1 year, were tested for Bovine Viral Diarrhea virus (BVD) antibodies and no antibodies were detected.

Further development

Within the next two weeks, another four yearlings died. In total, 14 animals or 16.3% of the livestock died. Mortality among the youngsters was 45.0%. Before confirmation, the owner had sold his adolescent sheep. After the positive test results the remaining
In this report, corneal opacity was not a consistent finding (Mitchell and Scholes, 2009). In all these outbreaks, as signs occurred in very young calves in the UK outbreak of MCF involving predominantly nervous signs of the head and eye form (Smith, 2002). Recently, an outbreak in Saudi Arabia even reports MCF in calves as young as 1 month (Elzein et al., 2003). It is remarkable, however, that 5 of the 6 reported outbreaks of the peracute form occurred in young (<24 months) animals, as is the case in this report (Holliman et al., 2007; Mitchell and Scholes, 2009).

In recent years, more reports on MCF are being published throughout Europe. In Belgium, 11 cases/outbreaks of MCF have been diagnosed at Ghent University during the period 1997-2008 and two have been reported in veterinary practices (J. Wullepit, personal communication, 2001; G. Lafaut, personal communication, 2008). Most of the cases have involved a single animal with the head and eye form (Muylle et al., 1985; Desmecht et al., 1999; Deprez et al., 2004). An overview is given in Table 1. Recent reports from the UK mention an increase in the total number of individual cases and the appearance both of larger outbreaks (VLA, 2006; SAC, 2007) and of cases involving the peracute form (Holliman et al., 2007). The reason for this evolution is not clear. The availability of better diagnostic techniques in recent years may have had an impact on the number of diagnoses. A further increase in the number of cattle being housed together with sheep seems unlikely in view of the continuing growth of modern farming practices. However, the co-stabaling of large numbers of cattle and sheep might explain the apparent rise in larger outbreaks, due to the

**Table 1. Overview of malignant catarrhal fever outbreaks reported at Ghent University between 1997 and 2008.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Region</th>
<th>Month</th>
<th>Number of cases</th>
<th>Clinical presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>Walloon Brabant</td>
<td>July</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2001</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2003</td>
<td>East Flanders</td>
<td>April</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2004</td>
<td>East Flanders</td>
<td>February</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2004</td>
<td>East Flanders</td>
<td>March</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2006</td>
<td>Antwerp</td>
<td>February</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2006</td>
<td>East Flanders</td>
<td>June</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2007</td>
<td>West Flanders</td>
<td>July</td>
<td>1</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2007</td>
<td>East Flanders</td>
<td>December-April</td>
<td>14</td>
<td>Peracute form</td>
</tr>
<tr>
<td>2008</td>
<td>West Flanders</td>
<td>May</td>
<td>2</td>
<td>Head and eye form</td>
</tr>
<tr>
<td>2008</td>
<td>East Flanders</td>
<td>June</td>
<td>1</td>
<td>Cutaneous form</td>
</tr>
<tr>
<td>2008</td>
<td>East Flanders</td>
<td>September</td>
<td>1</td>
<td>Peracute form</td>
</tr>
</tbody>
</table>

NA: No detailed information available
higher viral load in these stables. The apparent increase of larger outbreaks could be explained by a change in host or pathogen factors. A genetic evolution of the virus towards a better adaptation to cattle cannot be substantiated at the current time. Cattle seem to be only moderately susceptible to OvHV-2, compared to the highly susceptible bison and sheep, which only show symptoms at very high infectious doses (Taus et al., 2005, 2006; Li et al. 2005, 2006; Berezowski et al., 2005). Immunosuppressive factors could increase the susceptibility of cattle. For example, copper deficiency (Otter et al., 2002), bracken fern toxicosis (Twomey et al., 2002), BVD virus (Sharpe et al., 1987) and perturbation immunosuppression (Otter et al., 2002) have all been linked to MCF outbreaks. Finally, the existence of different genetic predispositions between different lines could possibly be another contributing factor, as susceptibility for MCF has been linked to the polymorphism of the Major Compatibility Complex 1a in bison (Traul et al., 2007) and a mother/calf relationship was found in nearly half of the affected animals in one outbreak (Otter et al., 2002).

CONCLUSION

This case report documents an increase over the last decade of confirmed MCF cases in Belgium, similar to the situation in the UK. The financial implications of mingling cattle with sheep can be devastating, comparable to mingling cattle with poultry (botulism), with pigs (Aujeszky’s disease) or with dogs (neosporosis). Avoiding direct contact between cattle and sheep is the best preventive measure. The report also illustrates the persistent importance of including MCF in the differential diagnosis of neurological problems in cattle.

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Uit het verleden

### NIEUWE SLACHTMETHODE MET VOORHOOFDMASKER EN SCHIETPEN (1875)

Begin 1875 verzocht de Gentse burgemeester de Kerchove de Denterghem de directeur van het stedelijke slachthuis een nieuwe slachtmethode met voorhoofdmasker en schietpen uit te proberen. Hij had een verzoek daartoe gekregen van de Maatschappij voor Dierenbescherming en hij stemde volledig in met wat toen al de ‘humanitaire’ beweegredenen van die vereniging genoemd werd.

De hierna volgende beschrijving (in vertaling) is ontleend aan het *Bulletin Communal de la Ville de Gand* (1875, p. 361-362). Het procédé, op punt gesteld door M. Bruneau, president van het directecomité van het grote Parijse slachthuis van La Vilette, maakt gebruik van een leren masker op het voorhoofd en de ogen van het slachtbedier geplaatst en vastgemaakt met riemen. In het midden is er een ronde opening die doorgang geeft aan een pen, een soort uitgeholde bout die als doorslag (drevel) functioneert. Een hamerslag op de bout drijft deze in de schedelholte en laat de lucht geperst in de uitholling de hersenen samendrukken waardoor het dier ogenblikkelijk bewusteloos neervalt.

Een afvaardiging van het gemeentebestuur woonde een dergelijk experiment bij en kon met eigen ogen constateren dat er maximaal één minuut verliep tot wanneer het dier geen enkel teken van leven meer gaf. Het procédé is erg eenvoudig en geeft volgende voordelen: (1) de slachter slaagt steeds in zijn opzet, (2) het dier lijdt minimaal, (3) de doodstrijd is kort en (4) het vlees bewaart goed. Eén van de belangrijkste slachtersbazen van de stad had de nieuwe methode al aangenomen. Op unaniem voorstel van de leden van de gemeentelijke commissie voor handel en nijverheid samen met deze van volksgezondheid werd het procédé Bruneau via een gemeentebesluit verplicht gemaakt. De slachthuisdirecteur mocht er echter van afwijken in gevallen waarin hij dat nodig zou achten.

Noot van de vertaler: Later werden de pinnen aangedreven met cartouches (ontsteking). Stuiptrekken werd vermeden door een riet in het gut doorheen de schedelholte tot in het verlengde merg te steken. Hiervoor waren gespecialiseerde ervaren slachters van doen.

Luc Devriese