CASES AND FINANCIAL IMPACT OF THE LUNG PARASITOSIS

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Introduction: Lungworm outbreaks (coughing, milk drop and several dead cows) in dairy herds may result in serious economic losses. On 2 farms total losses were estimated at a minimum of €134 per cow present. History, development, diagnosis, differential diagnosis, therapy and prevention of the outbreaks are described and underline the need to recognize and to adequately diagnose and treat a lungworm outbreak at an early stage. Proper knowledge of the reinfection syndrome is required to understand the implications with respect to epidemiology of lungworm infection within the milking herd, where diagnosis is not always easy.

Introduction: Parasitic bronchitis, caused by Dictyocaulus viviparus, is a well-known disorder in young stock during pasturing. Parasitic bronchitis also occurs in adult dairy cows (Holzhauer et al 2003), either due to a primary infection or to reinfection resulting in the so-called lungworm reinfection syndrome. An increasing number of lungworm outbreaks in adult cattle have also been observed in several other countries.

Identified risk factors to lungworm outbreaks in dairy cows are, among others, introduction of lungworm-naïve heifers into the dairy herd and the reintroduction of pasturing after some years of permanent housing. Both level of milk drop and mortality in the affected herds are related to the interval between treatment and the first observation of clinical symptoms in the dairy herd. Woolley (1997) estimated financial losses caused by a moderate lungworm outbreak, affecting the whole cow herd, at roughly € 300.

The objective of this presentation is to present two case descriptions of lungworm outbreak, an estimation of the economic consequences, the diagnosis, the differential diagnosis, therapy and prevention.

Case descriptions:

Herd 1

Outbreak and herd history: The farm owned 110 dairy cows that were pastured in the summer and 20 calves remaining indoors until 6 months of age and then were moved to another location for rearing. The replacement heifers were pastured at 15-16 months of age, after being sired and checked for pregnancy. Three to two weeks before the expected calving date, the pregnant heifers returned to the original dairy herd and were pastured with the dry cows. After calving the heifers were joined with the lactating cows.

The problems of coughing and loss of milk production especially in the cows of parity 2 and older started in June. Five cows died as a result of the outbreak. Because of continuation of the problems, the herd was visited in September, while the cows were pastured day and night.

Diagnosis and therapy: In this herd, it was decided to examine serum from 5 heifers for antibodies against lungworm, of which 2 were lungworm positive in the ELISA (Ceditest®-Lelystad). Consequently, all present cows were treated with moxidectin (Cydectin®, Fort Dodge). After this treatment clinical symptoms slowly disappeared, but not entirely, and the milk production increased gradually during the next 2-3 months. Coughing was persistently heart until the next year.

Pathogenesis: The most likely explanation for the recurrent outbreaks several years in a row was the regular introduction of lungworm-naïve heifers into a D. viviparus infected population. No lungworm disease was observed in the replacements that were farmed out, while each year outbreaks occurred in the adult cow herd. Introduced lungworm-naïve heifers may start ingesting some lungworm larvae originating from a few carrier cows in the herd. Subsequently, patent infections develop in these heifers, which then start excreting many new larvae thereby increasing pasture infestation levels considerably (Eysker et al 1994). The heifers may show few clinical symptoms during this first infection cycle, because the first infection from the carrier cows usually is low (Eysker 2002). Following new introductions of lungworm-naïve heifers this process repeats itself which may include a second infection cycle in earlier introduced heifers. The result will be that the whole herd at some point in time will be confronted with considerable pasture lungworm larvae infestation levels. The latter may result in what is called the lungworm re-infection syndrome in cows, which is characterized by a severe immune-mediated inflammation in the lungs in response to juvenile stages trying to invade the lungs (Breeze, 1985).

Economic consequences: Parasitic bronchitis can result in decreased income and increased expenses. Decreased income is associated with decreased milk production, loss of body condition and subsequently a resulting decrease in fertility. Increased expenses are associated with substitution of animals culled or died because of the infection, extra inseminations, anthelmintic treatments, treatments for secondary infections and veterinary assistance. In addition, due to frequent detachment of the milking machine from the udder because of coughing, the incidence of mastitis may increase. Economic losses for the 2007 outbreak were estimated and summarized in table 1.

Overall, the total economic loss can be estimated to have been at least € 16.363, which means € 149 per dairy cow present (110) at the moment of the herd visit.

Herd 2

Outbreak and herd history: This herd included 95 dairy cows that were pastured in the summer, 35 calves (< 1 year) that...
remained indoors until 6 months of age and 20 yearlings between 1-2 years of age that remained indoors until pregnancy. At the time of the herd visit (October 2007) the dairy cows were still pastured daily for 6 hours. The previous winter the farmer had bought 20 pregnant yearlings, that were introduced into the dairy herd following calving from June until August. In the first week of August, signs of decreased milk production and diarrhoea started especially in the newly introduced heifers. From mid-August onwards cows started coughing. Some cows also showed fever. In the first half of September, 3 cows died. Of these, the two older cows were submitted for post mortem examination to the GD. One showed a fibrinous pleuropneumonia caused by Pasteurella multocida. No lungworms or signs of parasitic bronchitis were found. The other cow had a bronchiolitis obliterans and just one lungworm larva was found. There were no creeping passages under the pleurae or interstitium. From the end of September 4 more cows died.

**Diagnosis and therapy:** Herd investigation during the farm visit showed presence of fever (40.0-40.5˚C), pneumonia, diarrhoea and an increased incidence of mastitis. Because of these findings and the fact that the post-mortem results as discussed above did not immediately suggest a lungworm outbreak, 5 heifers with typical clinical symptoms were checked for IBR, Salmonella, BVD and BRSV serologically. Because all tests were negative, four of those serum samples were checked for the presence of lungworm antibodies (Ceditest®-Lelystad ELISA). All four samples were positive which indicated that a lungworm infection was present. Following this finding all dairy cows were treated with eprinomectin (Eprinex®, Merial) and one week later the clinical symptoms resolved. At the same time the milk production increased and 2 months later the milk yields had returned to the expected herd level.

**Pathogenesis:** The outbreak on this farm was most likely initiated at the time the purchased animals were introduced into the dairy herd from June until August. Assuming that these yearlings were lungworm-naïve at the time of purchase and that there were lungworm carriers present among the cows, a similar process as described for farm 1 must have occurred. This is supported by both the fact that all tested heifers showed antibodies in the lungworm ELISA and that the post mortem examinations of the two older cows did not conclusively indicate a lungworm infection. The older cows must have experienced a low level (subclinical) lungworm infection in preceding years. As a consequence a severe challenge with lungworm larvae, produced by the introduced heifers, might result in the so-called reinfection syndrome (Breeze 1985), i.e. clinical disease without adult worms being present. Severe lungworm disease may very well predispose for various secondary infections which may account for the observation of symptoms not primarily associated with a lungworm infection.

**Economic consequences:** The economic loss in this herd is summarized in table 1. The estimation was done as outlined for farm 1 and was estimated to amount to at least € 12,684, which means €134 per dairy cow present in the herd at the moment of the herd visit.

**Diagnosis:** The diagnosis, which is not always simple to make, is based on anamnesis, clinical examination of the patients, serological or faecal examination of heifers with typical symptoms and/or post-mortem examination (see fig. 1).

**Differential Diagnosis:** - Ascariosis (fertilizing of the grass with pig manure, diagnosis based on post mortem findings and larvae determination)
- BHV1 (coughing not prominent present)
- BRSV (seldom seen in dairy cows)
- Fog fever (sudden onset and death, especially in suckling cows)
- Pasteurellosis (incidently seen in dairy)

**Therapy:** In Western Europe the most used therapeutics are Eprinex® (eprinomectine) and Cydectin® (moxidectine), because of their good therapeutic effects and no withdrawal time for milk.

**Prevention:** To prevent parasitic bronchitis in adult dairy cattle in these and other herds in comparable circumstances, the following strategies may be considered:
- pasturing young stock with adult dairy cattle (lungworm carriers) and/or on pasture previously grazed by adult dairy cattle.
- preventive vaccination of heifers before being pastured for the first time with the dairy cows (Holzhauer et al., 2005).
- preventive treatment of all possible carriers, with an effective anthelmintic shortly before the start of the pasturing season.
- permanent housing of the dairy cows.

**Key words:** lung parasitosis, bovine, cases and financial impact.

**References:**


