IMPACT OF LUNGWORM ON CATTLE HEALTH AND FUTURE PRODUCTION

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considers the control options for combating this disease, traditionally a problem in calves, which is becoming more common among adult cattle

"THE disease (lungworm) is characterised by bronchitis and pneumonia and typically affects young cattle during their first grazing season on permanent or semi-permanent pastures", according to Urquhart et al in 1996.

However, there are increasing numbers of reports of adult cattle succumbing to clinical disease.

Signs of the disease can vary greatly:

- intermittent cough;
- frequent bouts of coughing and tachypnoea;
- severe tachypnoea and mouth breathing; and
- sudden death.

These signs can vary from group to group and within a group of animals.

Unfortunately, lungworm outbreaks are predictable in their unpredictability. Cattle do develop immunity to *Dictyocaulus viviparus*, but this may wane in the absence of re-infection. With re-infection essential for the maintenance of their immunity and the change in management practices with herds, it may be several seasons before adult cattle are challenged or re-challenged by lungworm.

The life cycle of *D viviparus* is summarised in **Figure 1**. In some cases where there is a heavy challenge, there can be sudden death without signs of coughing, although acute respiratory signs may be noted for a short period.

Figure 2 shows part of the lungs from a two-and-a-half year old heifer; no adult lungworm were found in the trachea, but some were found in the bronchioles and there was interstitial emphysema.

Treatment of animals may include antibiotics and NSAIDs to reduce the effects of bacteria and inflammation, as well as anthelmintics. Any veterinary surgeon who has witnessed a severe outbreak in the post-patent phase will appreciate that euthanasia on humane grounds may be considered.

With dairy herds expanding, a common scenario is that the main holding is large enough to accommodate the adult herd, but has insufficient grazing for the replacement heifers.

Figure 3 illustrates an attempt to map the possible movements within a dairy herd.

- Calves are born and, after weaning, could either go to rearing paddocks or to a contract rearer.
- From the rearing paddocks they are moved to summer grazing or possibly to the adult herd (if a smaller herd).
- From the summer grazing or contract rearer, they are moved to the calving group.
- The calving group also receives cows from the adult herd.
- Bought-in milking cows may join the adult herd.
- Added animals may join this herd, for example, at summer grazing, contract rearing and adult herd.

Adding animals does not necessarily mean this is a planned introduction of stock. From my experiences, neighbours' cattle may join the youngstock at grass and may not be removed for weeks or months.

The "green" group of cattle may never have been exposed to lungworm, that is, they have no immunity, or they may have been exposed, but have experienced no further challenge, leading to their immunity waning and thus becoming susceptible to disease.

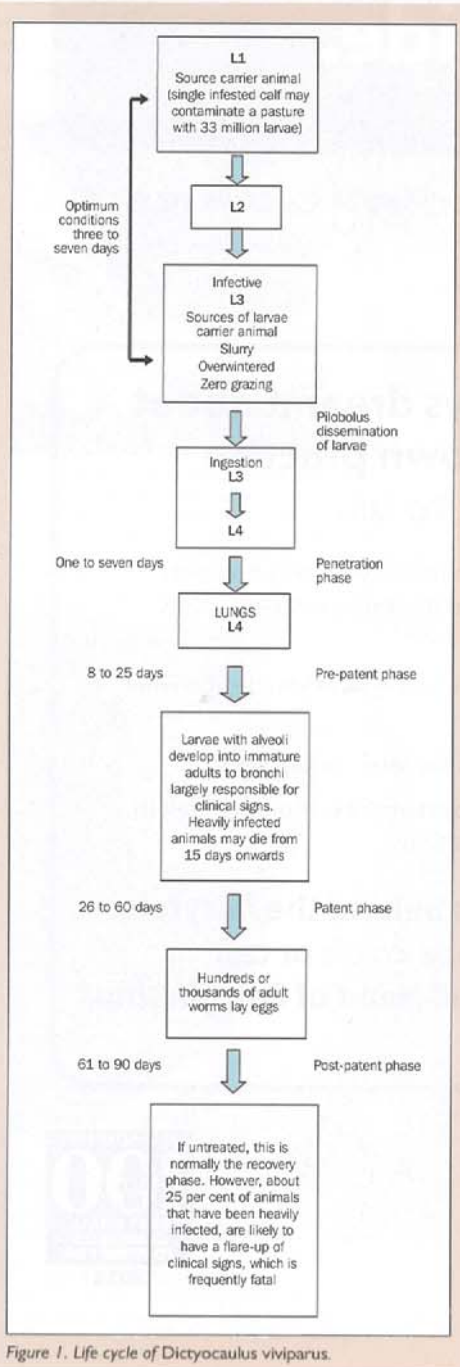

Figure 1. Life cycle of Dictyocaulus viviparus.

Experiences of lungworm outbreaks

– Case one

- Dairy cow herd of 150.
- Annual lungworm vaccination of calves for 20 years.
- Change of policy leading to calves under 15 months of age being housed to ensure target weights and growth rates for replacement heifers.
- Acute outbreak of lungworm in these heifer replacements when turned out.
- These heifers' first grazing season was the season 12 months following vaccination.

Here was an example of a farm that was well organised with written procedures. Unfortunately, it was not emphasised that the vaccine was administered just prior to turnout, thus, for 12 months, this lack of exposure to lungworm effectively meant these calves were naïve. This is an extreme case, but where calves are vaccinated and treated with efficient anthelmintics, maintenance of immunity may be impaired.

– Case two

In 2001, 55 weaned calves were turned out to grass and received no anthelmintic treatments. The client noticed coughing within the group and over a period of three days seven animals died. Each animal was valued at £270 (total cost of fatalities £1,590).

The total cost of the outbreak was estimated at £9,939. (**Table 1**). The major cost of £8,369 (£9,939 minus £1,590) resulted from the surviving animals not reaching their optimum slaughter weights and their daily liveweight gain (DLWG) was reduced, leading to an average further 22 weeks before they went to slaughter.

This is an example where the cost of sub-optimal performance exceeds that of the cost of fatalities.

– Case three

- Large closed dairy herd milking 350 cows.
- First season grazers treated with pulse release intra-ruminal bolus.
- In July there were seven fatalities in the dry cow group and numerous coughing cows, which had a reduced milk yield following calving.
- No other groups of animals were affected.
- Farmer's estimated cost of outbreak was £20,000.

Lungworm was not perceived as a problem within the herd. Why were there fatalities with the dry cows (calving group)? This is a large, high-yielding herd (12,000kg/cow/year), where the high yielders and fresh calvers do not graze and only the dry cows are turned out during May and September.

On analysis of the fatalities, only the third-plus calvers died, while younger cows/heifers were not affected. On further examination of the records, the seven fatalities had calved in previous years between January and May and had not grazed since calving for the first time. I suspect these cows died because their immunity had waned to such an extent they were susceptible to disease.

Many clients view the cost of disease purely on fatalities and treatment costs. However, in most cases indirect costs far outweigh the "direct" costs.

Indirect costs, such as reduced daily/lifetime production ones, are more significant. Reduced DLWG, as well as increasing feed costs, will delay the time to reach target weights. For replacement heifers, this can delay the time to service and thus alter subsequent calving patterns.

Calving patterns are extremely important in seasonal calving herds. It may be that heifers are served below their target weight leading to relative maternal undersize dystocia. Cows in milk will have reduced milk production. Non-fatal lungworm outbreaks in dairy cows can reduce yields by 8kg/day (Dutch experience [Holzhauer et al, 2011]).

Beef cows with reduced milk yields will reduce the DLWG of their suckled calves. If the breeding season coincides with the lungworm outbreak there can be reduced conception rate, which can lead to an increase in the barren rate.

Figure 2. Part of the lungs of a 30-month-old heifer. Adult lungworm were found in the bronchioles and there was interstitial emphysema.

Reasons for adult cattle susceptibility

Reasons for adult cattle being susceptible to clinical parasitic bronchitis can include the following.

- No immunity – that is, they are naïve and have never been exposed to lungworm.
- The cattle were immune, either because of previous exposure or vaccination, but due to lack of exposure their immunity has waned, leading to susceptibility.
- Use of effective/long duration anthelmintics in previous grazing seasons has prevented adequate exposure to produce immunity.
- They have been previously infected, then exposed to a massive challenge that may invoke a severe or fatal hypersensitivity reaction.

Control options

Prevention of clinical disease is the ultimate goal. This can be a challenge as there needs to

TABLE 1. Costs of lungworm outbreak. Modified from Borsberry S (2004). Farm Business, 3:1.

Expected sales	£27,495
Actual sales	£21,780
Loss	£5,715
Loss/animal sold (A)	£119
Extra feed for 48 animals at £4/week for 22 weeks	£4,224
Cost loss/animal sold (B)	£88
Total loss/animal sold (A + B)	£207

be immunity, which is stimulated at subsequent grazing seasons. However, due to the changing management of some herds the immunity in adult cattle may have waned, leading to susceptibility and severe clinical disease. Changing management practices have also occurred in beef herds as they expand, similar to that of dairy herds.

"Although natural immunity provides adequate protection on many farms, it cannot be accurately measured nor predetermined," (Radostitis et al, 2007). Immunity that cannot be relied on poses a conundrum for both the clinician and farmer.

With a beef finisher, the target is to maximise DLWG; therefore, prophylactic anthelmintics with prolonged activity are acceptable, whereas when rearing replacements for breeding herds it is preferable that the herd is "immune". Immunity depends on a continuous challenge from year to year. However, there is speculation as to an individual's response to a heavy challenge.

Prevention

To prevent lungworm, the first thing to consider is the requirements of the enterprise where cattle are bought in or where the cattle are being finished for slaughter.

Where there have been previous lungworm outbreaks it is not difficult to persuade clients to adopt preventive methods. However, the precise timing of strategic anthelmintic treatments may, at times, not be adhered to. Where cattle are being raised for slaughter it is satisfactory to have prevention rather than immunity.

Vaccination

A vaccination dose of viable *D viviparus* third stage irradiated larvae can be given orally six and two weeks before turnout to produce immunity, but there needs to be pasture exposure to boost the immunity. To maintain effective immunity, perhaps a single booster should be given prior to turnout in subsequent seasons.

With highly effective anthelmintic treatments applied to first season grazers it may be prudent to vaccinate prior to their second season of grazing.

Prophylactic anthelmintic treatments

Strategic anthelmintic administration is an attempt to prevent disease, but also allow the animal to develop immunity.

Macrocyclic lactones are frequently used, as they act against both immature and mature stages and, by their formulation, provide residual protection.

Albendazole, fenbendazole and levamisole all have activity against lungworm, but have no residual activity. The aim of any treatment by strategic dosing is to allow some immunity to develop by ingesting larvae from the pasture, which are subsequently killed before completion of their life cycle.

No matter what regimen is used, immunity depends on the animals gaining sufficient exposure to lungworm.

A continuous release bolus of fenbendazole provides protection for up to 140 days.

A seven pulse intraruminal device of oxfendazole can provide protection for approximately 180 days. However, where there is a heavy challenge, clinical signs of lungworm can become evident and will require treatment with an appropriate anthelmintic.

A long-acting moxidectin can provide protection for 120 days. A pour-on avermectin can provide protection for 28 days.

A pour-on doramectin and moxidectin can provide protection for 42 days.

Various programmes have been introduced – for example, three, eight and 13 weeks post-turnout and three and 11 weeks post-turnout (avermectin and doramectin or moxidectin respectively).

Immunity through strategic anthelmintic treatments can never be assumed to protect animals from subsequent challenge and, with the ever-changing management of herds, lungworm will continue to be a problem.

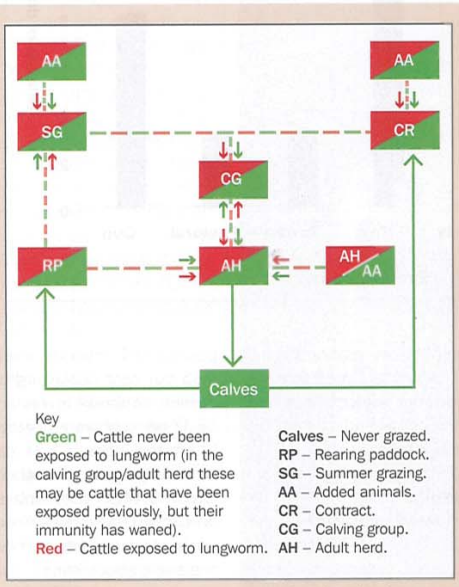

Figure 3. Possible cattle movements with a dairy herd.

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Lifetime ban for pair who dumped dogs

A COUPLE has been banned for life from keeping animals and given suspended prison sentences after admitting causing unnecessary suffering to their pets.

Cassie Alexandra George, 22, and her husband Paul Hilton, 30, of Leigh, appeared before Wigan Magistrates' Court.

At a previous hearing, George had pleaded guilty to nine breaches of the Animal Welfare Act 2006 and Hilton admitted four charges. The offences related to abandoning two emaciated Staffordshire bull terrier-type dogs and the death of a malnourished and infected pet rabbit earlier this year.

In addition to a lifetime ban, both defendants were given 18-week prison sentences, suspended for two years, and each was ordered to pay £500 costs. George was given a four-month curfew order and Hilton received a six-month drug rehabilitation order.

The court was told a male Staffordshire bull terrier-type dog was found collapsed after being dumped in a playing field near the couple's home. Two days later another dog was found at the same site. It was taken to a vet and survived.

Visiting George and Hilton's home, inspectors found the body of a rabbit, malnourished, suffering from an ear infection and covered in its own faeces.