CUTANEOUS MYIASIS IN SHEEP: TREATMENT AND MANAGEMENT

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discuss the severity and implications of fly strike in sheep, followed by methods of prevention and therapy to help control the disease

Summary

Blowfly strike of sheep in the UK is a severe skin disease caused by infestation with larvae, principally of the species *Lucilia sericata*. The feeding larvae cause considerable economic losses through lost production and ruined hides. If not recognised and treated promptly, the disease can result in significant morbidity and sometimes mortality.

The life cycle of blowflies is outlined, together with a discussion of the pathogenesis, presenting signs and treatment, including a table for comparison of the products available. The welfare implications of fly strike are mentioned in the context of the legal requirements of shepherds. The complex epidemiology and risk factors are examined, and opportunities for control are highlighted. While non-chemical methods of control, such as vaccines and genetic resistance, are preferable, progress in these areas has been limited to date.

Key words

fly strike, **myiasis**, **sheep**, ***Lucilia sericata***, **management**

CUTANEOUS myiasis, better known as fly strike, is a debilitating and occasionally fatal disease of livestock worldwide.

In the UK, the condition is most commonly associated with sheep, and is usually seen in spring and summer, when fly numbers and risk factors for infestation are at their peak. The feeding activity of blowfly larvae causes erosion and liquefaction of the skin and subcutis, causing intense irritation and suffering.

While few sheep in a flock tend to be affected, it is a widespread condition, resulting in significant production losses and poor welfare. The practitioner should be familiar with the life cycle and epidemiology to best advise on management strategies alongside the treatment of individual cases.

Importance

Fly strike has been estimated to affect 75 per cent of farms in England and Wales. The prevalence increases in the south, reaching 80 per cent in south-west England, which may be explained by warmer temperatures and more susceptible breeds in this region.

An average 1.4 per cent of ewes and 2.8 per cent of lambs are affected each year, potentially reaching 3.7 per cent to five per cent of lambs in summer months (Bisdorff and Wall, 2008; Taylor, 2009). This prevalence has remained relatively constant for the past 20 years.

Each year, strike costs the UK an estimated £3,104,000 (range of £1,768,000 to £4,439,000), without accounting for lost time and labour (Bennett and Ijpelaar, 2003). These losses include reduced growth rates, damaged hides and fleeces, and fallen stock.

Life cycle and pathogenesis

The flies involved in strike are facultative parasites, taking advantage of – but not relying on – sheep to complete their life cycle.

Several species of fly are involved in strike. The most important species in the UK – the green bottle *Lucilia sericata* – is a primary blowfly, laying its eggs on unbroken skin. The hatched larvae are able to penetrate the skin, creating a wound that, subsequently, attracts secondary blowflies, such as *Calliphora* and *Phormia* species. The larvae of these additional species cause a dramatic increase in wound size and disease severity. Secondary flies also target traumatic wounds, such as fighting injuries on the heads of rams.

Female blowflies are attracted by the odours released from moist and soiled fleece. A well-fed female *L sericata* can lay more than 200 eggs every few days (Figure 1). Within 12 to 24 hours, these eggs hatch and the larvae migrate towards the skin to feed on the host's tissues and inflammatory secretions. The larvae utilise a combination of digestive enzymes in saliva and excretions, and lacerating mouth hooks to breach the skin surface, leading to the subsequent destruction of underlying soft tissues (Figure 2).

Progressing through three instars, the larvae feed for a total of three to four days, before migrating away from the lesion and dropping to the ground to pupate in the soil. Metamorphosis into an adult fly takes as little as one week in the correct conditions. The entire cycle can be completed in under two weeks at the height of the season or, when the temperature falls too low, can be suspended in the pupal stage and recommenced the following year (Wall, 2012; Taylor et al, 2007).

Given the majority of this process occurs beneath the fleece, the extent of lesions is often alarming when an animal is treated. To an attentive and observant shepherd, the first signs of strike can be detected within 24 hours. The feeding larvae are intensely irritating, and affected animals can be seen gadding, stamping, nibbling and tail shaking.

As the lesion progresses, the animal become depressed, separates from the flock and a malodourous brownish discharge is seen on the wool. Left untreated, weight loss, anaemia, septicaemia and chronic ammonia toxaemia all ensue, leading, ultimately, to death within seven to 10 days (Figure 3).

Chemical treatment and prevention

While injectable avermectins and milbemycins are effective in the treatment of fly strike, pour-ons and plunge dips are preferable, since they are both licensed and act more quickly.

Pour-ons, while being easy to apply, are unlikely to prevent foot strike effectively (Bisdorff and Wall, 2008); therefore, dipping may provide more complete protection. The shorter acting cypermethrin pour-ons will often require re-application to provide protection throughout the risk period.

It is important to remember insect growth regulators (IGRs) prevent larval development, but do not stop flies from laying eggs and are not suitable choices for treatment. These, however, are very good choices for prevention, with some preparations offering up to 16 weeks of protection.

For mild to moderate cases:

• clip soiled fleece, including a wide margin around the lesion;

• apply a licensed insecticide directly to the affected area (Table 1);

• administer appropriate antibiotics and an NSAID;

• correct underlying risk factors where possible; and

• house cases that require close attention.

In severe cases, where the systemic effects of toxaemia are evident, animals should be euthanised on welfare grounds.

Following the application of insecticide, larvae are killed extremely quickly. In the absence of secondary infections, skin wounds soon begin to dry and scar tissue is formed. During the healing process, large areas of wool can be lost (Figure 4), which, depending on the severity, may not grow back fully in subsequent years.

Epidemiology and management

Due to their widespread distribution, facultative parasitic nature and ecological importance, the control of blowflies by eradication is an impossible and undesirable task. That said, the abundance of flies may be decreased, to an extent, by trapping and the prompt removal of the car-cases of fallen stock and wildlife. Clearly, these methods are impractical over large areas of grazing and work best when focused in locations where sheep tend to congregate.

Given this limitation, the majority of preventive strategies aim to reduce the susceptibility of sheep to strike. It is no coincidence more than two-thirds of cases of strike in the UK affect the perineum and tail head (French et al, 1995). Since this area – in the presence of a long fleece – is warm, moist and frequently soiled with faeces, it is particularly attractive to gravid female flies. Certain conformational characteristics exacerbate these factors further, including skin folds, obesity and the fine, dense wool of many lowland breeds (Wall, 2012).

The first wave of strike is often seen in ewes in mid-spring, shortly after turnout on to lush pasture. The sudden change in diet causes loose faeces, making soiling of the long fleece more likely, timed perfectly with the hatching of over-wintered blowfly pupae.

The most effective prevention for ewes is full shearing, with the incidence plummeting by 95 per cent immediately after (Broughan and Wall, 2007). However, since the risk of inclement weather is still high, the majority of farmers will prefer to wait until later in the year.

A successful compromise is to dag all ewes at turnout, thus reducing their susceptibility, but retaining the protection of fleece over the body. Postponing clipping until the fleece is already soiled will inevitably be too late for some, is harder and more time consuming, can ruin shearing equipment and increases the risk of injuries to both shearer and sheep.

A second wave of strike – this time in lambs – is often encountered in mid-summer. The ewes are, by now, shorn and low risk, but their offspring may already have more than two inches of wool growth.

In addition, now they are grazing in earnest and ingesting worm eggs, cases of parasitic gastroenteritis start to be seen.

Docking lambs' tails (ideally using a rubber ring before seven days of age, after which local anaesthetic is legally required; Protection of Animals (Anaesthetics) Act 1954, as amended) and a good worm control programme are essential for reducing faecal soiling and minimising the risk of infestation.

Beside these two peaks, an increase in cases may be seen following persistent rainfall, which can cause bacterial dermatitis. "Fleece rot" (*Pseudomonas* species) and "lumpy wool" (*Dermatophilus* species) both generate attractive olfactory signals for blowflies (Wall, 2012). Wet weather also increases the incidence of foot rot, which, due to its pungent odour, attracts flies strongly.

While it is usually impractical to house sheep in wet weather, the timely use of preventive treatments should be considered once the rain has stopped and the fleeces are relatively dry. Injuries, at all times of year, are potential targets for blowflies and should be managed accordingly. At the very least, fly repellents should be applied, but, ideally, the animal will be housed until the wound has dried.

While fly strike can be seen at almost any time of year, the traditional season is May to September. It is reasonable to expect, in a warming climate, this period may extend. At the height of the season, when risk factors and fly numbers are at their peak, it is essential for sheep to be checked at least once daily for the early signs of strike.

Fly strike is a rapidly progressive disease and, with an increasingly attentive public, the death of a sheep could lead to prosecution under animal welfare legislation. It is important we emphasise to farmers the welfare implications of strike and their legal obligations regarding the safeguarding of their flocks.

Future prospects

Given *L sericata* larvae are present on the host for a matter of days, there is little opportunity for the animal to mount an effective immune response against the initial strike. This is complicated further by the relative resistance of the larvae against the sheep's immune cells and cytokines.

While desirable, the potential, therefore, for both effective vaccination and breeding for immunological resistance is hard to realise. With the pressure mounting on Australian wool producers to abandon mulesing (a controversial surgical procedure that removes a crescent of skin

around the tail head and perineum to reduce the risk of strike), the urgency for alternative methods of controlling strike are driving research in that region.

A number of proteins have been targeted for vaccines and, while some promising results have materialised, a commercially viable product is likely to be many years away. Similarly, breeding for genetic resistance has recently shown some promise, yet progress is limited so far (Elkington and Mahony, 2007).

For the foreseeable future at least, control of fly strike in the UK must focus on predicting the period of high risk and the appropriate use of preventive treatments, shearing and dagging, and worm control.

A sound understanding of the epidemiological factors discussed can be used to inform flock health plans and generate clear, strategic preventive measures for strike, while emphasising the importance of regular flock inspections.

References

- Bennett R and Ijpelaar J I (2003). Economic assessment of livestock diseases in Great Britain, *Final Report to the Department for Environment*, *Food and Rural Affairs.*
- Bisdorff B and Wall R (2008). Sheep blowfly strike risk and management in Great Britain: a survey of current practice, *Med Vet Entomol* **22**(4): 303-308.
- Broughan J M and Wall R (2007). Fly abundance and climate as determinants of sheep blowfly strike incidence in south-west England, *Med Vet Entomol* **21**(3): 231-238.
- Elkington R A and Mahony T J (2007). A blowfly strike vaccine requires an understanding of host–pathogen interactions, *Vaccine* **25**(28): 5,133-5,145.
- French N P, Wall R and Morgan K L (1995). The seasonal pattern of sheep blowfly strike in England and Wales, *Med Vet Entomol* **9**(1): 1-8.
- Taylor M (2009). Changing patterns of parasitism in sheep, *In Practice* **31**: 474-483.
- Taylor M A, Coop R L and Wall R L (2007). *Veterinary Parasitology* (3rd edn), John Wiley and Sons: 240-242.
- Wall R (2012). Ovine cutaneous myiasis: effects on production and control, *Vet Parasitol* **189**(1): 44-51.

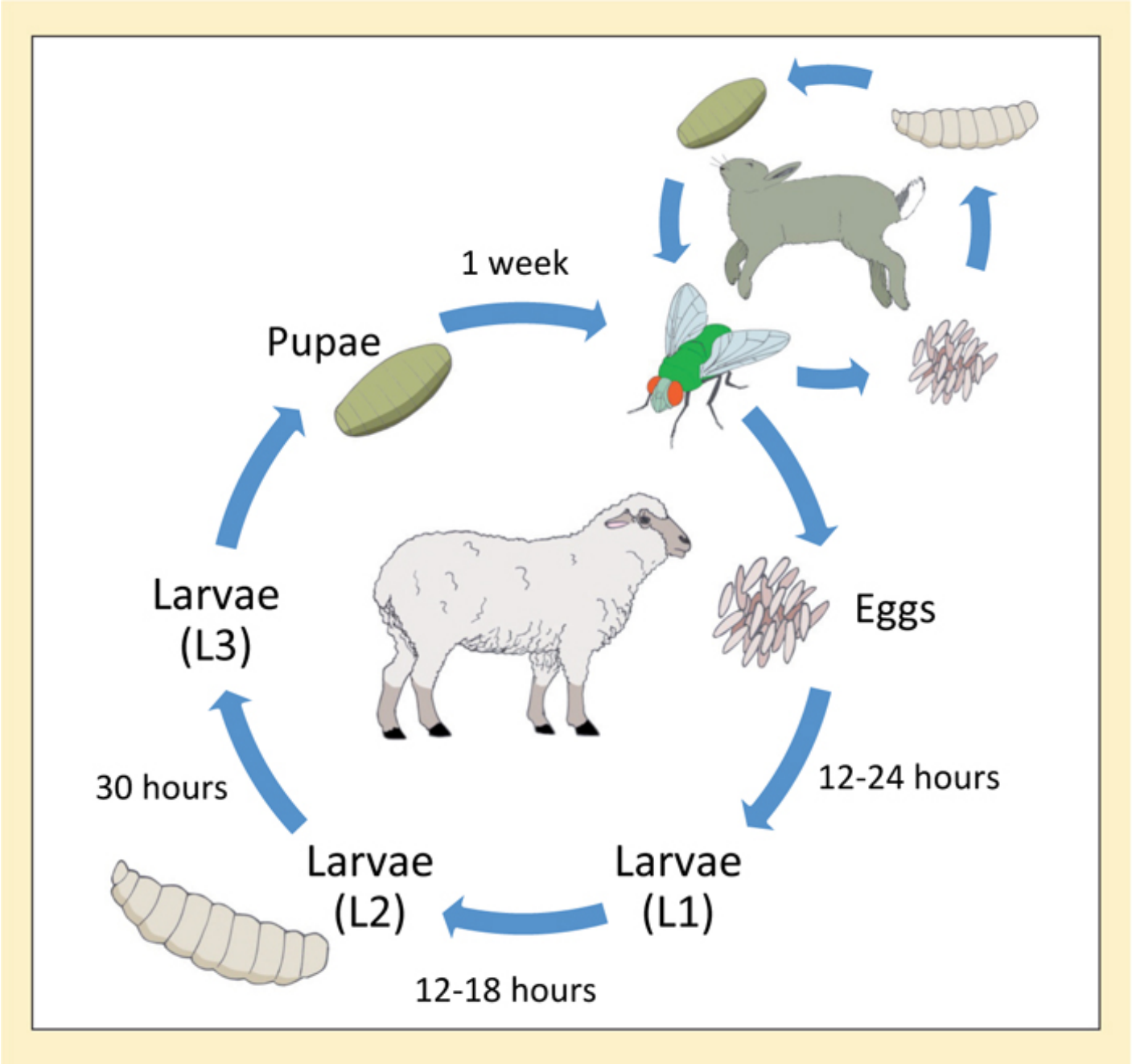

Figure 1. The life cycle of *Lucilia sericata*. In mid-summer, the entire cycle may be complete in less than two weeks.

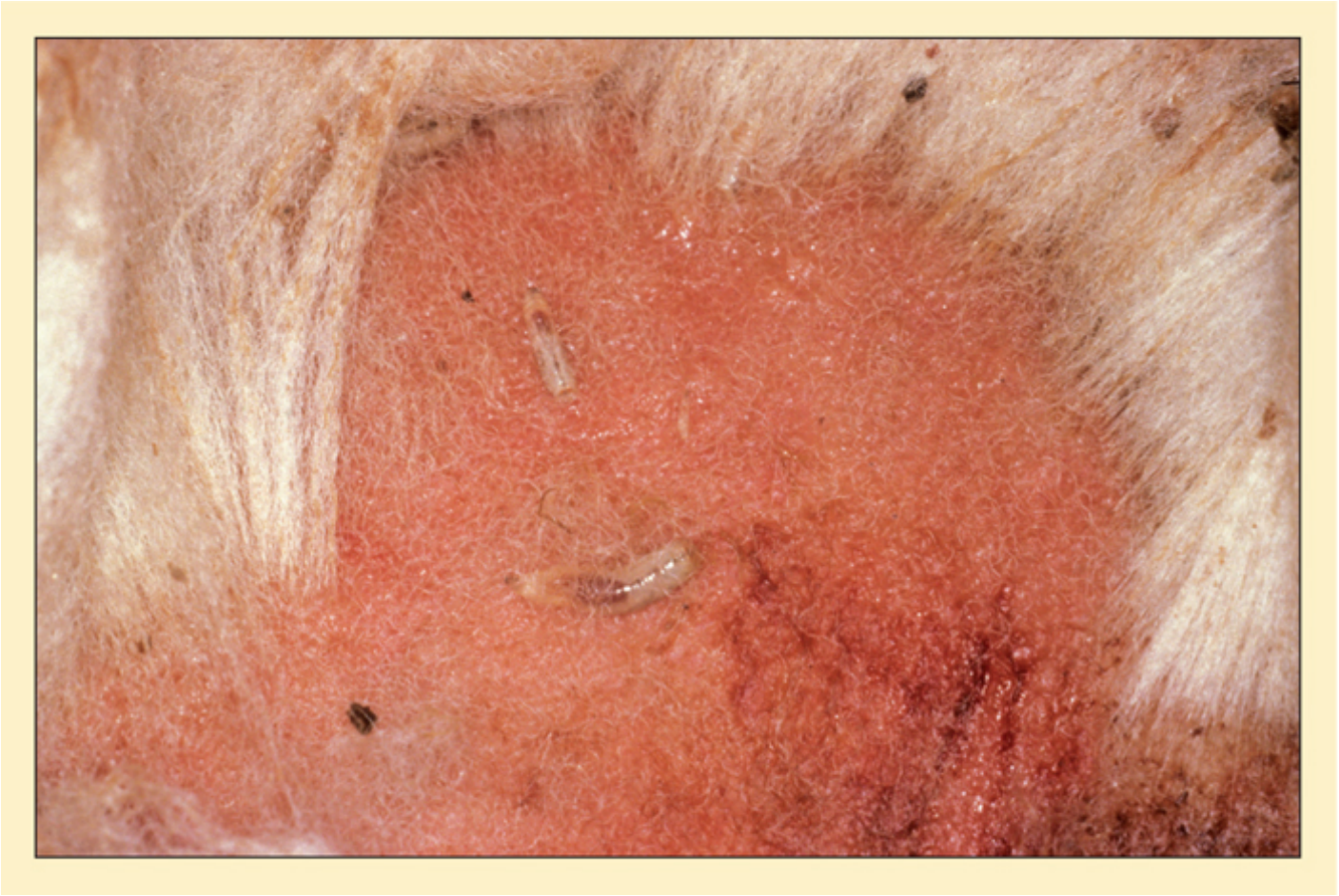

Figure 2. Larvae of *Lucilia sericata* breach the skin using mouth hooks.

IMAGE: M Corke, University of Cambridge.

Figure 3. A severely affected sheep that has died from strike, showing the brown discolouration of the wool and soft tissue maceration.

IMAGE: S Jeckel, RVC, AHVLA.

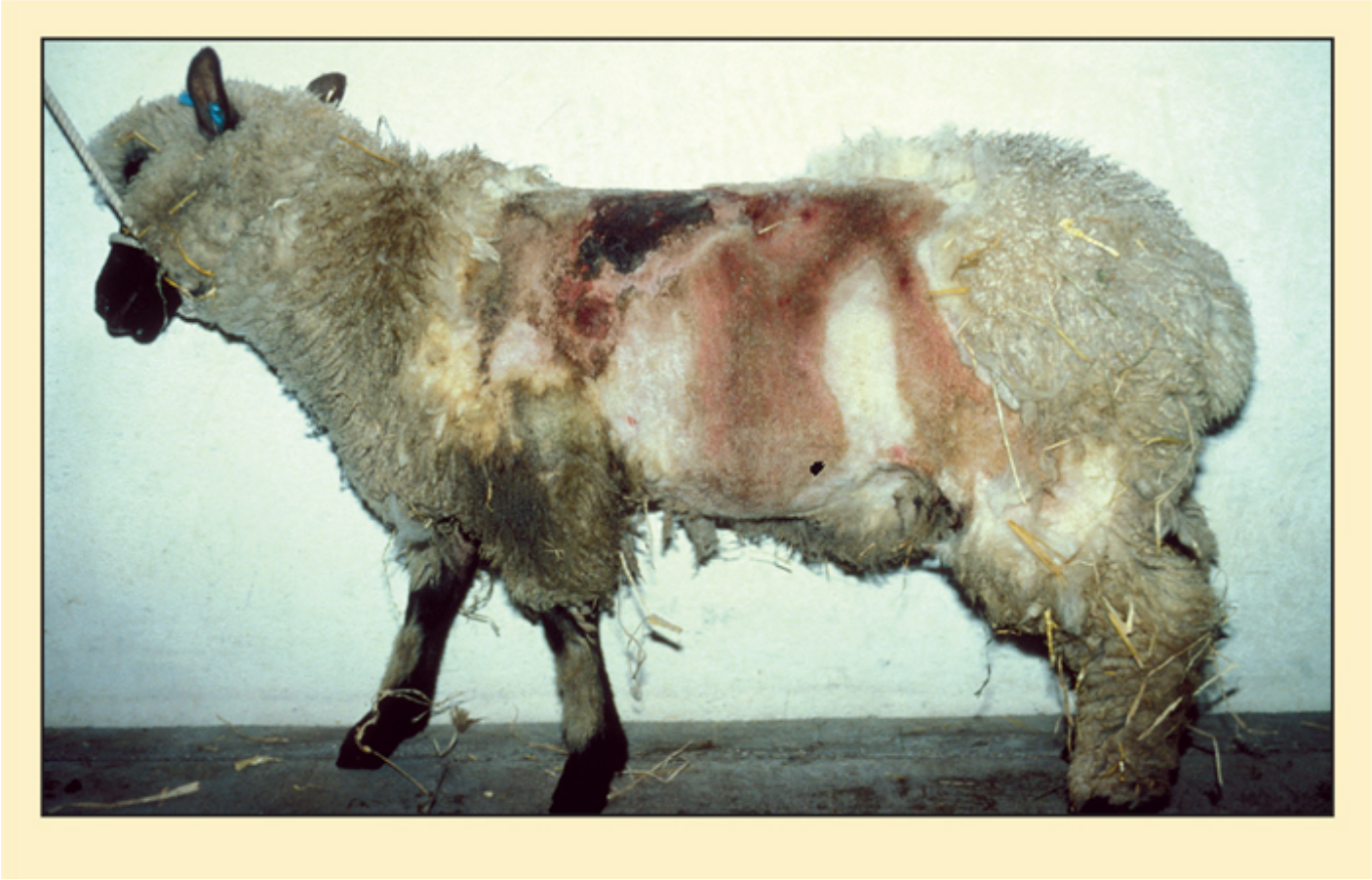

Figure 4. Large areas of wool can be lost and may not grow back.

IMAGE: M Corke, University of Cambridge.

Generic name	Trade name	Period of prevention	Suitable for treatment	Meat withhold period	Product type
Dimpylate	Paracide 62	8 weeks	Yes	70 days	Plunge dip
	Osmonds Gold Fleece Dip	8 weeks	Yes	70 days	Plunge dip
Dicyclanil (IGR)	CLiK	16 weeks	No	40 days	Pour-on
	CLiKZiN	8 weeks	No	7 days	Pour-on
Cypermethrin	Crovect	6-8 weeks	Yes	8 days	Pour-on
	Vectocert 1.25%	6-8 weeks	Yes	8 days	Pour-on
	Ectofly	6-8 weeks	Yes	8 days	Pour-on
	MoleEcto	6-8 weeks	Yes	8 days	Pour-on
Alpha-cypermethrin	Dysect	8-10 weeks	Yes	49 days	Pour-on
	Zermasect Sheep	8-10 weeks	Yes	49 days	Pour-on
Deltamethrin	Fly and Lice Spot On Insecticide	None	Yes	35 days	Pour-on
	Deltacert	None	Yes	35 days	Pour-on
Cyromazine (IGR)	Vetrazin	10 weeks	No	28 days	Pour-on

Table 1. Products available for the prevention and treatment of fly strike