SHORT COMMUNICATION

Comparison of traps for the control of sheep blowfly in the U.K.

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Abstract. The ability of three commercially available trap types to catch Lucilia (Diptera: Calliphoridae) blowflies was assessed on three sheep farms in southwest England in 2008. The aim was to evaluate their relative value for the control of ovine cutaneous myiasis (sheep blowfly strike) on farms. There was a highly significant difference between the total number of female Lucilia caught per day by the traps, with an Agrilure Trap (Agrimin Ltd, Brigg, U.K.) catching more than the other trap types (Rescue Disposable Fly Trap, Sterling International, Spokane, U.S.A.; Redtop Trap, Miller Methods, Johannesburg, South Africa). However, there was no significant difference between the traps in the numbers of female Lucilia sericata (Meigen) caught. Nevertheless, consideration of the rate at which female L. sericata were caught over time showed that the Agrilure trap did not begin catching until about 30 days after its initial deployment. It subsequently caught L. sericata at a faster rate than the other two traps. The data suggest that the freeze-dried liver bait used in the Agrilure trap required a period of about 30 days to become fully rehydrated and decompose to the degree required to attract and catch L. sericata. Once the bait was attractive, however, the trap outperformed the other two traps in terms of the rate of L. sericata capture. The Agrilure trap would appear to be the most effective of the designs tested for use against sheep blowfly and blowfly strike in the U.K., but care would be needed to ensure that the traps were deployed in advance of the blowfly season so that the bait was suitably aged when trapping was required.

Key words. Lucilia, blowfly, control, myiasis, sheep, trap, U.K.

Traps have been shown to be an effective tool for the control of a range of dipteran pest species under specific circumstances (Haniotakis et al., 1986, 1991; Vale et al., 1986). To be effective and economically viable, it is important that the number of flies caught is high relative to the basic rate of increase of the pest species in question; this should be combined with low cost, sustained effectiveness and minimal effects on non-target species.

Blowfly strike (cutaneous myiasis) is a major problem in most sheep-rearing areas of the world (Wardhaugh & Morton, 1990; Snoep et al., 2002; Bisdorff et al., 2006). The primary agent of myiasis in temperate northern Europe is Lucilia sericata (Diptera: Calliphoridae). The feeding activity of blowfly larvae leads rapidly to the development of cutaneous lesions, further oviposition, debilitation and the subsequent death of the infested animal, unless treated. Blowfly strike control is currently dependent on the timely application of neurotoxic insecticides and insect growth inhibitors, as well as farm management practices such as tail docking, shearing and the removal of faecally soiled wool (French et al., 1992). However, as a result of concern over operator safety and environmental contamination associated with the reliance on insecticides, cost and lengthy withdrawal periods, the consideration of complementary approaches to strike control is of value.

Several studies have considered the use of traps for the management of strike. Early trials in Australia, between 1932
and 1934, considered whether mass trapping of *Lucilia cuprina* (Wiedemann) (Diptera: Calliphoridae) using carrion-baited traps could be used to reduce the incidence of sheep myiasis (Mackerras et al., 1936). The trials indicated that intensive trapping could reduce both the abundance of *L. cuprina* and the incidence of strike by over 50%. However, at that time the use of traps for blowfly control was not considered cost-effective because of high construction costs, the large number of traps needed and the frequency of bait replacement and trap maintenance required. In New Zealand the use of carrion-baited traps was found to result in a 95% decline in the abundance of *L. cuprina*, although strike incidence was not recorded (Dymock & Forgie, 1995). Subsequently, an insecticide-free trap for *L. cuprina* and other calliphorid myiasis flies has been developed commercially in Australia (Lucitrap; Bioglobal Pty Ltd, Ballarat, Victoria, Australia). It is supplied with a synthetic chemical lure, composed of butyric acid, 2-mercaptoethanol, indole and 20% sodium sulphide solution (Urech et al., 1994, 2004). The ability of this trap and bait system to suppress fly populations (Scholtz et al., 2000) and to reduce strike incidence (Ward, 2001; Ward & Farrell, 2003) has been investigated with variable results, although reductions in strike incidence of up to 46% have been reported (Ward, 2001; Ward & Farrell, 2003). The Lucitrap, however, was found to be ineffective against *L. sericata* in the northern hemisphere (Hall et al., 2003). This appears to be largely because of the low probability that *L. sericata* will enter enclosed spaces, which renders a non-return container trap such as the Lucitrap ineffective (Hall et al., 2003). A novel trap, designed specifically for the control of *L. sericata*, was examined on 12 commercial sheep farms in southwest England in 2003. Strike incidence in the flocks that used trapping only and flocks that used trapping plus a chemical preventive was on average five times lower than in control flocks (Broughan & Wall, 2006). This trap was subsequently modified and commercialized for use in the U.K. (Agri lure Trap; Agrimin Ltd, Brigg, U.K.). However, a number of well-established, relatively inexpensive, alternative traps are also available for fly management.

The aim of the present work, therefore, was to compare the ability to catch *L. sericata* of two of the most widely used established fly traps against that of the Agri lure trap in order to allow an assessment of their relative effectiveness in catching *Lucilia* blowflies, thereby protecting sheep against myiasis. For this, three commercially available fly traps were placed at each of three farm sites in southwest England. Traps were placed on 6 July 2008 at sites 1 and 2 and on 20 July 2008 at site 3. The three traps were the Rescue Disposable Fly Trap (Sterling International, Spokane, WA, U.S.A.), the Redtop Trap (Miller Methods, Johannesburg, South Africa) and the Agrilure Trap (Agrimin Ltd).

Site 1 was located in North Somerset, approximately 13.5 km south of Bristol, at 100–170 m a.s.l. The site was grazed by a flock of approximately 250 ewes and 300 lambs. Site 2 lay on an organic beef/sheep farm located in North Somerset, approximately 5 km northwest of Bristol, at 90 m a.s.l. It was grazed by approximately 130 South Devon beef cattle and 60 mixed-breed sheep. Site 3 was located on a sheep farm near Christow, Devon, at approximately 100 m a.s.l., and was grazed by about 400 breeding ewes.

The traps were attached to 15-cm diameter wooden posts at approximately 1.5 m above the ground to avoid interference from sheep. At each site, the traps were placed about 1 m away from the edge of a single field, approximately equidistant from one another and a minimum of 200 m apart. Traps were inspected twice weekly at 3–4-day intervals. When the flocks of sheep were moved between pastures, the traps were moved into the new fields at the same time.

The Agrilure trap is composed of a white corrugated plastic cube (30 × 30 × 30 cm) with entry slits in each side. It was baited with freeze-dried liver, as supplied by the manufacturers, to which water was added when the trap was first put in place. The liver was not replaced during the trial, but the water was topped up throughout the trial as required. The Agrilure trap contains four vertical black sticky strips to which flies adhere when they enter and alight in the trap. These strips were removed and replaced with fresh strips at each inspection. In the laboratory all green-coloured Diptera were removed.

The Rescue trap is composed of a plastic bag, which is clear in its upper half and obscured by print below. The bag contains a commercial powdered bait to which water is added when it is to be used. Flies are attracted by the bait, enter through a yellow one-way cap and fall into the watery bait, where they die. At each inspection the top of the bag was cut open and the watery bait was washed through a sieve. All Diptera were picked out and placed into sample pots. At each inspection the entire Rescue trap was then replaced by a new trap and powdered bait to which water was added to rehydrate the bait.

The Redtop trap also consists of a completely clear polythene bag and uses a proprietary powdered bait. Flies attracted to the odour enter through a hole at the top, which is covered by a red cap. A mesh cone beneath the opening ensures that flies cannot escape once they have entered. Flies then fall into the watery bait and die. However, for this trap the manufacturer’s instructions state that the bait requires a period of 3–4 days after water is added to become attractive. Therefore, for this trap, water was added to batches of powdered bait in the laboratory, 3–4 days prior to each inspection. At each inspection, the old watery bait was removed and sieved, and all Diptera were picked out and deposited into vials. Replacement aged bait was then added to the trap.

Thus, at each inspection, the baits in the Rescue and Redtop traps were replaced because the flies had died directly in the bait and this therefore had to be removed to allow the flies to be collected. The bait in the Agrilure traps remained unchanged throughout the trial. At each inspection, the traps at each site were also rotated one position around each field, so that by the end of the trial each trap had been in each position an equal number of times. This procedure was adopted to remove any systematic positional bias in trap catch.

In the laboratory, *L. sericata* and other *Lucilia* species were identified, sexed and counted under a binocular microscope. Trapping was carried out for 12 weeks at sites 1 and 2 and 10 weeks at site 3.

To correct for differences in the intervals between dates on which traps were emptied, the number of females of *L. sericata* and, as appropriate, the pooled other *Lucilia* species, were
divided by the number of days since the last inspection to provide a measure of the number of females caught per day. For analysis, this was then subjected to log10 transformation prior to parametric analysis of variance, in which site and trap type were treated as factors and time as a covariate. Tukey multiple range tests were used to compare differences between groups within factors.

There was a highly significant difference between the number of all female *Lucilia* spp. caught per day by the three trap types ($F = 3.98, P < 0.02$) (Fig. 1). There was no significant effect of site ($F = 0.08, P = 0.9$) and no significant interaction between site and trap type. A Tukey multiple range test showed that the Agrilure trap caught significantly more female *Lucilia* than the Rescue trap, but not the Redtop trap, whereas the latter two traps did not differ significantly from each other in catch. However, for *L. sericata* alone, there was no significant difference between the number of females caught per day by the three trap types ($F = 1.2, P = 0.3$). There was no significant effect of site and no interaction between site and trap type. However, catches of *L. sericata* were very low and the variance correspondingly high. Consideration of the rate of catch of female *L. sericata*, by comparison of the cumulative numbers caught over time, shows that the Agrilure trap did not begin catching flies until day 30 after initial deployment (Fig. 2). It subsequently appeared to catch *L. sericata* at a faster rate than the other two traps.

Overall the Agrilure trap caught more female *Lucilia* than the other traps, but was slow to start catching *L. sericata*; it seems likely that the freeze-dried liver bait used for the Agrilure trap required a period of about 30 days to become fully rehydrated and decompose to the degree required to attract and catch *L. sericata*. Once the bait was attractive, the Agrilure trap caught *L. sericata* at a higher rate than the other two traps, at least up to day 50. Clearly, therefore, this suggests that pre-ageing of the bait should have been adopted for the Agrilure trap in this trial, as it was for the Redtop trap. To be able to identify flies caught in the two liquid traps, traps were emptied three to four times per 2-week period. Whether this regular change of bait reduced the numbers of *Lucilia* caught is not known. Similarly, it is possible that removing flies from the Agrilure trap will have reduced the visual stimulus attracting the entry of other flies.

The present results suggest that the Agrilure trap is an effective design for use against sheep blowfly and blowfly strike in the U.K., but care would be needed to ensure that the traps were deployed in advance of the blowfly season so that the bait was suitably aged when trapping was required. In addition, in this study the number of non-target insects caught by each trap was not monitored. This should be an important goal in future studies because specificity must be an important criterion in selecting the ideal trap for field use.

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**References**


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