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Efficiency of a walk-through fly trap for *Haematobia irritans* control in milking cows in Uruguay

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ABSTRACT

Haematobia irritans (horn fly) is a bloodsucking insect that affects grazing cattle. Since this fly's introduction into Uruguay in 1992, pest management practices used to control the insect have been exclusively based on the use of insecticides, which has caused synthetic pyrethroid resistance. The use of insecticides is a major constraint to livestock production due to food safety and environmental concerns. This study evaluated the effectiveness of a walk-through fly trap for horn fly control. The field trail was conducted in 18 trail evaluations dates from 2015 to 2016 in Holstein-Frisian lactating cows on two dairy farms in southern Uruguay. The traps were placed at the exit of the milking parlor. Two digital cameras were used to record video at the entrances and exits of the traps. On each of the 18 trail evaluation, between 30 and 158 cows were randomly selected for fly counting according to video records. On Farm 1, a total of 718 cows were assessed. The median number of flies per cow at the entrance of the traps was 22 (ranging from 1 to 199), while the median number at the exit was three flies per cow (ranging from 0 to 22). The median efficiency of the trap was 88%. Farm 2 had 345 observations, and the median fly count at the entrance of the traps was of 22 flies per cow (ranging from 1 to 129) and four flies at the exit (ranging from 0 to 35) with a median efficiency of 82%. It was observed that the effectiveness of the fly traps varied depending on the number of flies at entry, the season of the year and the farm site. In conclusion, fly traps could be used for the control of *H. irritans* in milking cows without the use of insecticides.

1. Introduction

Haematobia irritans was introduced to North American in the late 1880s (Bruce, 1938) and spread to South America at the end of the 1970s. The presence of this species was verified for the first time in northern Uruguay in 1992 (Carballo and Martinez, 1992) and spread to the rest of the country within the same year. In 1997, five years after the introduction of *H. irritans* to Uruguay, there was evidence of resistance to cypermethrin (Márquez et al., 1997), which is now widely dispersed throughout the country.

In order to protect the milk from residues, milking cows cannot be treated with insecticides that appear in milk. In addition, the use of insecticides is a major constraint to livestock production due to food safety and environmental concerns. Therefore, alternative methods such as biological and physical control should be used, especially in countries that export meat and dairy products. In Uruguay, biological control of *H. irritans* with the dung beetle *Digitonthophagus gazella* was proposed. However, it was difficult to achieve a sufficiently large population of beetles for effective fly control due to the temperate climate of the country (Alzugaray et al., 1993).

The use of walk-through fly traps in Uruguay may be an environmentally and economically sustainable control alternative to insecticides. The device works by trapping the horn fly, causing it to dye of desiccation and starvation. Earlier use of this type of trap started in 1899, however it was not an effective method because the light/shadow contrast was not appropriate, causing only a 5% trapping success rate (Ollege, 1900). Later, Bruce (1938) designed a different model of horn fly trap made with wood and trapping elements that achieved a fly reduction of 50%. Moreland et al. (1995) added electricity to Bruce's trap reaching 80% reduction. Another walk-through fly trap designed by Tozer and Sutherst (1996) proved to be more efficient because it optimized the light/shadow contrast, reaching a fly reduction of 84–98%. Later, Watson et al. (2002) evaluated an electric walk-through fly trap in which the animals passed through curtains that coaxed the

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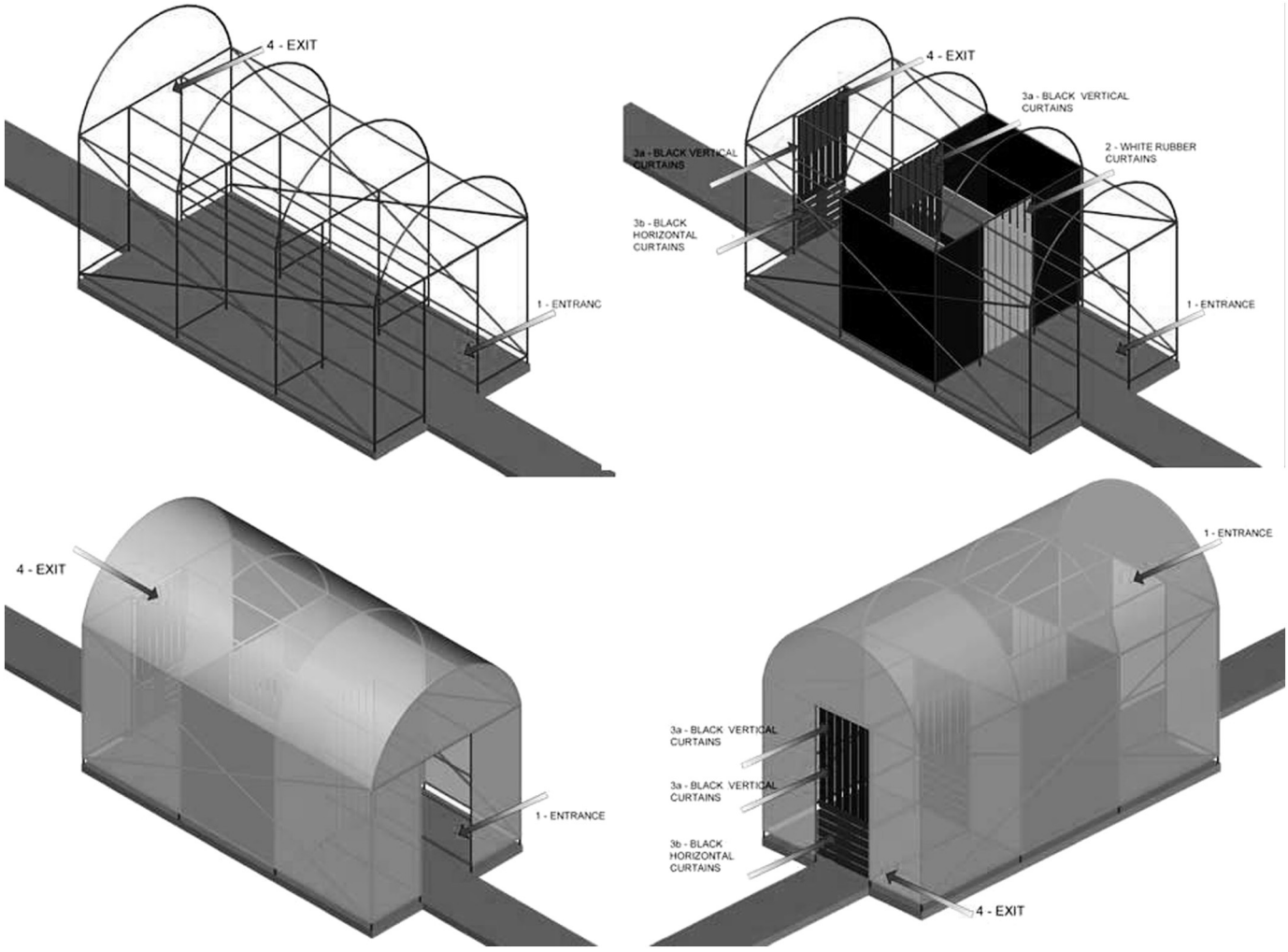

Fig. 1. Walk-through horn fly trap adapted from Tozer and Sutherst (1996). A) Metallic structure. B) Metallic structure with vertical and horizontal curtains and dark central corridor. C) View from the entrance of the walk-through trap with metallic structure covered by the external cover. D) View of the walk-through trap from the exit.

flies up into an electrified girdle. This trap did not work as expected because the flies easily adapted, flying near the ventral region of the animal where the curtains did not reach the flies. Its efficiency was between 32.7% and 44.7%. Recently, Denning et al. (2014) evaluated a walk-through trap with a suction system, reaching reductions of between 68% and 80%.

The objectives of the experiment discussed in this paper were to evaluate a walk- through fly trap regarding cattle adaptation and horn fly management in dairy cattle in Uruguay.

2. Materials and methods

The study period of 16 months included the construction of the traps, the adaptation period for the animals and the trial. The trial period comprised three phases (March 2015, November–December 2015, and March–April 2016) corresponding to the periods of higher fly loads (Castro et al., 2008). In the study region, the weather is temperate with a mean rainfall of 1000 mm and average temperatures ranging from 16 °C to 19 °C (INUMET, 2016). The walk-through fly trap model used in this trial was the one described by Tozer and Sutherst (1996) with modifications (Figs. 1 and 2). It consisted of a structure made of galvanized pipes (4.5 m long, 2.8 m high and 2.3 m wide) (Fig. 1A), with a 1.8 m high and 0.8 m wide central corridor through which the cattle passed. The trap was enclosed by an external cover. To strengthen the external cover, an anti-fouling greenhouse mesh composed of linear, high density polyethylene monofilament with UV stabilizers was

Fig. 2. Lateral view of a horn fly walk-through trap.

used instead of the plastic cover described in the original model. This cover prevented the escape of flies, but allowed ventilation and the passage of sunlight (50 mesh) (Fig. 1C and D). The central corridor was divided in three compartments separated with curtains (Fig. 1B). Compartments 1 and 2 were separated by white rubber curtains formed by 24 vertical stripes, 5 cm wide and 1.7 m high (Fig. 1B). These curtains allowed the flies to enter with the cows and blocked them from flying back through the door. All walls of compartment 2 were covered