



# Meteorological factors affecting the biting rate of UK *Culicoides* on sheep

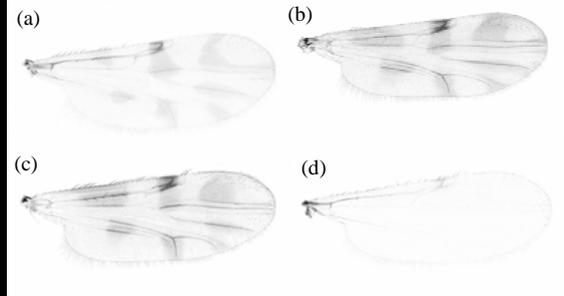
S. Carpenter<sup>1</sup>, C. Szmargd<sup>1</sup>, J. Barber<sup>1</sup>, K. Labuschagne<sup>2</sup>, S. Gubbins<sup>1</sup>, P. S. Mellor<sup>1</sup>

<sup>1</sup> Institute for Animal Health, Pirbright, UK

<sup>2</sup> Onderstepoort Veterinary Institute, RSA

## Introduction:

- ❖ Activity and biting rate of *Culicoides* midges on ruminants is influenced by both weather conditions and behavioural patterns.
- ❖ *Culicoides* vectors are the primary agent of bluetongue virus (BTV) transmission between ruminant hosts.
- ❖ The 2006 BTV-outbreak in the northern Palaearctic illustrated the risk posed by indigenous *Culicoides* populations in transmission of viral pathogens of veterinary importance.
- ❖ We investigated the *Culicoides* population biting sheep at a site in the UK.



In the UK, the *C. obsoletus* group consists of four morphologically similar species, (a) *C. dewulfi*, (b) *C. scoticus*, (c) *C. obsoletus* and (d) *C. chiopterus*. Any, or all, of these species may be involved in transmission of BTV in the current outbreak in northern Europe.



## Materials and Methods:

- ❖ *Culicoides* captured in a drop trap, baited with a sheep.
- ❖ 192 samples were taken over 21 days and related to meteorological conditions (wind speed & direction, air and soil temperature, humidity, solar intensity) recorded at the site.
- ❖ These conditions were related to the biting rate using a Generalised Linear Model framework with zero-inflated geometric distribution.
- ❖ Comparisons were drawn between proportions of species of *Culicoides* caught on the sheep and those in a light trap placed close to the experimental area, running overnight.
- ❖ Further analysis will reveal any differences in activity of *C. obsoletus* group midges over time on an animal host.

## Results:

- ❖ Air temperature, humidity, light intensity and, wind speed and variation in wind direction, best described the successful number of bites per sheep.
- ❖ All four species within the *C. obsoletus* group were present and fed on sheep.
- ❖ Biting rate reached a peak at average temperatures of between 15-25°C (figure 1).
- ❖ The maximum number of successful bites on a sheep for a ten minute exposure period was 56.
- ❖ *Culicoides pulicaris* were found in the light trap but not on sheep.
- ❖ Light trap catches of *Culicoides* and those from hosts are currently being compared.

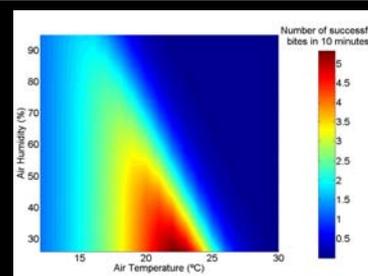


Figure 1: Effect of air temperature and humidity on the biting rate of *Culicoides* on sheep

The number of bites expected in 10 minutes is represented by a colour bar (deep blue to red for increasing values) in function of air temperature and humidity. The values of the three other factors (light intensity, wind speed and variation its direction) are set constant

## Discussion

- ❖ Host location mechanisms in the *C. obsoletus* group are at present poorly understood, and populations sampled with standard surveillance equipment (e.g. light traps) may, or may not, differ from those actively biting on hosts in the field.
- ❖ Species level analysis of the *Culicoides obsoletus* group will enable us to define both activity according to meteorological parameters and partially predict the probability of BTV transmission in combination with other risk factors.
- ❖ We have identified variables involved in determining biting rate on sheep, however, these may differ for cattle, the main focus of BTV persistence in the field.

## Acknowledgments:

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