

Characterising ticks collected from across Dorset, in 2015, for the GENesis investigation of *Borrelia* in ticks

Eleanor Wilberforce, Dr J Rowe, Mr S Lewis, Mrs J Wardlaw (GENesis Lab at The Thomas Hardy School),
Dr N King (University of Exeter).

Overview

The GENesis lab group at The Thomas Hardy School used volunteers to collect more than 350 ticks from across Dorset, in 2015, and carried out PCR and gel electrophoresis to determine the presence of *Borrelia* DNA in ticks. This poster summarizes the results and characteristics of the ticks collected.

Aims

- Identify patterns in the profile of ticks collected from across Dorset.

Method

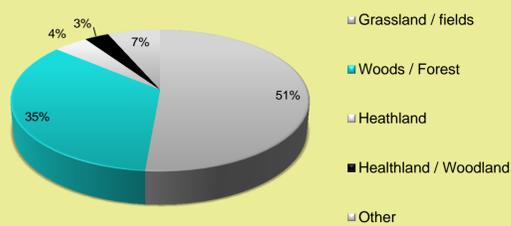
Data regarding when and where the ticks were taken from was recorded after each collection. Additionally, before processing, the ticks were measured and the students determined the gender of each. Using the information, the following categories: habitat, host animal, gender and size were used to profile the ticks.



Fig 1 - Location of tick collection in 2015

Analysis

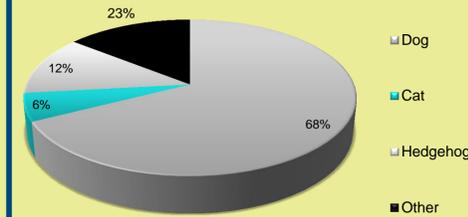
Fig 2. The percentage of ticks taken from each of four different habitats



Ticks live in moist and humid environments, favouring wooded and grassland areas. [1]

Fig 2 shows that the majority of ticks in the investigation were 51% from grassland / farms and 35% from woods / forest. Possibly as they are naturally more abundant here. It might be due to the collectors choosing to go to these areas as many of them were dog walkers.

Fig 4. The percentage of ticks from each host animal



There are over 20 species of ticks in Britain. Normally, they choose wildlife and farm livestock as hosts however a number of the 20 species have been known to attach to people or pets. [2]

Fig 4 indicates the higher proportion of ticks collected from dog hosts. This could be due to many of the collectors being dog walkers. Or it could be a result of the location of the ticks being found (mainly in grassland and woodland) which would be a likely place for dog walking and therefore resulting in many of the ticks being taken from them.

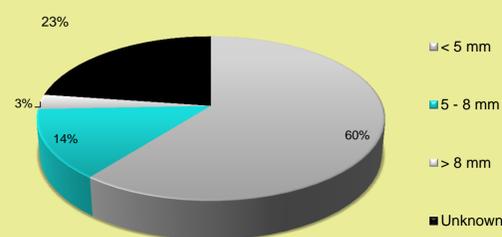
Fig 3. The percentage of ticks that are male and female



Fig 3 indicates the proportion of each is very similar, and in reality the expectation would not be a massive variation in numbers as gender isn't affected by the environment.

* Unknowns due to the uncertainty of size of abdomen which indicates if male or females.

Fig 5. The percentage of each size of tick



A tick goes through four stages in its life cycle: egg, larva, nymph and adult. Larva are no bigger than a full stop and nymphs are only slightly larger. A nymph is most likely to bite a host which explains why most ticks collected from hosts are small. [1]

Additionally, nymphs may not have attached to as many hosts as an adult tick as they haven't lived as long therefore the chance it contains the *Borrelia* may be smaller, possibly a reason for not finding as many ticks positive for *Borrelia*. Also, large ticks are easier to spot.

* There are unknowns due to the uncertainty of size as some were either difficult to see or classify.

Results – Tick 48

Of the tick DNA analysed, one positive for *Borrelia* was found, tick number 48. This tick was from Weymouth, male, taken from a garden, off a dog and was less than 4mm: within the range of the most popular divisions in Fig 2,3,4 and 5. It is therefore very representative of the ticks collected.

Conclusions

- The majority of the ticks were collected from grassland / fields: off a dog host and measured less than 5mm – tick 48 which was positive fell exactly within this range.
- The profile of the collectors may have impacted to a certain degree on the tick characteristics: A larger sample might have revealed a different profile.
- Possibility of methodology limiting amount of *Borrelia* such as the effect of tick type on whether the tick is infected with *Borrelia*.