Summary of Nematodirus Workshop 3rd August 2017, Bristol University.

1. Present:

Fiona Anderson (Elanco); Dave Bartley (Moredun); Matt Colston (Elanco); Jan van Dijk (Liverpool); Mike Glover (Torch vets); Mike Howe (Nadis); Lynsey Melville (Moredun); ; Sian Mitchell (APHA); Eric Morgan (Bristol); Hannah Rose (Bristol); Lesley Stubbings (SCOPS); Eurion Thomas (Techion); Nerys Wright(AHDB).

2. Pdfs of presentations

See attached

3. Outcomes / Observations from Discussions

3.1 Regional and Seasonal variation in disease.

There is significant regional variation in the type, timing and severity of disease and a shift to more autumn disease in England (SW in particular), while spring disease remains the major issue in Scotland. Autumn *Nematodirus battus* infections are usually present as part of a mixed nematode burden.

The differences (especially increased autumn disease in SW) may in part be due to the hatching behaviour of the parasites (see Van Dijk paper); much narrower temperature ranges in Scotland encouraging mass hatch – wide ranges in southern England a more gradual hatch or eggs fail to hatch and carried over to the next hatching window?

Data from APHA now have evidence of the parasite (eggs) seen every month of the year in 2104 and 2015. Three 'types' of disease seen:

- Acute- no eggs present , death pre-patency
- Chronic- diarrhoea with N battus eggs, also nephrosis in some.
- Chronic – diarrhoea concurrent with other GINs / coccidiosis (see below and use of FECS).

Overall the incidence of disease is falling year on year – maybe the messages forecasts are having a positive influence?

Autumn hatching - not all eggs need to be chilled before hatch and this may be a major factor in autumn disease. There is huge variation at farm level in the proportion of 'non chillers'. Moredun also report that some larvae can hatch after just 2 weeks, contrary to assumptions of slow development and need for chilling. The naivety of the animals is also a consideration – if they have not acquired immunity then they will be susceptible AND multiply the parasites.

We should encourage farmers to start FECs earlier in the season. While they cannot rely on this to identify pre-patent infections, it does provide useful information on the potential complication of other GINS, and also levels of contamination on pastures.

3.2Forecast:

Feedback from users of the 2016 service are still coming in, but generally it is very positive, with users changing their actions as a result of the information.

Need to keep reports coming in, as very useful to assess forecast accuracy in different years – but maybe not on the website – or only at the start? Time consuming to load these manually and limited resources should be prioritised to generate forecast itself?

The main change in the model for 2017 will be to bring the 'moderate' (amber) state forward by about 7 days. A colour change to the reds was also discussed to allow easier differentiation (currently the two highest risk categories are similar shades of red).

To reduce the number of pages the visitor has to view Hannah will try to condense it into one page and also put the risk assessment into the pop-up boxes and we will try to put the check list (risk assessment) under the weather station box too.

Autumn alerts are needed tied into the regions most likely to be affected.
We need to add more details in the background to help advisers interpret the data / information.

3.3 AR

AR in Nematodirus has been found at three focal locations in the UK: Aberdeenshire; Penrith; South West – but there is huge variation even in these area with neighbouring farms having AR and the other no evidence. This may reflect the level of use of 1-BZ on individual farms and how fastidiously they have been used in the past. We need more information on this past use to interpret.

Agreed that people need to be aware there is a risk, encouraged to drench test and to always make sure they use the 1-BZ at the right dose rate / right technique etc. to maximise effectiveness. However, the 1-BZ is still the product of choice (sparing to the other groups and suitability) unless there are reasons for suspecting it will not deal with a concurrent GIN population.

Drench test – 7 days after treatment – but we need to take care to make sure people realise the limitations. If there are eggs still present in may indicate AR; if no eggs this is not conclusive in terms of there being no AR. Many treatments especially in response to forecast will be in the pre-patent period, so no eggs on day of treatment – hence FECRT not appropriate.

1-BZ still preferred – but product choice should also be driven by the other strongyles levels.

Importance of *refugia* was discussed but so far there has been no work on this with respect to Nematodirus. The group felt that the advice should be to 'Treat the whole 'at risk' group' on the basis that not to do so could result in losses; there is also likely to be a high number of unexposed parasites present, given long egg survival.

AR is known to be ß–tubulin mediated and the codons now known – work continues and in Canada (John Gileard) they are looking at the pre-adaptive issue.

No real link between AR and hatching changes has been identified nor is AR thought to carry a 'fitness' cost to the parasite.

4. Summary of Additional Advice and Changes

- Product Choice – still 1-BZ but need to check (see below).
- Use of FECS – not to be relied upon but can be useful to indicate when other GINs are present in significant numbers.
- Drench testing – 7 days after treatment agreed.
- Autumn disease – flag up main risk factors.
- Provide more details on the topics discussed above to help advisers guide their farmers on risk / options.

5. Actions

- Incorporate the above advice into SCOPS recommendations
- Make updates to the forecast for 2017 (see above)
- Add in autumn alerts starting in 2016
- SCOPS agenda item – flag up future funding. Bristol IAA project (which generated the 2016 forecast) ends in 2016; Bristol can generate forecast again in 2017 but planning is needed to place this on a long term footing.
- Try to coordinate all the sources of information on diseases – APHA the conduit? More surveillance information such as VIDA 'light' and Techion.
- Need a CPD module on Nematodirus for prescribers and more background detail on the website.
- Interface / link with Nadis: initially, link more general Nematodirus warnings in NADIS to SCOPS forecast when active; and link from SCOPS to NADIS for further information and CPD
- Work to use nematodirus forecast as leverage to draw people in for other messages

6. Future Research

- More local resolution - microclimates / temp monitoring – weather stations / soil / air temps and validating the difference. More science needed. Aim to monitor microclimate on some selected farms in spring 2017 to see how big the differences are.
- Contamination mapping – to help improve grazing management options (avoidance) of disease.
- Continued work on AR in Nematodirus and review the 1-BZ situation which may need to be changed in the future.
- Better understanding of the role and development of acquired immunity to Nematodirus battus.
- Enthusiasm was expressed for joint funding bids to develop these priorities – it is the right time and the right consortium.