Reversion to susceptibility

Reversion, by definition, is the return to susceptibility of a resistant nematode population following a period of cessation in exposure to the anthelmintic class to which resistance is present. Evidence to support the occurrence of reversion in the field are limited and currently there is no evidence that reversion occurs in the UK. In a long-term study in the UK on anthelmintic reversion, 1-BZ-resistance remained present over a 15-year period during which only anthelmintics of different classes were used.

Reduction in resistance to 1-BZ in populations of 1-BZ-resistant nematodes following exposure to levamisole has been reported, although 1-BZ-resistance rapidly returned when 1-BZ treatment was reintroduced. There are several hypotheses on how this might occur, outlined below:

- Reduction in fitness of resistant parasites in comparison to susceptible ones, either in the host and/or on pasture.
- A temporary increase in the efficacy of an anthelmintic if it has not been used for a long period of time. This can occur in the early stages of anthelmintic resistance selection when there are still plenty of genes for susceptibility in a population (either fully susceptible (homozygote) or semi resistant (heterozygote)). Mating between these worms will generate some fully (homozygote) susceptible individuals that will temporarily appear sensitive to the treatment. See figure 5 in section 1.2.1 What is Anthelmintic resistance.
- If treatment with one anthelmintic class increases the susceptibility to another (counter-selection and/or cross resistance, section 1.2.3 Side and Cross Resistance).

Is Rotation of anthelmintics still valid?

In the past sheep farmers were advised to 'rotate' between anthelmintics of different classes on an annual basis. The rationale of this strategy was that the effective life of each anthelmintic class could be prolonged by allowing reversion to susceptibility to occur when that class was not in use. However, this was only likely to be effective when AR was in the very early phase of development, i.e. when gene frequencies for resistance were very low, long before AR was detectable. At this level we might expect natural selection to reduce the prevalence of parasites containing resistance alleles. **Now that AR is widespread this strategy is unlikely to be effective, unless individual farms are monitored for resistance regularly. It should certainly not override any of the SCOPS recommendations in terms of targeting parasites, the use of narrow spectrum products and quarantine treatments.** As the SCOPS principles have been developed on UK farms, it is clear that in the majority of cases, products from two or more of the broad spectrum anthelmintic groups will be required **within any one season**.

For example: a 1-BZ may be used for lambs against *Nematodirus*; this is followed by either 2-LV or a 3-ML for lamb treatment(s) during the season; closantel may be used against *Haemonchus contortus* in ewes and lambs on "at risk" farms: monepantel (4-AD) or derquantel + abamectin (5-SI) are used mid/late season drenches to act as resistance breakers and also as quarantine treatments. This integration of the chemical groups, using the right product at the right time is a key element of SCOPS principles and underlines the need for individual farm advice and plans.