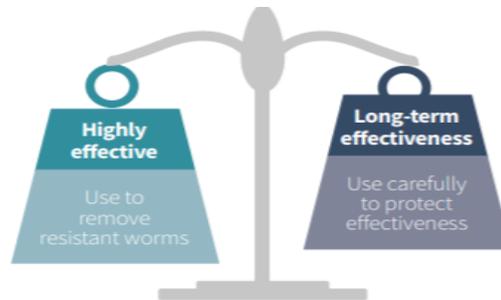


## Using Group 4-AD and Group 5-SI anthelmintics

The use of the two newest groups of anthelmintic has to be a careful balance between harnessing their potential to slow down the development of resistance and protecting them from over use as illustrated below:



There are 3 main factors to take into account when considering the use of these anthelmintics on a sheep farms:

### 1. Their value as a quarantine treatment.

These groups are central to a quarantine strategy aimed at the removal of worms that are resistant to one or more of the Group 1,2 or 3 anthelmintics. It may be argued that with the increasing prevalence of AR in the UK this use has reduced in importance. However, there are many different permutations with respect to worm species when AR is fully investigated on a farm. This means that it is highly likely that the status between two farms will be different and that a Quarantine dose with one or other (or indeed both) of these wormers will still be a worthwhile step for sheep flocks. It is also a means of removing *Haemonchus contortus* from in-coming sheep, which is important where this species of worm is not present on the receiving farm.

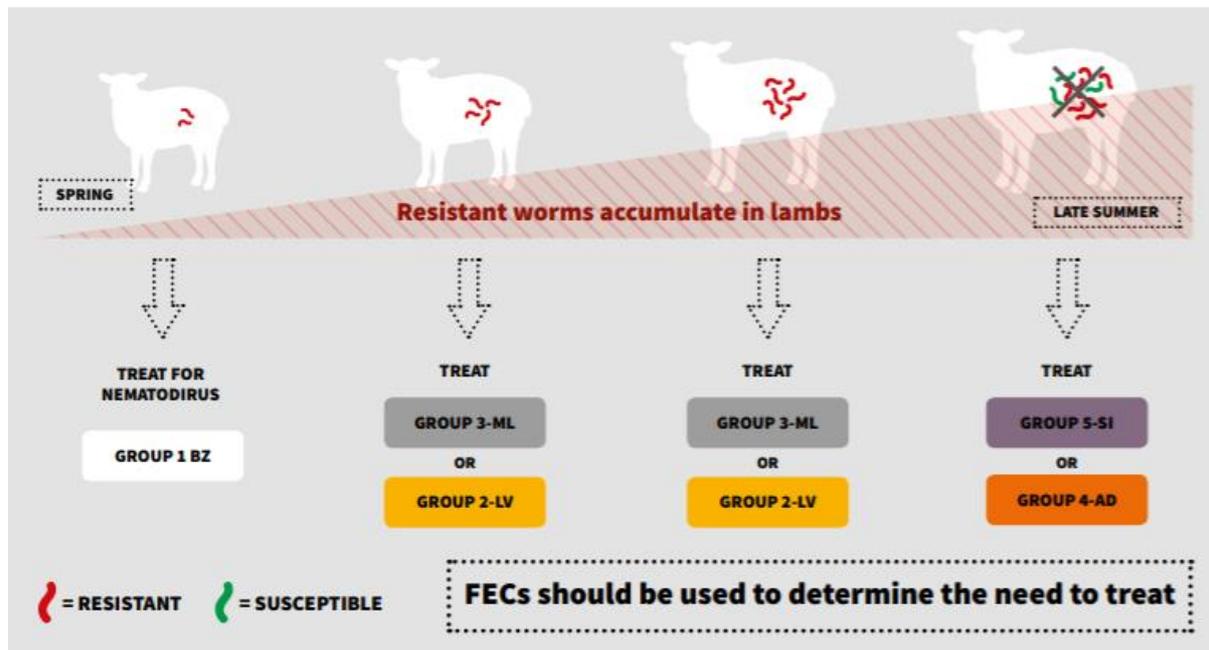
### 2. The need to integrate them into worm control strategies on all sheep farms

SCOPS has always recommended that these two groups are integrated into control strategies on **all** sheep farms to harness their potential to slow the development of AR to the older 3 group. This means they **should not** be left 'in reserve' for when all other groups have failed on a farm. Initially this was met with reluctance by many farmers and their vets/advisers who preferred to 'save them for when the others had failed'. However, there will always be a risk that resistance will develop to these actives because resistance alleles are believed to pre-exist in unselected worm populations making development of AR is an inevitable consequence of their use. The objective is to exert minimum selection pressure on these actives while harnessing their potential when resistance allele frequency is low.

The need for this approach has been demonstrated by the three documented cases of resistance to the 4-AD monepantel in the UK. In all of these the active was used on numerous a occasions on farms with triple resistance (ref). This underlines the importance of not waiting until Group 4 and 5 are the only actives working because such exclusive use will mean AR is likely to a occur rapidly unless anthelmintic use is reduced to very low levels through other management and breeding strategies. In reality, farms with triple resistance are likely to be ones that have relied heavily on anthelmintics in the past and implementing such practices will be complicated and take significant time

The general recommendation is that one or other of Group 4-AD or 5-SI are used in the latter part of the grazing season in lambs that have had one or more treatments with the older 3 Groups. This is sometimes referred to as a 'break' or 'exit' dose.

The rationale for this is illustrated in the diagram below:



As the season progresses there is a build up of AR worms in the animals which means that worm eggs dropped in their dung have a far higher AR allele frequency than the population *in refugia*. The late season treatment removes these worms and limits the contribution they make to the genetics of subsequent generations of worms. There is also a potential benefit to the farmer in terms of lamb performance when they are treated with a highly effective anthelmintic.

The key elements to remember when discussing the timing of this treatment are:

- It should be left until later in the season when most of the lamb treatments have been completed for maximum benefit. This means that weaning may be too early for most flocks.
- It is important to monitor and ensure that the lambs have a FEC count that suggests they have a worm burden and therefore need to be treated.

### The importance of *refugia*

SCOPS normally recommends that some sheep are left untreated (TST) to reduce the selection pressure for resistance. However, with this late season use of the Group 4-AD or 5-SI, the dose is given to the ALL lambs. The result is that a 'dose and move' to low challenge grazing is a potential pitfall and must be managed carefully.

The most practical option is to drench and then leave the lambs on the original dirty grazing for 4-5 days before moving to allow for the dilution of any survivors with the *in refugia* population. This will avoid taking only resistant worms with the lambs while ensuring they only take a low burden of ingested larvae with. Moving and then dosing carries the risk that the lambs deposit resistant worm eggs on the new pasture and is therefore not recommended for this treatment.