



Managing which animals to treat (part flock/mob treatment)

Some animals in the flock or mob can be left untreated, allowing a pool of unexposed parasites to produce eggs that are passed out on to the low-contamination pasture.

It has been suggested that, as a rule of thumb, leaving about 10% of the flock untreated can delay AR, providing resistant allele frequency is relatively low. However, to correctly estimate the proportion of animals to be left untreated so there is a significant effect on AR, a farm specific model would probably be needed. This would take account of parasite population (composition and size), level of AR and the farm conditions (climate and pasture management).

Targeted selective treatment (TST)

Selection of animals to be left untreated is aimed at identifying those animals that exhibit greater resilience, meaning the ability to thrive despite parasitic challenge, or those animals with the lowest worm burdens (higher resistance), that can safely be left untreated. These animals should be able to cope with worms without needing anthelmintic treatment. Selection can also be done randomly, but this has been shown to have a negative effect on animal performances and could potentially impact on animal health and welfare.

Markers/indicators for the selection animals include: - production indices such as growth rate, diarrhoea (dag or breech soiling) score, faecal egg counts (FECs), FAMACHA©

- Production indices include milk yield in dairy goats, body condition score (BCS) or live weight gain. BCS and live weight gain are both based on individual assessment and comparison of previous production records so that treatment is targeted to those animals that are not achieving the predicted performances (increasing/maintaining BCS or reaching predicted weight gain). Changes in BCS and weight are useful but one-off measures of BCS, or weight, are not suitable markers. A specific marker that has received particular attention and has shown good result is the Happy Factor™, an indicator of the need for treatment based on the prediction of liveweight gain from nutrient availability.

Ref: McBean, D., et al. (2016). "Viability of the Happy Factor™ targeted selective treatment approach on several sheep farms in Scotland." *Veterinary Parasitology* 218: 22-30.

- The presence of diarrhoea (dag or breech soiling) has been widely used by farmers as an indication for the need to administer anthelmintic treatment, due to its practicality and perceived association with gastrointestinal parasite. It has been shown that scores 3 or higher (on a scale 1- no visible faecal soiling, to 5- severe, watery diarrhoea) are associated with lower weight gain, suggesting a possible use of this indicator as a marker for impaired growth rate (Busin et al., 2014).
- FECs are used mainly as an indicator of group treatment, by selecting to treat those groups with the highest worm egg count, rather than individual animals. However, they are used within selective breeding programmes.
- The FAMACHA© is based on the evaluation of the mucous membranes of the conjunctivae using a 5 colour chart score (1 – normal to 5 – severe anaemia), with animals showing a score at 3 or higher selected for treatment. It is, however, only applicable for *Haemonchus contortus* infection and not the other trichostrongyles. FAMACHA colour charts are only available to certified individuals. Online certification is available from the University of Rhode Island (<https://web.uri.edu/sheepngoat/famacha/>).

Farmers may have reservations on the TST approach for different reasons. The first is the time and labour costs involved, especially when compared to the availability of comparatively cheap anthelmintic products. There is the perception that leaving some animals untreated could negatively affect production and finally, the perceived lost opportunity to keep a field 'clean'.



However, all of these concerns should be seen in the long-term strategy of maintaining effective anthelmintics through their sustainable use, versus the development of AR to all of the available drugs, eventually compromising worm control all together. It should be emphasized to farmers that there are many well-documented examples of successful application of TSTs ([Charlier, J., et al. \(2014\)](#))

Work is still ongoing in this area, looking at the most reliable, “pen-side” and cost-effective marker, exploiting the concept of precision farming medicine to automatically identify and draft out animals that could be left untreated. Farmers looking to exploit the concepts of *in refugia* using the TST approach should seek advice.