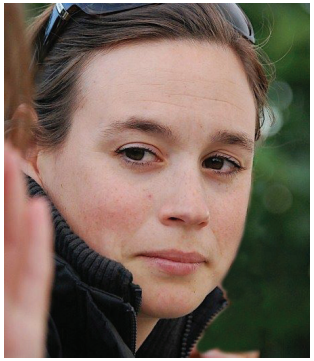

Margit Groenevelt[1,2] DVM Dip ECSRHM, Reinard Everts[1,3] DVM LLM, Harm Ploeger[4] PhD

[1] Schapendokter.nl, Looweg 84, 7741 EE Coevorden, The Netherlands
[2] Department of Farm Animal health, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 7, 3584 CL Utrecht, The Netherlands
[3] Dutch Sheep and Goat Breeders Association (NSFO), P.O.Box 160, 5300 AD Zaltbommel, the Netherlands.
[4] Department of Infectious Diseases and Immunology, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 1, 3584 CL Utrecht, the Netherlands.

Corresponding author: groenevelt@zod.nl

ENDOPARASITE CONTROL IN SHEEP, AN UPDATE ON THE DUTCH RESISTANCE LEVELS AND NEW CONTROL STRATEGIES

Introduction

Worms and sheep, every sheep farm knows the two go together. You can't have one without the other. Historically, most farmers treated strategically at set times in the year, irrespective of weather, field conditions or age of the sheep they were dealing with. Anthelmintic resistance (AR) was not of great concern, the drugs were relatively cheap and seemed to do the job. From 1980's onwards however, problems with the efficacy of benzimidazoles were reported from all over the world. Initially that wasn't felt as a great issue as new and very effective dewormers came onto the market such as the macrocyclic lactones. And, surprisingly, many farmers and vets still don't think there is that much of an issue with these products. Unfortunately, both science and practical evidence are making something very clear; it is not just that AR is slowly becoming a bigger issue. It is a big, a very big problem, also in The Netherlands. The way we control our worm infections needs to change and pretty quick too.

Levels of AR in The Netherlands

Although anecdotally and from smaller studies it was clear that the AR levels in The Netherlands were rising quickly, it wasn't until 2015 that a study was carried out to evaluate the efficacy levels of six of the commonly used dewormers. The study was carried out on 34 farms across the country. The levels of AR were evaluated using a faecal egg count reduction test (FECRT). As seen in Table 1, alarming levels of AR were detected against both benzimidazoles and macrocyclic lactones. Moxidectin (active ingredient of 'Cydectin') shows AR on 48.4% of the farms tested. Many farms in The Netherlands rely on this product because of its longer duration of action. The results indicate that this is not a wise choice on many of those farms. The relatively low efficacy for closantel as shown in Table 1 is largely due to the endoparasites present at the time as it is only effective against *Haemonchus contortus* (1).

New strategies for worm control needed

The chance of new products becoming available soon is small and the chance of increasing levels of AR against all available products is very high. Relying solely on anthelmintics as a means of worm control will not be sufficient anymore. As most of our farms will not be able to function without the use of them, we will need to ensure that the products that are still effective remain that way. This is definitely possible but does require commitment from both farmer and vet. There are two very important issues to keep in mind with regards to sheep and AR. The first is that every single farm is different and will need a tailored approach for his or her needs, a simple 'one advice fits all farms' approach is outdated and will result in problems. The second is

Table 1: Efficacy of six anthelmintic products tested in ewes following lambing in 2015.

Anthelmintic	No. flocks tested	No. flocks showing 90-95% efficacy	Flocks showing <90% efficacy			% Flocks showing <90% FECR (*95% CI* [b])	
			No.	Median % efficacy (*range*)			
oxfendazole	30	3	22	63.9	(0 – 88.0)	73.3	(*55.6 – 85.8*)
levamisol	18	1	0			0	(*0 – 17.6*)
ivermectin	23	0	18	38.1	(*0 – 84.9*)	78.3	(*58.1 – 90.3*)
moxidectin	31	2	15	69.9	(*0 – 89.7*)	48.4	(*32.0 – 65.2*)
monepantel	25	0	2	65.3	(*46.0 – 84.5*)	8.0	(*2.2 – 25.0*)
closantel [a]	16	3	9	67.3	(*0 – 80.1*)	56.3	(*nc* [c])

[a] Closantel is only effective against blood-sucking gastrointestinal nematodes.
[b] 95% CI calculated using the program Epitools
[c] *nc* = not calculated, because in many egg counts following treatment other species than *H. contortus* were represented as well.

that this is a very complicated issue and you can't expect your farmer to understand and remember everything in one go. Be prepared to think with your farmers about the best approach for their farm and explain how certain strategies will help them keep on farming in the future.

In short, there are 8 guidelines that will help your farmer to both control worm infections on his or her farm and to slow down the levels of AR on the farms.

1. Work out a strategy
When starting to change our farmers behaviour (and the prescribing behaviour of vets!), there is often a lot of guidance needed. Information on things such as stocking densities, ages of sheep that are actually out on grass and the main issues that are seen are essential. When this information is clear, a tailor made, farm specific control strategy can be put in place.

2. Use quarantine treatment
If you don't have AR problems on the farm, you certainly don't want to buy them in with newly bought sheep. Setting up a quarantine treatment protocol will reduce the risk of buying in AR.

3. Test for AR
It is vital for a farmer to know which products actually still work on his or her farm or which ones are starting to show increasing levels of AR. The farmer will only notice AR on the basis of clinical signs once the product is less than 50% effective. However, the product started being inefficient well before that!

4. Administer effectively
Teach farmers to guess the weights correctly or, better still, actually weigh animals in the group before dosing. Make sure the equipment used is calibrated and suitable for the product that is given at the time.

5. Use only when necessary
A treatment that was given unnecessarily does nothing harmful to the sheep receiving the treatment. However, every unnecessary treatment does expose the worms of that farm to the wormer used and as such can increase existing levels of AR just that bit further.

6. Select the appropriate product
As with antibiotics, try to use a small spectrum product when available. This does require some knowledge on both the worms that are causing problems and the products that are available.

7. Keep susceptible worms on farms
This may sound strange to many farmers but as we can't beat the worms we will have to learn to live with them. This does involve ensuring a healthy and susceptible population of worms on each farm so our products can keep their efficacy.

8. Reduce dependency on wormers
And last but certainly not least, move to different ways of worm control. There are many possibilities of doing this.

a. Make use of proper field rotation including the appropriate amount of resting time
b. Make use of different crops than grass with anthelmintic properties, such as chicory or sainfoin
c. Start breeding for worm resistance using individual faecal egg counts, individual FAMACHA scores or saliva IgA levels
d. Base treatments on different parameters such as weight gain or color of the conjunctival mucous membranes

All of these guidelines combined will create a farm specific control plan which enables the farmer to control the worm infections on his or her farm in a sustainable way [(2)].

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