

Integrated management of helminths in goats and cattle

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BETTER USE OF ANTHELMINTICS: MAINTAINING REFUGIA

Maintaining refugia

- Subpopulation of susceptible parasites not exposed to anthelmintic treatments: adult worms in untreated animals or susceptible larvae in pasture
- Targeted selective treatment:
 - treating the less resistant or resilient animals, leaving the others untreated
 - Double interest: for the farmers, treatment of the most affected animals, for resistance, refugia
- Need to identify the best period of treatment and to choose the herds/groups/animals that need to be treated.
- Examples of indicators: FAMACHA[®], milk production, faeces softening scoring, body condition scoring.

Targeted selective treatment in cattle and goats

- In dairy cattle:
 - Several trials to identify **at-risk** periods and groups/animals that need to be treated
 - Indicators: depending on the age of animals
 - Mathematical models based on grazing management and historic and meteorological data
 - Weight gain
 - Parasitological results: pepsinogen dosage, Ostertagia OD
- In beef cattle ? Few trials
- In goats: few trials
 - Well-accepted by farmers
 - Indicators cited by farmers (Chartier, 2014)
 - Decrease in milk production
 - Change in body condition
 - Faeces softening

Targeted selective treatment in cattle

- Targeted/selective treatments in heifers:
 - Targeted treatment
 - During the grazing season: identification of the groups and **at-risk** periods by using mathematical models based on grazing management and historic and meteorological data.
 - In winter: identification of the groups **to be treated**: pepsinogen dosage ?
 - Selective treatment: trials on weight gain, parasitological indicators
 - More studies **are** needed
- In adult cows
 - Combination of production-based, parasitological and grazing-history indicators

Targeted selective treatment in dairy goats

- Primordial in the French situation: no authorized anthelmintic with zero-day withdrawal **period** for milk
- Targeted treatment well accepted by the farmers
- Indicators cited by farmers (Chartier, 2014)
 - Decrease in milk production
 - Change in body condition
 - Faeces softening
- Trial on indicators in 3 dairy herds (Paraud et al., EMOP 2008): Body condition scoring useful when parasitism level is high (mean FEC higher than 1500 epg)

BETTER USE OF ANTHELMINTICS: REDUCING THE USE OF AH BY INTEGRATED MANAGEMENT

Integrated management

- Grazing management: pasture rotation, alternate/mixed grazing
- Genetic selection of sheep for resistance: experiments in dairy sheep commercial flocks in France (Jacquiet, 2015)
- Vaccination in sheep

Integrated management

- Use of tanniferous plants
 - Probably the most potent alternative method
 - Reduction of larvae installation, reduction of female egg output,
 - Sources of variation of the effect: host, plant species and form, helminth species
 - No defined scheme of administration. Trials with sainfoin pellets in goats in France
 - Good uptake by goats owners: CT given at pasture, as hay or as powder (Chartier, 2014).
- Other alternatives
 - Phytotherapy: use of essential oils. No efficacy results and residue studies.
 - *Nematophagous fungi*

Mixed grazing goat/cattle

- Goat herds with different levels of mixity with cattle: significant reduction of worm burdens with **increased** mixity (Doumenc, 2003)

Species		Parasite burden		
		No cattle	Low mixity with cattle	High mixity with cattle
Abomasum	<i>H. contortus</i>	515	578	275
	<i>T. circumcincta</i>	17451	1236	411
	<i>O. ostertagi</i>	12	102	2
Small intestine	<i>T. colubriformis</i>	11887	4721	3870
Large intestine	<i>O. venulosum</i>	36	19	46

Use of essential oils

- Results of a survey conducted in 2014 in 33 goat herds in the Poitou-Charentes region
- Use of AH: less than 2 treatments per year and per flock. Most frequently used molecule: eprinomectin.
- 11 goat owners managed helminth infections in their herds without AH, all in organic production
- 8 used essential oils (different forms) to prevent or treat helminth infections.

Concluding points

- Lot of research results on options of integrated management, especially in small ruminants.
- More research needed on combination of methods and combination with anthelmintic use
- To do **plan**:
 - Transfer the results to field (difficulty: adaptation to each situation)
 - Convince farmers of the necessity of changing practices and train them
 - Evaluate the efficacy of integrated management regarding:
 - Helminth control in farms
 - Anthelmintic resistance $\Rightarrow$ need of surveillance