Incidence of anthelmintic resistance in cattle farms in Northern Germany – first results

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Abstract

Anthelmintic resistance (AR) is an increasing problem worldwide especially for small ruminants and it is also rising in cattle. To maintain the efficacy of anthelmintics is an important objective. The current project aims at the investigation of the current efficacy of macrocyclic lactone anthelmintics for strongylid nematodes in first season grazing (FSG) calves in Northern Germany. On 8 participating farms in Northern Germany faecal egg count reduction tests (FECRT) with ivermectin (IVM) were performed. On 3 farms the efficacy of IVM was found to be ≤90% and on only 4 farms it was > 95% at 14 days post treatment (d.p.t.). Only 2 farms showed a reduction ≥ 95% at 21 d.p.t.. This survey reveals a rising problem of AR. The problem of drug resistance places the welfare of animals at risk. In organic farming, without a preventive treatment, livestock may harbour high worm counts. Therefore it is necessary to maintain powerful anthelmintic drugs to guarantee the welfare of animals that need salvage treatment. To investigate the AR problem in cattle more surveys with different anthelmintic drug classes are urgently needed.

Introduction

Animal husbandry on pasture requires a concept to avoid gastro-intestinal parasites. The main gastro-intestinal nematodes (GIN) in Northern Germany for FSG calves are the strongylids *Cooperia oncophora* and *Ostertagia ostertagi.* Depending on the level of infection GIN may cause parasitic gastroenteritis with apparent disease symptoms like diarrhoea, reduced feeding and significant production losses. Although optimized grazing management systems can contribute to lower pasture infectivity, the use of anthelmintics is still essential to control gastro-intestinal parasites in cattle.

AR in cattle has been reported mainly in the southern hemisphere. Reports showed resistance against benzimidazoles (Mejia et. al 2003) and macrocyclic lactones (Anziani et. al 2001, Waghorn et al. 2007). Until now in Europe AR was only described for IVM in England (Coles et. al 2001).

The object of this survey is to evaluate the efficacy of IVM against GIN in cattle in Northern Germany.

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Materials and methods

To evaluate the situation of IVM resistance FECRTs (Coles et al. 2006) were performed on 8 farms in Northern Germany in 2006. The participating farms had at least 24 FSG calves on pasture. The calves were naturally infected by grazing on pasture. During grazing season pooled faecal samples were collected in order to find the point of treatment. Once sufficient nematode egg counts were detected, the animals were treated. This day was called day 0. On 6 farms the mean EPG at day 0 was above 100, the other farms were included upon request of the farmers. The animals were treated by subcutaneous injection of 0.2 µg IVM (Merial) per kg body weight. The body weight was estimated by measurement of girth tape (chest circumference). Individual rectal faecal samples were collected from each animal prior to treatment.

A modified McMaster technique (Wetzel 1931 and Schmidt 1971) was used to obtain the faecal egg count, measured as eggs per gram fresh faeces (EPG). The animals with the highest EPG counts were included in the trial. For the FECRT about 10 - 15 calves per farm were tested after treatment. On day 14 and day 21 after treatment individual rectal faecal re-samples were taken and the EPG was determined. The reduction was calculated for this group.

Results

The results of the FECRT using IVM at day 0 of FSG calves in the year 2006 are shown in table 1.

Tab. 1: FECRT data (the data were calculated by the program „Bootstreat“, from Jacques Cabaret as part of the EU-Project PARASOL, in preparation)

Farm	No. of calves on farm	No. of test-calves	**EPG of test-calves**			**Faecal Egg Count Reduction in % (lcl) in test-calves**	
No.	n	No.	**day 0**			**day 14**	**day 21**
			arith. mean	min	max		
1	34	11	185	100	533	96 (91-100)	95 (88-98)
2	34	15	950	600	2000	90 (83-98)	84 (72- 95)
3	30	10	137	67	180	97 (90- 100)	94 (88-100)
5	39	10	40	0	100	87 (68- 99)	81 (66-94)
6	25	10	193	100	500	98 (96-100)	94 (88-100)
7	33	10	146	100	266	91 (82-98)	93 (83-99)
8	35	10	58	33	100	69 (34-82)	35 (-18-66)
9	24	16	107	67	150	100	96 (89-100)

Further statistic analysis will be published in association with the data analysis of the EU- Project PARASOL.

On day 14 post treatment at three farms the reductions were only 90% or less. On 4 farms the reduction on day 14 was below 95%. This is a sign of reduced efficacy of IVM on these farms.

Discussion

According to the guidelines of the World Association for the Advancement of Veterinary Parasitology (Coles et al. 1992) AR is present, if FECRT results are < 95% and the 95% confidence level is < 90%.The present data suspect the onset of IVM-resistant gastro-intestinal nematodes in Northern Germany. The results confirm with the notice that the importance of AR has increased dramatically in nematodes (Coles et al. 2006). Since no new drug classes can be expected to be commercialized in due course, it is important to maintain the efficacy of the current anthelmintics.

To postpone the development and spread of resistance some options are pointed out (Coles et al. 2001, Koopmann et al. 2007). A possible approach could be Targeted selective treatment (TST) strategies . TST means that only a part of the animal group is treated with anthelmintics, contrary to the current manner to treat the whole group. Through TST the use of anthelmintics can be reduced and selection pressure on susceptible endoparasite isolates decreases.

Conclusions

The results of this survey indicate that resistance against macrocyclic lactone type drugs in cattle may occur more often in the northern hemisphere than currently expected. Further surveys involving larger sets of farms and compounds from different anthelmintic drug classes are urgently needed.

References

Anziani, O.S., V. Suarez, A.A. Guglielmone, O. Warnke, H. Grande, and C.G. Coles, (2004): Resistance to benzimidazole and macrocyclic lactone anthelmintics in cattle nematodes in Argentinia. Vet.Parasitol. 122 (4) 303-306

Coles, ,G.C.C. Bauer, F.H.M. Borgsteede, S. Geerts, T.R. Klei, M.A. Taylor, P.J.Waller (1992): World-Association-For-The-Advancement-Of-Veterinary-Parasitology (Waavp) Methods for the Detection of Anthelmintic Resistance in Nematodes of Veterinary Importance. Vet.Parasitol. 44(1-2): 35-44

Coles, G. C., F. Jackson, W. E. Pomroy, R. K. Prichard, G. von Samson-Himmelstjerna, A. Silvestre, M. A. Taylor, and J. Vercruysse. (2006): The detection of anthelmintic resistance in nematodes of veterinary importance. Vet.Parasitol. 136 (3-4):167-185.

Coles, G.C. (2001): Cattle nematodes resistant to anthelmintics: why so few cases? Vet. Res. 33 (5): 481-489

G. C. Coles, G. C. C. L. Watson, and O. S. Anziani. (2001): Ivermectin-resistant Cooperia in cattle. Vet.Rec. 148 (9):283-284,

Koopmann, R. M. Eykser, H. Hertzberg, A. Mackay, G. von Samson- Himmelstjerna, S. Thamsborg (2007): Workshop summery: Controlling nematode endoparasites in organic animal husbandry. Landbauforschung Völkenrode 4 (57): 429- 433

Mejia, M. E. , B. M. F. Igartua, E. E. Schmidt, and J. Cabaret. (2003): Multispecies and multiple anthelmintic resistance on cattle nematodes in a farm in Argentina: the beginning of high resistance? Vet.Res. 34 (4):461-467.

Schmidt, U. (1971): Vergleichende Untersuchung verschiedener Anreicherungsmethoden zum Nachweis von Wurmeiern. München, Tierärztliche Fakultät Diss.

Waghorn, T.S. D.M. Leathwick, A.P. Rhodes, R. Jackson, W.E. Pomroy, D.M. West, J.R. Moffat (2006): Prevalence of anthelmintic resistance on 62 beef cattle farms in the North Island of New Zealand. N.Z. Vet. J. 54 (6): 278-282

Wetzel, R. (1951): Verbesserte McMaster Kammer zum Auszählen von Wurmeiern. Tierärztl. Umschau 6: 209-210