Prevention of Parasitic Gastroenteritis in Second-Season Beef Cattle with Topical Ivermectin

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Introduction

In the U.K. and Ireland, parasitic gastroenteritis is a serious threat to the health and welfare of young cattle during their first season on grass (1). Disease and consequent production losses are usually prevented by strategic anthelmintic therapy associated with appropriate pasture management. One such system which takes advantage of the prolonged activity of ivermectin formulations involves the treatment of calves at 3, 8 and 13 weeks after turn-out(2). Less is known about the epidemiology of parasites in cattle during their second season on grass, however, it is recognized that immunity to Ostertagia ostertagii, the most important gastrointestinal parasite, is slow to develop (3). There are no previous publications on the use of an early-season anthelmintic suppression system using ivermectin for second-season grazing cattle. A trial was conducted in Northern Ireland to determine the parasitological and production effects of treating second season cattle with topical ivermectin at 3 and 8 weeks after turn-out.

Materials and Methods

Forty beef-type heifers were purchased at the end of their first grazing season through commercial markets and housed until turn-out for their second grazing season on April 24th. Their previous anthelmintic history is unknown, since they were from multiple sources.No anthelmintic treatments were given prior to turn-out. For the first 3 weeks after turn-out the heifers grazed all of the pasture available for the trial. At this time the pasture was divided into 4 paddocks of equal area.

On Day 20 after turn-out the animals were weighed, ranked and paired by body weight. One animal from each pair was then assigned to each of the treatment groups using a computer-generated random table. The treatments were :

1. Unmedicated Control
2. Topical ivermectin (IVOMEC Pour-on , MSD Agvet) administered at a dose rate of 500 mcg/kg bodyweight at 3 and 8 weeks after turn-out.

On Day 21 the animals were drafted into 4 groups of 10 according to weight and treatment. Groups of similar weight were randomly allocated to adjacent paddocks. Cattle in one pair of paddocks weighed about 300 kg at

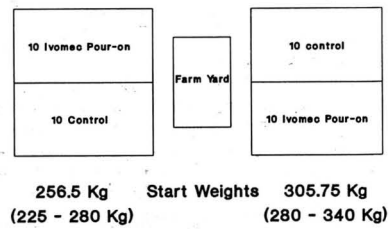

Figure 1. Pasture layout and experimental design.

allocation (heavier animals) whereas cattle in the other pair weighed about 250 kg (lighter animals) (Fig. 1).

At 99 days after turn-out it became necessary because of reduced pasture growth and some of the animals were tending towards excess fat, to reduce stocking density. This was done by removing 2 animals from each paddock, each animal being matched with its originally allocated pair from the adjacent paddock. Apart from the removal of these animals, the cattle were kept on their allocated paddocks for the duration of the trial.

The animals were managed according to normal farm practice. The study was concluded on Day 140 for the pair of paddocks with heavier animals at allocation, and on Day 180 for the pair with lighter animals at allocation. A small amount of grass silage was provided in equal quantity in each paddock when grass became insufficient towards the end of the grazing season.

All animals were weighed at approximately monthly intervals through the grazing season. Faecal samples were taken for egg counts and larval culture. Blood samples were taken and plasma stored for pepsinogen assay. Subsequently only the samples from the lighter animals were assayed. Pasture larval counts were conducted at intervals during the grazing season.

Results

In early August (c. Day 100) the first evidence of clinical disease was noted. Occasional coughing was noted when the animals were at pasture but was more obvious when they were driven for weighing on Day 112. However D.viviparus larvae were not encountered in the dung of trial animals at any of the regular sampling times. Severe diarrhoea developed in two of the animals in the lighter control animals between Days 112 and 140.

Body weights are summarized in Figure 2. Both groups of the heavier animals gained weight at a similar rate throughout the season. The loss of body weight in the lighter control group coincided with typical signs of parasitic gastroenteritis during the latter part of the grazing season. The two control animals with severe diarrhoea required salvage treatment with fenbendazole (Panacur, Hoechst) and responded with a marked clinical improvement. The group treated with topical ivermectin at 3 and 8 weeks after turn-out steadily gained weight throughout the grazing season. This resulted in a difference in weight gain of 65 kg per animal in favour of the ivermectin-treated group by end of the grazing season.

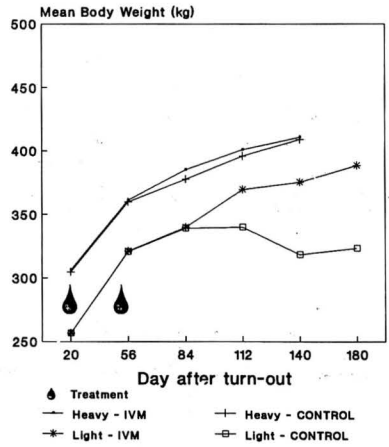

Figure 2. Mean weight gain of each group.

Ivermectin treatment suppressed faecal output of worm eggs in both of the treated groups during the first 3 months of the season (Table 1). However, even in the control animals, mean counts did not exceed 200 e.p.g. at any time.

Table 1. Summary of Faecal egg counts. Geometric Means based on a transformation of ln(Count+50).

Day	20	56	84	112	140	180
---------Heavier Animals----------						
CTR	0	81	52	55	43	N/A
IVM	12	6	9	130	77	N/A
---------Lighter Animals----------						
CTRL	19	161	93	139	16	41
IVM	0	14	4	16	43	125
----------Overall----------						
CTRL	9	117	71	91	28	N/A
IVM	6	10	6	59	59	N/A

Total pasture nematode larval counts are shown in Figure 3. Larval contamination of pasture remained much lower in the paddocks with ivermectin-treated animals throughout the season. The dominant genera were Ostertagia and Cooperia, regardless of treatment.

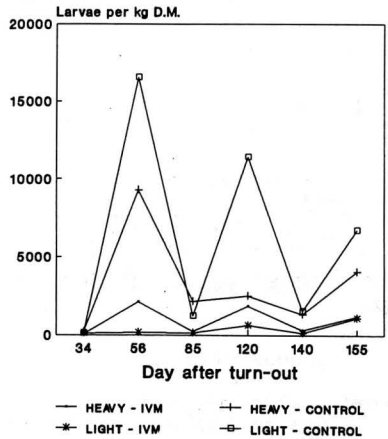

Figure 3. Pasture nematode larva counts.

The results of plasma pepsinogen assay for the lighter animals are recorded in Figure 4. A marked increase occurred in the control animals between Day 84 and Day 112. High plasma pepsinogen values persisted in this group until the end of the trial. In contrast, the values for the ivermectin-treated cattle remained <1 i.u. throughout the grazing season.

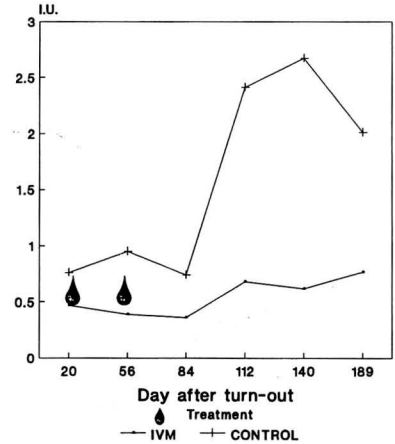

Figure 4. Mean Plasma Pepsinogen (I.U.) for lighter animals.

Discussion

The allocation of animals to treatment groups and paddocks by weight ranking resulted in groups of heavier and lighter animals for each treatment. The heavier animals weighed approximately 300 kg when allocated 3 weeks after turn-out. Both the ivermectin-treated and untreated control groups gained weight at a similar rate throughout the trial. Due to poor pasture growth towards the end of the grazing season, there was some reduction in weight gain in both groups, in spite of supplementary feeding. Pasture larval

counts were lower for the treated group throughout the trial.

The lighter animals weighed approximately 250 kg at 3 weeks after turn-out. Both treatment groups gained weight steadily during the initial 3 months. However, clinical signs of parasitism developed in some of the control group during August and was associated with a marked check in weight gain. This coincided with evidence of parasite infection, i.e. raised plasma pepsinogens and diarrhoea in some of these animals. Two control animals had very severe diarrhoea, were salvage treated with anthelmintic and showed a good response to therapy. These results clearly demonstrate that acute parasitic gastroenteritis can occur in animals in their second grazing season and result in severe growth depression. This lends support to the view that development of immunity to Ostertagia can be slow to develop. The marked effect seen in the lighter animals in this trial may be due to the fact that they would probably have been later-born calves, and thus had a shorter first grazing season, and period of parasite exposure, than the heavier animals.

Conclusions

In this trial the use of topical ivermectin (IVOMEC Pour-on) at 3 and 8 weeks after turn-out was highly effective in preventing clinical parasitic gastroenteritis and associated production losses, and was associated with lower pasture larval counts throughout the season. Clinical parasitic gastroenteritis occurred in one group of control animals, though it was not associated with faecal worm egg counts as high as those seen in first-season calves. The use of topical ivermectin at 3 and 8 weeks after turn-out in second season beef cattle protected from clinical disease and allowed the animals to perform normally even in the face of considerable parasite challenge.

References

1. N.Anderson, J.Armour, W.F.H. Jarrett, F.W.Jennings, J.S.D. Ritchie and G.M.Urquhart. A Field Study of Parasitic Gastritis is Cattle (1965) Veterinary Record 77:1196-1204. 2.Taylor,S.M., Mallon,T.R., and Kenny,J. Comparison of early season suppressive anthelmintic prophylactic methods for parasitic gastroenteritis and bronchitis. (1985) Veterinary Record 117:521-524. 3. Klesius, P.H. Immunity to Ostertagia ostertagii. (1988) Veterinary Parasitology 27:159-167.

Summary

A trial was carried out to assess the effect of using topical ivermectin at 3 and 8 weeks after turn-out in second season beef cattle, as compared to salvage treatment only. Forty continental-cross heifers aged about 1 year were allowed to graze on all of the available pasture for the first 3 weeks after turn-out. The animals were then paired by weight and allocated randomly to the two treatments. The pastures were divided into 4 paddocks and 10 animals were turned out on each. Cattle in one pair of paddocks weighed about 300 kg at allocation (heavier animals) whereas cattle in the other pair weighed about 250 kg (lighter animals). Weights and parasitological data were collected at approximately monthly intervals through the grazing season.

Both treatment groups of heavier animals gained weight similarly. Ivermectin treatment suppressed faecal output of worm eggs during the first 3 months of the season. The lighter control group presented with typical signs of parasitic gastroenteritis during the latter part of the grazing season. Two animals required salvage treatment with anthelmintic. The group treated with topical ivermectin at 3 and 8 weeks after turn-out were unaffected. This resulted in a difference in weight gain of 65 kg per animal in favour of the ivermectin group by end of the grazing season.

The use of topical ivermectin at 3 and 8 weeks after turn-out in second season beef cattle protected from clinical disease and allowed the animals to perform normally even in the face of considerable parasite challenge.

Sumario

Se realizó una prueba para avalar el efecto de ivermectin, vía tópica, a las 3 e 8 semanas después de la salida al pasto del ganado bovino de segunda año em pasto, comparado ao tratamiento curativo. Se utilizaron cuarenta novillas cruzadas de raz europea continenal de aproximadamente un año de idade. Pastaron en todo el área disponible durante 3 semanas después de la salida al pasto. Entonces los animales fueron pesados, clasificados por peso en pares, y distribuidos al azar en los dos grupos de tratamiento. Los pastos fueron divididos en cuatro cercados, cada uno con diez animales. Los animales de dos cercados, pesaron alrededor de 300 kg cuando fueron distribuidos ("pesados"), mientras que en los otros dos la media fue de 250 kg ("ligeros"). Los pesos e datos parasitólogicos fueron recogidos a intervalos de aproximadamente 1 mes durante el periodo de pastoreo.

Los dos grupos de animales "pesados", ganaron peso de un modo semejante. El tratamiento com ivermectin hizo disminuir el recuento de huevos de nematodos en heces durante un periodo de 3 meses posterior de la salida al pasto. Los animales "ligeros" no-tratados presentaron síntomas típicas de gastroenteritis parasitaria al final del periodo de pastoreo. A dos animales del grupo no tratado fue necesario aplicarles tratamiento antihelmíntico. Los animales tratados con ivermectin topico a las 3 y 8 semanas no fueron afectados. El resultado en los animales ligeros fue una ganancia de 65 kg por animal, al final del periodo de pastoreo,a favor de los animales tratados con ivermectin.

El uso de ivermectin por la vía tópica a las 3 y 8 semanas después de la salida al pasto, permitió al ganado bovino de segundo año a desarrollarse normalmente, venciendo el desafío de una presencia parasitaria considerable.

Résumé

Un essai a été realisé afin de mesurer l'effet comparé de l'utilisation de l'ivermectine pour-on administreé 3 et 8 semaines après la mise à l'herbe sur de jeunes bovins de boucherie en seconde saison de pâture par rapport à des bovins de même catégorie, non traités et servant de témoin. Quarante génisses de races continentales croiseés et ageés d'environ un an furent regroupeés sur la même pâture durant les trois semaines qui suivirent la mise à l'herbe. Ce délai passé, les animaux furent assortis par paires selon leur poids et assignés au sein de chaque paire à l'un des deux lots (lot témoin non traité et lot traité à l'ivermectine pour-on) par tirage au sort. La pâture fut divisée en quatre parcelles et dix animaux de chacun des deux lots ventilés sur chaque parcelle. Les bovins se trouvant sur la premiere paire de parcelles pesaient environ 300kg le jour de la mise en lot (animaux plus lourds) alors que ceux alloués à la seconde paire de parcelles ne pesaient que 250 kg ce même jour (animaux plus légers). Les poids et les données relatives aux examens parasitologiques furent collectés durant toute la saison de pâture à raison d'une fois par mois approximativement.

Le lot témoin et le lot traité composés d'animaux plus lourds ont présenté des gains de poids similaires. Le traitement ivermectine pour-on a permis la suppression de la production d'oeufs de parasites intestinaux durant les trois premiers mois de la saison de pâture. Le lot témoin composé des animaux plus légers a presenté des signes typiques de gastroentérite parasitaire durant la seconde moitié de la saison de pâture. Deux animaux durent être traités d'urgence avec un anthelmintique. Le lot traité composé des animaux plus légers ne fut pas affecté. Il s'ensuivit une différence de gain de poids de 65kg par animal en faveur du lot traité à l'ivermectine pour-on en fin de saison de pâture.

L'utilisation de l'ivermectine pour-on à 3 et 8 semaines après la mise à l'herbe chez de jeunes bovins de boucherie en seconde saison de pâture prévient toute gastroentérite parasitaire clinique et autorise des gains de poids normaux malgré une exposition parasitaire importante.