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SIMPLE TREATMENT OF FORAGE TO REDUCE TRANSMISSION OF STRONGYLE PARASITES IN SHEEP

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SIMPLE TREATMENT OF FORAGE TO REDUCE TRANSMISSION OF STRONGYLE PARASITES IN SHEEP

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ABSTRACT

The effects of various methods of forage treatment on transmission of strongyle infection were studied at the Small Ruminant Collaborative Research Support Program's Sei Putih experiment station in Galang District near Medan, North Sumatra. All the animals used were mature local Sumatra Thin-tail sheep kept together at night in a kandang (raised sheep house). With the exception of a grazed group and a negative control group, all sheep received forage which was gathered from a manually contaminated field of grass in the rubber plantation. The five groups of sheep were:

1. fed untreated grass directly from the field
2. fed grass from a field kept clean of sheep manure for a minimum of three months
3. grazed on the pastures normally with the other sheep
4. fed forage which had been washed with water after being gathered from the contaminated field, and
5. fed dried forage collected from the contaminated field

The results indicated that washing the forage, using forage from an ungrazed field, and allowing animals to graze in a rotational grazing system all resulted in slower transmission of strongyles than feeding contaminated forage or feeding dried contaminated forage.

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PERLAKUAN ALAMI HIJAUAN UNTUK MENGURANGI PENYEBARAN PARASIT CACING PADA DOMBA

ABSTRAK

Pengaruh berbagai metode perlakuan hijauan pada penyebaran infeksi cacing telah diteliti di SR-CRSP Balai Penelitian Sei Putih di Galang, dekat Medan, Sumatera Utara. Semua ternak yang digunakan adalah ternak dewasa domba lokal Sumatra Thin-tail, domba dikandangkan pada malam hari. Dengan kekecualian satu group digembalakan dan satu group lagi merupakan kontrol. Semua domba menerima hijauan yang dikumpulkan dari padang rumput dibawah kebun karet.

Domba dibagi dalam lima group yaitu :

1. Tanpa perlakuan pemberian rumput langsung dari lapangan
2. Pemberian rumput dari lapangan yang dibersihkan dari kotoran domba selama tiga bulan
3. Digembalakan pada padang penggembalaan biasa bersama domba lain
4. Pemberian hijauan yang sudah dibersihkan dengan air setelah di-ambil dari lapangan yang terkontaminasi
5. Pemberian rumput yang dikeringkan yang diambil dari lapangan yang terkontaminasi

Hasil menunjukkan bahwa pencucian rumput, penggunaan rumput dari lapangan yang tidak digunakan untuk penggembalaan, dan ternak yang diizinkan untuk digembalakan dengan sistim rotasi semuanya mem- berikan hasil penyebaran cacing yang lebih lambat dibandingkan dengan pemberian hijauan yang terkontaminasi atau pemberian hijauan terkontaminasi yang dikeringkan.

INTRODUCTION

Project History

In 1984 the Small Ruminant Collaborative Research Support Program (SR-CRSP) expanded its multidisciplinary research program in Bogor Indonesia to include indigenous sheep grazing in rubber plantations at Sei Putih, North Sumatra. One of the major factors limiting the success of this project, as with many other animal production projects in the tropics, was found to be parasitic infection with nematodes (Sani et al, 1985; Carmichael 1991; Arasu 1991; Lawrence, 1992). Initial attempts to control the parasite problem mimicked the anthelmintic rotation methods used in Malaysia. Not only are these methods expensive, and labor intensive, they also failed to adequately control the problem (Carmichael, 1991). The current parasite control program at Sei Putih involves treatment of the entire flock with benzimidazole anthelmintic (Rintal) once every three months, followed by rotation of these treated animals to a pasture which has not been used for grazing for the previous three months. At night these sheep are kept in a raised sheep barn with slatted floors to prevent the build up of manure inside the pens and make disposal of this manure easier (Wilson, 1992).

Parasite Resistance

One alternative method for controlling parasite infection is simply to use parasite resistant sheep. This was part of the reason local sheep have been used in the project which despite their small size have managed to survive, among other things, the local parasites (Carmichael, 1991). Further research since that time has found that although these sheep do survive in this environment, their productivity is significantly increased with the use of anthelmintics (showing that they are not resistant to local nematode parasites) and their productivity appears to be no greater than that of certain imported sheep (Handayani and Gatenby, 1988; Iniguez et al, 1991). This would seem to indicate that the use of a breeding program to select for parasite resistance in these sheep would be expensive and time consuming.

Pasture Management

In the light of these findings, it is clearly necessary to implement some type of pasture management technique to control the rate of parasite infection. It has been established that the natural period of survival of gastrointestinal nematode larvae deposited by sheep grazing pastures in rubber plantations is less than four months (Carmichael et al, 1992). Farmers in this area are not always able to keep a pasture clear of sheep for this period of time, and it is therefore necessary to develop an additional form of pasture management. It has been suggested (Carmichael et al, 1992; Lawrence, 1992) that heavy rainfall might be responsible for "washing" infective larvae off infected grass. This is in contradiction to what was found in West Malaysia where rainfall was found to have no effect on parasitism in goats (Sani et al, 1985). It is also possible that the high daily temperatures might be used to dry the grass to a point where the infective larvae can no longer survive on it. This idea would match the epidemiological pattern seen in temperate areas in which dry and hot weather often reduces pasture infection. The aim of this experiment was to evaluate the usefulness of these two methods of treating forage as it relates to reducing helminth infection in sheep.

MATERIALS AND METHODS

The experiment was carried out at the SR-CRSP Sei Putih experiment station in Galang District near Medan in North Sumatra, Indonesia. On June 8, 1992, thirty mature Sumatra Thin-tail sheep, all of which had last lambed between March 9 and April 10, 1992, were treated with the benzimidazole anthelmintic, febantel ("Rintal"-Bayer). These sheep were then randomly divided into five groups of six, each of which was fed forage which had been treated in a different manner. The groups were differentiated by colours painted on specific parts of their bodies.

Group Descriptions

The forage treatments for each of the five groups are summarized in table 1, and are as follows:

1) The grazed (GRAZED) group was grazed normally with those sheep which were not associated with this experiment.

2) The negative control group ((-)CONTROL) received forage which was cut separately from a field which had not been grazed for at least three months.

3) The positive control group ((+)CONTROL) was fed forage gathered from a field which had been manually contaminated with sheep feces collected from underneath the kandang (raised sheep house) at Suka Dame. The manure had been scattered throughout this field on two consecutive days and then left for one week during which time mild but regular rainfall ocurred.

4) The washed forage group (WASHED) was fed forage from the manually contaminated field that was first laid over a raised 2m x 2m screen and washed thoroughly with water either from buckets or a hose.

5) The dried forage group (DRIED) was fed forage from the manually contaminated field which had been left on an aluminum roof of a water tank for twenty four hours prior to feeding.

TABLE 1: Summary of Forage Treatments

GROUP	FEED
GRAZED	Grazed normally with other sheep
(-) CONTROL	Parasite free ungrazed forage
(+) CONTROL	Manually contaminated forage
WASHED	Manually contaminated forage washed with water prior to feeding
Dried	Manually contaminated forage left to dry in the sun 24 hours prior to feeding

Feeding and Management Schedule

With the exception of the GRAZED group, all of the experimental sheep were kept inside at all times. During the day, the non-grazed groups were separated into adjacent well swept pens and fed out of troughs. Each group received approximately 50 kg of grass per

day, and some grass was always left uneaten. At night these animals were moved together into one pen after this pen had first been swept clean of feces and grass. The grazed group spent the nights in an adjacent pen along with other sheep. The management procedures for each group are summarized in Table 2.

TABLE 2: Summary of Management for each Group

GROUP	MANAGEMENT
GRAZED	Outdoors 0800 - 1600. Separate pen at night
(-) CONTROL	Group pen 0800 - 1600. Communal pen at night
(+) CONTROL	Group pen 0800 - 1600. Communal pen at night
WASHED	Group pen 0800 - 1600. Communal pen at night
Dried	Group pen 0800 - 1600. Communal pen at night

The feeding of the sheep according to this plan commenced on June 10. Fecal samples were taken from all of the sheep on June 17 (week 1), June 24 (week 2), July 1 (week 3), and July 8 (week 4). Each of these samples was counted for strongyle nematode eggs.

RESULTS

Weeks One and Two

The first set of fecal samples taken on June 17 (Table 3) showed all animals with egg counts of zero eggs per gram (epg). This was expected after the anthelmintic dosing on June 8. In the second week of sampling, one animal in the (-)CONTROL group was found to have an egg count of 1260 epg. Being only two weeks after anthelmintic treatment, this egg production occurred earlier than the prepatent periods of the strongyle nematodes found in this area. Consequently, strongyle egg count data from this animal were excluded from the analyses. The possible reasons for these anomalous results are discussed later.

During the second week of sampling, one of the (-)CONTROL animals gave birth to a lamb. The discrepancy between this lambing and the recorded lambing only three months earlier was found to be the result of a misread animal number. This animal continued to eat the same uncontaminated grass it was being fed experimentally, but was moved to a separate pen. The significance of this animal will be discussed later.

Week Three

In the third week of sampling, most groups began to show positive egg counts (Table 3). The (-)CONTROL group, with the exception of the previously mentioned infected

animal, continued to produce zero egg counts. The previously mentioned infected animal's egg count did not change significantly between the second and third week of sampling. The mean strongyle counts of the DRIED group (240 epg) and the (+)CONTROL group (210 epg) were not significantly different from each other ($P > 0.05$) but were significantly greater ($P < 0.05$) than those of the other three groups (Table 3). The standard deviations of the means were all high (coefficients of variation greater than 63%).

Week Four

The fourth week of sampling produced results which did not logically follow the trends established in the third week of testing. With the exception of the GRAZED group, all groups showed large increases in both mean egg counts, as well as in standard deviations. This included the (-)CONTROL group which was fed forage known to be clean of parasites. The implication is that cross-contamination between groups occurred at night when the animals were housed together.

An important observation is that the (-)CONTROL animal which had given birth in the second week, and was subsequently moved to a different area, but continued to receive the same uncontaminated grass, maintained its zero egg counts throughout the fourth week of testing.

Table 3: Mean strongyle counts (eggs per gram) and standard deviations (std) for the first four weeks after anthelmintic treatment. Means in Week 3 with identical superscripts are not significantly different ($p>0.05$)

	WEEK 1	WEEK 2	WEEK 3	WEEK 4
GRAZED				
mean	0	0	40 [b]	110
std	0	0	66	100
(-)CONTROL				
mean	0	0	0 [b]	570
std	0	0	0	1142
(+)CONTROL				
mean	0	0	210 [a]	2830
std	0	0	226	2485
WASHED				
mean	0	0	40 [b]	3810
std	0	0	66	2830
DRIED				
mean	0	0	240 [a]	2680
std	0	0	151	2802

DISCUSSION

Effects of Forage Treatment

Grazed Group

The data collected in the third week appear to indicate that grazing animals, using the procedure implemented at Sei Putih, succeeds in delaying the rise in egg counts when compared with feeding contaminated grass. The fact that this experiment overlapped with the end of a pasture rotation period when pasture contamination was at its highest is also significant. This would appear to indicate that the method of grazing and pasture rotation is well planned and might decrease worm infection for a longer period of time than either a non-rotational grazing method or a cut-and-carry method in which not all of the neighboring animals are also penned.

Washed and Dried Groups

Strongyle egg count data from the third week indicate that the washing method for treating cut-and-carry forage is equal in success to the grazing method for controlling strongyle infection. This could be a useful tool for the farmer who does not have a large flock, and does not have the time to allow his animals to graze daily, but must cut grass and carry it back to his kandang. Cut-and-carry is a method which is traditionally used on Java, and is often used in Sumatra by some small holders (Handayani and Gatenby, 1988). In areas where all of the local farmers keep their animals in kandangs and do not let them graze, surrounding forage areas will remain uncontaminated. However, if any of the local farmers allow their sheep to graze, as occurs in Sumatra, the forage which is used for cut-and-carry will be contaminated. This method of washing the grass with water before feeding may be useful to farmers who are forced by time and labor constraints to use contaminated forage to feed their animals. Although the (-)CONTROL group, (grass gathered from an ungrazed pasture) tends toward even lower egg counts, it is not always possible for a farmer to gather grass from an ungrazed pasture.

It does not appear that allowing the grass to dry in the sun is a helpful method of removing parasites from forage.

Anthelmintic Problems

Although the majority of the animals did not show positive egg counts during the first two weeks after anthelmintic treatment, the one that did merits discussion. This animal, in the (-)CONTROL group began to show positive egg counts in the second week after medication. Even if this animal ingested infective larvae immediately and continuously after receiving medication, the larvae would have required a minimum of three weeks to mature to a stage at which they would have been able to produce eggs which would be detectable in the feces of the animal. This is substantiated by the fact that the egg counts for this animal did not increase between the second and third weeks when the rest of the animals in its group

also showed no signs of infection. This would indicate that either this animal did not receive a full dose of anthelmintic sufficient to kill all parasitic life stages, or it harbored parasites which are somewhat, if not completely resistant to the anthelmintics used. The decline to zero of the egg counts from this animal in the first week indicates that any strongyles it may have harbored were at least damaged to the point that they could not reproduce. Whether the ineffectiveness of the medication was due to resistance or poor dosing procedure is significant, and warrants further investigation. If it was due to resistance to medication, it may be necessary to begin rotating medications as well as pastures. This, however, is unlikely. If resistant parasites were present in the flock, it is likely that more than one animal would have shown prematurely high egg counts.

If the prematurely high egg counts are due to poor dosing procedures, then it is necessary to correct these in the future. Not only would repeated occurrences of inadequate dosing result in poor performance of the animal involved, but it would also result in rapid recontamination of the pastures grazed by these animals. This would in turn recontaminate the flock as a whole, and destroy the positive effects of pasture rotation.

Cross Contamination Between Groups

This study highlights the problems of cross-contamination in studies of internal parasites with sheep, as indicated by the inconsistent results from the last two weeks of sampling. It appears that cross contamination occurred between those groups which were housed together at night. In future studies, more care should be taken to prevent such cross-contamination. In particular the animals should be housed both day and night in separate, non-adjacent pens. Further precautions might include thorough cleaning of all tools and materials which come into contact with either manure or feed, and the use of washable metal tools instead of wooden ones.

CONCLUSIONS

The results of this study indicate that washing contaminated forage, using uncontaminated forage from an ungrazed field, and grazing animals in a rotational grazing system all result in slower transmission of strongyle nematode parasites than feeding contaminated forage or dried contaminated forage.

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