# AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)

## A STUDY OF INTERNAL PARASITE EGG COUNTS IN GOATS FROM THREE VILLAGES IN THE TUTUME AGRICULTURAL DISTRICT, 1988-90

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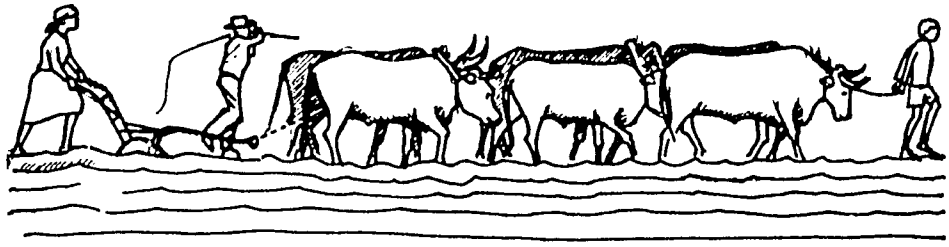
T. R. THEDFORD, K. M. KELEMOGILE, F. D. WORMAN AND J. A. BAATHODI

ATIP WORKING PAPER

ATIP WP-31



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## PREFACE

ATIP working papers are prepared and circulated to make ATIP research findings easily available to Government of Botswana personnel and researchers interested in Botswana Farming Systems. This working paper has been reviewed internally by ATIP staff and by the Chief Animal Production Research Officer, DAR, Dr. L. Setshwaelo.

This paper presents the data collected over a 15 month period from twenty goat herds, in three villages in the Tutume Agricultural District. There were 973 faecal samples collected and analyzed over this period at three month intervals.

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# A STUDY OF INTERNAL PARASITE EGG COUNTS IN GOATS FROM THREE VILLAGES IN THE TUTUME AGRICULTURAL DISTRICT, 1988-90

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## TABLES

## ABSTRACT

Examination of 973 faecal samples from the goats in 20 herds, over a 15 month period, indicated moderate egg per gram (EPG) counts of gastro-intestinal parasites with a peak number occurring from February to April. Coccidia counts were also run on 866 of these samples. Counts were high but not correlated with clinical disease.

## INTRODUCTION

Internal parasite infection and methods of control are always a favourite topic of conversation among animal scientists and veterinarians when discussing smallstock production in developing countries. The Department of Agricultural Field Services has developed a few smallstock associations in some villages with the major emphasis being on deworming procedures. These are not done on any strategic predetermined basis, but more or less sporadically. It was decided that by examining the faeces of a representative number of goats in each herd of the cooperating farmers on a quarter yearly basis, some estimations could be made as to levels of parasitism and when it was most likely that damage would occur. The Tutume Agricultural District has an annual rainfall of about 450 mm which falls during the months of November through April. It is not evenly distributed during this time, and it is common to have periods of four to eight weeks without rainfall. Also the sandy soil tends to dry out very rapidly. This coupled with the fact that goats prefer browse, if it is available -- and there is an abundance of browse available in the district -- did not suggest a high probability of internal parasitism being a problem. The study was designed to examine this situation.

## OBJECTIVES

The objective of this trial was to evaluate egg counts per gram of faeces to determine, if possible, the relative level of infection of internal parasites, when peak infestations occur, and if a strategic control programme could be devised that would be both successful and economical.

## JUSTIFICATION

Internal parasites are routinely assumed to be a problem in goats in developing countries. The climate in the Tutume Agricultural District is characterized by a low average rainfall which is erratically distributed from November to April. Hot weather occurs in the same period, and the soil is sandy. This climate does not indicate an environment suitable for nematode propagation. Other factors which would reduce parasitism are the fact that goats tend to browse, when available, and that overstocking of village grazing areas decreases the possibility of goats grazing and therefore picking up viable larvae.

It was decided to collect representative samples of faeces from the herds, run McMasters tests, and to see if substantial numbers of parasites did exist, when they occurred, and in what groups of goats. If deworming is necessary, it is important to know when would be the most strategic time to do so as proper timing would be essential to the establishment of an efficient and economic control programme.

## APPROACH AND DESIGN

The following were the collection dates and their assigned collection number used in this report.

| | | |
|---|---|---|
| October - November 1988 | = | Collection 1 |
| February 1989 | = | Collection 2 |
| April 1989 | = | Collection 3 |
| August 1989 | = | Collection 4 |
| October - November 1989 | = | Collection 5 |
| January 1990 | = | Collection 6 |

In collection 1, samples were collected from each of five goats from each of the 20 farmers, previously selected as cooperators. There were six farmers each in the villages of Mathangwane and Matobo, and eight farmers in Marapong. During subsequent collections, up to 10 samples were collected from each farm, up to five from goats older than one year and five from kids.

Each of these samples were examined by using a Haver-Lockhart 4100 McMasters Faecal Counting Chamber Kit and following the standard mixing procedure for the McMasters technique as closely as possible. Floatation was accomplished by using a saturated salt solution. All mixing was done by two individuals, and all counts by the senior author. After collection, the faecal samples were refrigerated until the mixing and count could be done. All counts were completed within 72 hours of collection. All data were treated as if deworming had not been done.[1]

Coccidia counts were performed on 866 of the faecal samples. These results are presented below.

## RESULTS

### Nematodes

The mean eggs per gram (EPG) count was calculated for each of the six collection periods (see Table 1). There is an obvious and expected difference in EPG levels between periods 1, 4, and 5 and 2, 3, and 6. The periods 2, 3, and 6 correspond to the rainy season and increased risk of parasitism is expected at this time.

Distribution of mean egg counts among age groups over the entire period was calculated and is presented in Table 2. There was very little difference in mean egg counts between age groups. This is somewhat different from what was expected; usually kids have higher counts. A possible explanation is that the area where the kids tended to feed was devoid of grass almost all year long. They fed on weeds and bush almost exclusively,

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[1]. One village (Marapong) had a Department of Agricultural Field Services (DAFS) Smallstock Association which, among other things, periodically provided deworming medication for members at a preset, subsidized price -- a benzimidazole preparation at 10 thebe per head. Some of the goats were dewormed in late September, within 28 days of collection period number 5. The 60 egg counts from these animals were compared to the 913 other counts using a t-test, and no significant difference was found between the two groups. Therefore all data were treated as if no deworming had been done.

reducing the potential for ingesting infective third stage larvae.

These counts by age group were compared by collection period. They were all similar except for two year olds in collection period 5, which were slightly elevated. This was not an expected result and cannot be explained.

TABLE 1: MEAN EPG COUNTS BETWEEN PERIODS

| COLLECTION PERIOD | MEAN EPG | S.D. | NUMBER OF CASES |
|---|---|---|---|
| #1 | 514 | 718 | 93 |
| #2 | 818 | 1475 | 166 |
| #3 | 810 | 799 | 186 |
| #4 | 225 | 257 | 173 |
| #5 | 402 | 548 | 183 |
| #6 | 887 | 1139 | 172 |
| TOTAL POPULATION | 616 | 917 | 973 |

TABLE 2: MEAN EPG COUNT BY AGES OF GOATS AVERAGED OVER TIME

| AGE | MEAN EPG | S.D. | NUMBER OF CASES |
|---|---|---|---|
| KIDS | 630 | 977 | 410 |
| 1 YEAR | 560 | 715 | 73 |
| 2 YEARS | 644 | 1277 | 71 |
| 3 YEARS | 633 | 798 | 141 |
| 4 YEARS PLUS | 606 | 956 | 265 |
| UNKNOWN | 346 | 405 | 13 |
| FOR TOTAL POPULATION | 616 | 950 | 973 |

The EPG count used as a pathological level in North America is 2000 EPG. In Botswana, a count of 700 is considered a moderate infestation and worming is advised. The Diagnostic Laboratory considers 1500 EPG as a significant count, probably indicating a severe parasitic infestation[2].

To try to substantiate some level as an indication of clinical parasitism, numbers of animals exhibiting particular levels of egg counts were looked at as a percentage of the total population. The following was found: 76 percent of egg counts for the complete period of time fell below 700 EPG, and 84 percent fell below 1000 EPG. Eighty-seven percent of the counts were less than 1200 and 89 percent less than 1500. Only 6.5 percent of the counts were higher than 2000 EPG. Thus 93.5 percent were below this level. Very few cases of clinical parasitism have been seen in these herds.

The contention that internal parasitism is not a major problem, at least in goats in Tutume Agricultural District, was supported by a recent study of diseases in goats (Thedford, Worman, and Kelemogile, 1990b). This study indicated only two percent of all diagnoses made, when considering the number of all diseased animals found during a nineteen month

[2]. Personal communication with Dr. E.P.S. Rogers, Senior Veterinary Officer, Diagnostic Laboratory, MOA, Gaborone.

period, involved internal parasitism. These data were taken from a period during near normal rainfall and distribution, if such can be claimed in Botswana.

Based on these figures a count of 700 EPG is probably too low to recommend a routine deworming of the herd. It is suggested that 1200 EPG or 1500 EPG be considered as indicating a moderate infestation, and 2000 EPG a serious threat.

When comparing mean egg counts among villages, there was no difference. Upon examining EPG count differences among farmers within each village, there were differences in two of the three villages. There was no apparent explanation for these differences.

## Coccidia

Coccidia were counted simultaneously with nematode eggs during 1989-90 (collection periods 2 through 6). It is difficult to determine exactly what these counts mean as no clinical signs or death loss from this malady were observed during this period of time. The mean coccidia per gram (actual count x 100 = EPG) by age is seen in Table 3.

The increased count for kids is a predictable result. This is a common occurrence, and is expected to drop by the time the kids reach one year old. The decrease indicates an immunological response by the animal to the presence of the coccidia in its body. As long as no clinical evidence of disease or no deaths occur, a count like this should be monitored, but not treated.

TABLE 3: MEAN COCCIDIA PER GRAM OF FAECES BY AGE

| AGE | COCCIDIA PER GRAM MEAN | S.D. | NUMBER OF CASES |
|---|---|---|---|
| KIDS | 7398 | 19684 | 403 |
| 1 YEAR | 1369 | 2360 | 68 |
| 2 YEARS | 980 | 1698 | 54 |
| 3 YEARS | 1169 | 1707 | 112 |
| OTHERS | 1784 | 3266 | 229 |
| ALL AGES | 4234 | 13880 | 866 |

Mean count for the various collection periods is shown in Table 4. The difference between collection periods 2 and 3, when compared to 4, 5 and 6, could be explained by the rainfall pattern, and the number of kids available for infection at that time. Rainfall is normally highest from December to April. and kid numbers tend to peak early in this period of time. As the kids aged and developed immunity, the expected drop would occur.

The continued low count during collection period 6 could also be explained by weather patterns. Rains up to this time had been light and sporadic, neither of which are conducive to coccidia propagation.

There was no difference between counts in flocks exhibiting diarrhea and those reporting no diarrhea.

TABLE 4: MEAN COCCIDIA PER GRAM COUNT BY COLLECTION PERIOD

| COLLECTION PERIOD | COCCIDIA PER GRAM MEAN | S.D. | NUMBER OF CASES |
|---|---|---|---|
| 2 | 9608 | 23495 | 164 |
| 3 | 4369 | 15444 | 186 |
| 4 | 2846 | 5826 | 173 |
| 5 | 2448 | 9842 | 183 |
| 6 | 2113 | 4108 | 160 |
| ALL COLLECTIONS | 4234 | 13643 | 866 |

## DISCUSSION

### Nematodes

Upon looking at the complete data set there was no time, within the 15 month period, when the mean count approached what was considered an indication of severe or clinical helminthiasis. There were differences between periods of collection with periods 2 - February 1989; 3 - April 1989; and 6 - January 1990 showing the highest mean count. These periods corresponded to the periods of, or just after, the highest rainfall of the year. EPG counts between age groups over the complete 15 months showed some variation, but none were judged important. When EPG for each age group, at each collection period were considered, only two year olds in period 5, October - November 1989, showed an increased EPG. This difference cannot be readily explained.

When considering what level to designate as a pathological EPG, it is suggested that a count of 1200 to 1500 EPG be used as an indication of possible clinical parasitism. A count of 2000 EPG should be used as an indication of severe clinical parasitism.

If treatment for internal parasitism is to be carried out on a routine basis, it is suggested that a strategic period be selected for such treatment, such as the April - May period when EPG counts appear at their highest. If a clean out treatment is used, i.e., one to remove latent worms in the gastro-intestinal tract, then it should be done in September or October, or after the first rain occurs. A broad spectrum anthelmintic such as "Ivermectin" should be used at this time as it will control larval and adult gastro-intestinal nematodes, as well as lice and other external parasites (Thedford, Worman and Kelemogile, 1990a). Use of a broad spectrum anthelmintic in May also would reduce lice populations as well as lower internal parasite levels. Dewormings at other times during the year, except in specific cases, appears to be inefficient and probably not cost effective.

### Coccidia

The coccidia counts were performed as an afterthought because there were so many appearing in the counting chamber. It is not known how to interpret these results as no clinical cases were seen during this period of time, and the counts do not seem to be correlated with clinical disease. Counts appear highest in younger animals which is fairly predictable. They also appear highest during the wet season: which is to be expected.

It is suggested that coccidia counts be monitored and correlated with actual clinical evidence of disease, and that animals only be treated when absolutely necessary. Treatment for Coccidiosis of small ruminants is best handled by mass medication with "Ionophores", or

other Coccidiastats, added to the feed (Gregory and Norton, 1986). This is not a practical solution in Botswana at this time because of unavailability of the drugs and inability to feed these products over a 30 day period. Immunity develops quickly after infection. If clinical disease does not occur and deaths are not common, it is best to allow infection, recovery, and resultant immunity to occur.

Improved management practices, such as better kid nutrition, not keeping kids in kraals for extended periods of time, and providing warm-dry shelters in colder weather, would greatly reduce the chance of clinical coccidiosis developing in young kid goats.

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