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Table 70. Pasture and animal performance during the 1979 dry season under two stocking rates in a Brachiaria ruziziensis and legume[1] pasture in the Cerrados, CPAC, Brazil.

Stocking rate (AU/ha)	Available dry matter (t/ha)				Liveweight gains (g/head/day)
	Beginning of dry season		End of dry season		
	Grass	Legume	Grass	Legume	
1.25	3.76	0.94	2.24	0.0	7.0 (28.0)[2]
0.65	3.83	0.56	2.63	1.01	44.0 (88.0)

1 Glycine wightii, Stylosanthes guianensis cv. Endeavour, and Macroptilium sp.
2 Figures in parenthesis are liveweight gains in g/ha/day).

expected, the reduction of dry matter from the sward was greater at the higher stocking rate (17.6 versus 12.5 kg/ha/day) assuming no correction for regrowth; however, the dry matter reduction per AU was the contrary (14.1 versus 19.2 kg/animal/day) suggesting that the animals in the lower stocking rate had a higher intake.

While animal liveweight gains were small both groups lost no weight during the dry season. The 28-day weight changes are shown in Figure 68. Weight losses during July and August are more closely associated with the disappearance of the legume component from the sward than the reduction in total available dry matter. By the end of the dry season the legume had practically disappeared from the sward. The positive weight change which occurred in late September was due to an unseasonal rain in late August. The experiment will be continued through the rainy season where both animal and pasture performance will be monitored.

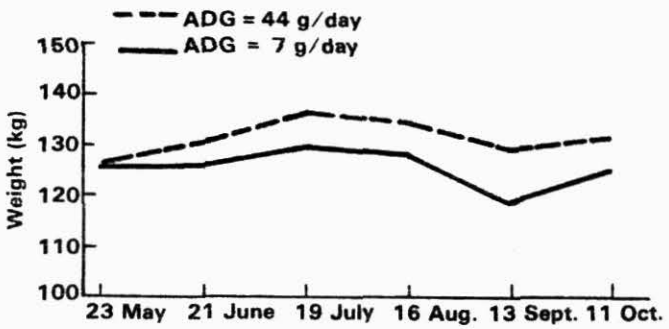

Figure 68. Effect of stocking rate on liveweight change in Zebu calves grazing a *Brachiaria ruziziensis*/legume mixture during the dry season in the Cerrado, CPAC, Brazil.

ANIMAL HEALTH

The objective of the Animal Health section is to develop preventive medicine schemes adjusted to the pasture/animal management systems developed by the Tropical Pastures Program. Work continued at three levels: at the macro-level, an inventory of disease and syndromes conducive to mortality or decreased productivity is being assembled and will be integrated with the target area survey in order to piece together distributions based on ecosystems. Macro-level studies are providing a catalogue of all existing conditions that are influencing productivity in the target area and their relative importance. At the intermediate level, work continued on surveillance in farms of the ETES project and monitoring of the test herds at Carimagua. Intermediate level monitoring provides information from individual animals in specific farms that permits quantification of main disease causes. At the micro-level, studies continued on the profile of gastro-intestinal parasites and hemoparasites at Carimagua, and the development of photosensitization in steers grazing *Brachiaria decumbens*. Micro-level studies provide information on incidence of specific conditions defined as important for the development of a preventive medicine control scheme.

Table 71. Importance of cattle diseases as reported by cattlemen from two sources.

Colombian Llanos Orientales[1]		Cerrado of Brazil[2]	
Condition	No. of farms	Condition	Farms (%)
Vulvovaginitis	28	Pneumoenteritis	21.4
Retained placenta	25	Hemoparasites	18.8
Abortion	23	Foot and mouth disease	18.4
Metritis	19	Black-leg	14.9
Chronic malnutrition	19	Endoparasites	6.2
Hidrosamni	13	Colibacilosis	4.3
Black-leg	11	Brucellosis	2.8
Brucellosis	9	Salmonellosis	2.4
Anaplasmosis	8	Ectoparasites	1.6
Septicemia	8	Pasteurellosis	1.5
Bone fractures	6	Rabies	1.2
Anthrax	6	Botulism	1.0
Calf diarrhea	4	Anthrax	0.9
Babesiosis	4	Tuberculosis	0.2
Foot and mouth disease	3		

1 From : "Survey of cattle health problems in the eastern plains of Colombia" Corrier, D.E. et al. Br. Vet. J. (1978).

2 From : A survey of cattlemen. States of Mato Grosso, Goias and Minas Gerais. In: "Diagnostico Saude Animal. Ministerio de Agricultura, Brazil, 1977".

Macro-monitoring

Animal disease inventory

Data is being collected and analyzed primarily from Brazil, Colombia, Venezuela and Paraguay. There are three main levels for the information collected. The first is data collected from livestock owners and private professional practitioners either through survey questionnaires or direct visits. The second level corresponds to official figures given by regional laboratories, slaughterhouses and animal health offices at the regional and national level. The third level of information corresponds to data obtained through specific surveys in which samples from individual animals are examined by a laboratory. Information from the first level is subjective and figures need confirmation from the other levels of information. It is especially useful for a description of syndromes that cause deaths or decreased productivity which do not appear on the official morbidity and mortality reports. Table 71 illustrates two sources of information at this level. A condition such as pneumo-enteritis from one source is probably equivalent to diarrhea in calves from the other; hemoparasites appear together in one source but as *Anaplasma* and *Babesia* in the other. The work which is underway has the aim of selecting conditions that are appearing only at this level and classifying them by their relative importance. The information on specific infectious diseases from this level is not considered as reliable unless data from laboratory examinations are presented. The second source corresponding to official figures, is oriented towards specific recognized infectious diseases causing morbidity and mortality. The information from this level is being arranged by geographical sectors within the target area.

The third source corresponds to conditions that can be identified by direct observation of the cattle or by serological diagnostic tests. This level of information is more reliable for entities that can be identified by serological procedures. Work is underway on serological testing of samples from cattle of Brazil (Mato Grosso) and Venezuela (Western Llanos) obtained by collaborators. When the work is completed at all three levels, a complete listing of syndromes and diseases and their relative importance in the target area of the program, will be available.

Intermediate Monitoring

ETES Project

A full description of the ETES project is found in the Cattle Production Systems section (see page 85). Animal Health information was obtained from a survey of cattle ranchers completed in two visits; parasite levels (internal and external) were measured through four samplings, reproductive analysis by rectal examinations were carried out and observations on malnutrition were made. Farm visits were carried out every six months. Ranchers believed that their main cause of calf mortality is "black scours". According to their records it is the cause of a 3.2% mortality of animals up to 12 months of age. In the case of adults, ranchers consider that the main causes of mortality are drowning (2.8% mortality, mostly during February at the end of the dry season), fractures (1.8%) and malnutrition (1.3%), all three are due to management factors. Nine farms reported 28 cases of snake bite deaths.

Four fecal examinations for internal parasites were completed for 10% of adults and 5% of calves that passed through the chute. The level of infestation in adults is negligible. In calves, few farms had herd parasitosis. It was considered a herd problem when more than 20% of the examined calves had over 300 *Trichostrongylidae* eggs/g of feces. There was one farm with that level of infestation in the first visit, two in the second and none in the other visits. For the protozoan *Eimeria* spp., using the same level of infestation and the clinical examination of calves, there was one farm with herd parasitosis in the first visit and five farms in the second. Whether it is economically sound to control this level of parasitosis is to be determined. Although all farms reported to be doing deworming, there is no evidence of a regular schedule followed. The parasite profile reported below studies population fluctuations of the parasites in the area in order to determine the need and the best timing for deworming.

A sampling of adult cattle for trematodes revealed the presence of eggs of *Paramphistomum* sp. in 6 of 14 farms examined. Five samples were analyzed per farm and eggs of the trematode were found in 16.4% of them. This parasite was reported last year in steers of Carimagua and this is the first evidence of its presence in other farms of the Llanos Orientales. However, there is no evidence indicating that it is a cause of losses in productivity.

Observations on tick levels were made on three visits; counts were made on both sides of 10% of the animals that came through the chute. Semi-engorged ticks (5 mm and over) were counted. All farms had low levels of infestation. From 738 observations, 9.6% had less than 5 ticks/animal. All farms had established tick control procedures, mainly tick baths, and 10 our of 17 reported sprays every months.

Counts of *Dermatobia hominis* larvae were made. Low infestation levels were found; from 6789 animals examined, only 3.3% had 1-6 larvae/animal. However, 16 of the farms examined had animals infested indicating a wider distribution than previously observed.

Two other parasites were monitored. Lice *(Haematopinus quadripertusus)* was found in 10.3% of adult cattle examined in 10 of 17 farms. *Estefanofilaria stilesi,* a cutaneous worm, was found in 71% of animals examined, and was present in all farms. There is no evidence of damage in cattle affected by either of these parasites.

Analysis of reproductive tract

The examination of 1305 female cattle of the 16 farms during the four visits in 1978-79, revealed 2.2% of abnormalities of the reproductive organs, a figure within the expected limits. The finding of nine cases of hidrallantois (abnormal collection of fluids in the uterus) confirms previous findings in relation to its frequency. It was found more often in the less productive farms, supporting the hypothesis that this condition would not be found in farms where a complete salt-supplement is fully utilized.

Conception rates varied from 39 to 65% as measured in cows that for two years had no abortions nor dead calves. Abortion rates for the same period were obtained only considering pregnant cows (see Table 54 on page 93). Nine of the 15 farms had high abortion rates from 9 to 42%; the remaining six farms had abortion rates within the expected limits. Abortions are occurring at all times of pregnancy and do not seem to be seasonal. This most likely indicates that there is no specific infectious disease as the main cause of abortions. However, there are two infectious veneral reproductive diseases, Vibriosis and Trichomoniasis, that should be discarded before a final conclusion is drawn. Mortality of calves at birth and up to the first month of age (perinatal mortality) was for 6 of the 15 farms (7 to 28%). Besides nutritional deficiencies

which may be the cause of perinatal mortality, Leptospirosis is known to be endemic in the area and could be involved in its etiology.

Chronic malnutrition ("secadera")

The overall condition of the body of adult cows was classified as good, fair, poor (lean animal) and very poor (chronic malnutrition, commonly called secadera or wasting disease) based on physical appearance and weight. An average of 1780 head of cattle was examined four times in 16 farms. Only five farms showed no animals classified as very poor. These are some of the best farms in terms of productivity per AU (see Figure 59 on page 94). However, the highest number of cases of malnutrition was also from one farm with a high productivity index (Table 72). The average age for the 73 cases found was six years. Three deaths due to malnutrition were recorded and three animals were diagnosed with malnutrition in two consecutive examination periods. This contrasts with beliefs that chronic malnutrition usually ends with the death of the animal. There is some tendency to observe more cases of chronic malnutrition by the end of the rainy season, perhaps when most animals are in better body condition, and thus the chronically ill are more noticeable. In the 73 cases observed in these farms no correlation was found between the condition and the lactation status of the animals, as approximately half (43) were dry at the time of examination.

Case study

One farm (Farm 4, ETES Project) which reported a high abortion rate (8.6%) as the main factor affecting productivity was followed in depth to monitor the problem. A rigorous sampling for clinical, bacteriological, virological, hematological, parasitological and reproductive analysis was completed. The general condition of the animals as well as weights and blood parameters showed considerable nutritional deficiencies. The mean stocking rate for the farm is high (3.5 ha/AU) compared to other farms of the ETES Project. Poor animal condition is thereby reflected in low fertility (50% of the cows did not have active ovaries). A comparison of blood parameters from this farm with parameters obtained at Carimagua in a herd without mineral supplementation is shown in Table 73. The ETES farm has lower average figures for hemoglobin and packed cell volume (PCV) for cows in the lactating open conditions as well as in the dry non-pregnant condition. This indicates that the animals in

Table 72. Chronic malnutrition in 16 farms of the ETES Project, Llanos Orientales de Colombia, during four visits from November 1977-May, 1979.

Farm No.	No. of observations	Average number of animals/visit	Total number of animals with chronic malnutrition	Chronic malnutrition cases/ total number of observations (x 100)
2	306	102	1	0.3
4	643	160	6	0.9
5	381	95	10	2.6
6	476	119	0	0
7	444	111	4	0.9
8	438	109	0	0
9	331	82	11	3.3
11	471	157	0	0
12	470	117	4	0.8
13	491	122	1	0.2
14	427	106	18	4.2
15	434	108	6	1.4
17	502	125	0	0
18	626	156	9	1.4
19	293	73	3	1.0
20	379	94	0	0
Total	7112	1778	73	1.0

the farm were in a similar nutritional condition or worse than those in a herd that was kept without mineral supplementation at Carimagua.

Table 73. Comparison of two blood parameters and weights between cows from one ETES farm (Farm 4) and a herd from Carimagua with no mineral supplementation.

Parameter	Carimagua herd[1]		ETES Farm 4[2]	
	Lactating open	Dry open	Lactating open	Dry open
Hemoglobin (g/100 ml)	12.7	13.7	11.5	12.4
Packed cell volume (%)	36.9	40.5	34.2	35.4
Weight (kg)	277.0	302.0	286.0	271.0

1 Number of animals sampled, 35. Source: CIAT Annual Report, 1977, p. A-89.
2 Number of animals sampled, 64.

Hemoparasites were detected in blood smears of cows and calves. Seven (10%) cows showed parasitemia for *Anaplasma marginale, Bemisia argentina* or both. Two cows had counts of eosinophils (24 and 19%) which appear in parasitic infections (Table 74). Serologic evidence is also confirming *Anaplasma* and *Babesia* infections. Seven calves (70%) showed parasitemia for *A. marginale,* one with a high percentage of infection (24%) and a low PCV value (22%); the others had blood values within normal ranges. Serologic tests indicated active infections. Although there were no animals infested with ticks at the time of the sampling visit, infestations were known to be very high in the farm and represent a serious problem. No venereal diseases were found and brucellosis is not a problem. It appears that hemoparasites and ticks together with nutritional deficiencies are contributing to the low productivity in this farm. Although there is still no definite explanation for the high abortion rate reported, the analysis showed the need of rigorous sampling to understand health status.

Table 74. Blood analysis of cattle with parasitemia, Farm 4 of the ETES Project, Llanos Orientales, Colombia.

Identification	Hemoparasites[1]		Packed cell volume (%)	Hemoglobin g/100 ml	Eosinophiles (%)
	Thick smear	Thin smear[2]			
Cows					
1	Ba	0.01 Ba	35	11.5	14
2	Am	-	38	12.5	13
3	Am	-	40	13.5	8
4	Am	0.01 Am	34	11.5	19
5	Am, Ba	0.005 Ba	27	9.0	24
6	Am, Ba	0.005 Am	33	11.0	10
7	Am	0.010 Am	35	12.0	3
Calves					
1	Am	0.01 Am	36	12.0	-
2	Am	1.40 Am	34	11.0	-
3	Am	0.02 Am	47	15.5	-
4	Am	-	35	12.0	1
5	Am	24.00 Am	22	7.0	-
6	Am	-	43	14.5	1
7	Am	-	43	14.0	2

1 Ba = Babesia argentina; Am = Anaplasma marginale.
2 % of red blood cells affected.

Carimagua surveillance

Chronic malnutrition, sinking in watering holes, bone fractures and septicemia continue to be the main causes of cattle mortality in Carimagua, as shown in Table 75. The first three causes are mostly management-related conditions. Overall mortality rate was a little lower this year (3.0%) compared to the 1978 figure (3.7%). Most of the entities responsible for deaths in Carimagua seem to be endemic. Some conditions like bone fractures and malnutrition decreased while others such as photosensitization occurred more frequently this year.

Micro-monitoring

Gastro-intestinal parasite profile at Carimagua

Work continued on the study of the natural evolution of internal parasites in the savannas of the Colombian Llanos, as a basis to design control methods adapted to the ecological conditions. Two herds of 50 cows with their progeny at a stocking rate of 6.5 ha/AU are being studied. The native pasture is being burned sequentially and management is similar to that used by farmers in the area. Animals received a complete mineral supplement, were treated to control internal parasites, and were subjected to the standard vaccination scheme used for the farm. In Group I the calves were born from March-July 1978 (beginning of rainy season), and in Group II from September1978-January 1979 (beginning of dry season). Both groups were sampled at monthly intervals for fecal examinations and blood analysis. Weights were recorded and one calf from each group was slaughtered at 1, 2, 4, 6, 8, 12, and 18 months of age. All parasites in abomasum, and in the large and small intestines were collected and identified. The trial will be concluded in mid-1980.

Table 75. Causes of cattle mortality in Carimagua (October 1, 1978-September 30, 1979).

Cause of death	No. of animals
Malnutrition	15
Sinking in mud or watering holes	14
Bone fractures	9
Septicemia	7
Snake bite	6
Photosensitization (B. decumbens)	5
Polyarthritis	4
Tick infestation	2
Herniae	1
Meningoencephalitis	1
Accident	1
Peritonitis	1
Unknown	20
Total deaths	86[1]
Total animals in station	2900
Mortality rate	3%

1 Only from calves that had been ear tagged.

Internal parasite loads varied considerably in relation to calf age and season (Table 76). The results of internal parasite examinations assessed by the counts of eggs have to be correlated with the total parasite counts in the slaughtered calves. In the total counts the most important parasite in both groups was *Cooperia* which reached its highest level at eight months of age (Table 77); this corresponds to the highest egg counts of Trichostrongylidae (*Cooperia* sp. is included) at seven months for Group I, and nine months for Group II. Total counts of the more damaging *Haemonchus* sp. follows exactly the same pattern (it is also included in the Trichostrongylidae family in Table 76.

Cooperia parasites account for 89.2% of the total parasites collected in the slaughtered animals of Group I after four months, and 71.5% of Group II. *Haemonchus* accounts for 8.2% and 18.6% of both groups, respectively. The total parasite counts for other species are probably negligible.

The gastro-intestinal worm infestations of beef cattle grazing native savannas in the Colombian Llanos were more noticeable towards the middle and end of the rainy season (Figure 69). It is important to note that the additive effect of two or more species poses a different problem than considering only one species. In this case the sinergism between *Cooperia*, *Haemonchus* and *Eimeria* affecting productivity in calves 4-8 months of age has to be considered. Further research will be carried out to determine if, with the levels of infection found and high prevalence of *Cooperia* spp. it is economically sound to apply control measures. If control would appear economically feasible, treatments should be done at the end of the rainy season or when calves are 6-8 months of age.

Profile of hemoparasites at Carimagua

The same calves used for the gastro-intestinal parasite profile are being utilized for the description of infections associated with *A. marginale, B. argentina* and *B. bigemina.* It is interesting to note that *Babesia*

Table 76. Average fecal egg counts (egg/g feces) for the most common gastro-intestinal parasites found in calves at Carimagua, 1978-79. (Parasite Profile Trial.)

Sampling date	Group I			Group II		
	No. animals examined	Trichostrongylidae	Eimeria	No. animals examined	Trichostrongylidae	Eimeria
1978						
III-6	8	0	0			
IV-5	18	35.1	0			
V-9	15	540.3	17.4			
VI-6	29	197.6	54.6			
VII-5	31	200.2	514.1			
VIII-2	36	183.5	1860.7			
IX-1	34	27.0	173.7	3	12.0	0
X-2	37	239.0	149.4	7	22.0	288.1
XI-1	40	332.6	441.0	15	128.6	2107.0
XII-2	34	300.0	200.0	27	126.0	674.0
1979						
I-2	36	105.3	111.0	36	124.0	1390.0
II-3	38	169.4	36.2	36	136.0	80.0
III-4	41	219.3	38.0	35	76.7	94.0
IV-2	37	108.3	6.8	41	43.7	3.5
V-3	35	79.3	97.7	35	60.4	70.0
VI-5	34	117.2	279.9	36	155.6	33.2
VII-4	34	93.5	14.5	34	320.5	75.4
VIII-1	37	164.9	44.0	31	285.3	24.1
IX-2	35	105.0	60.4	41	170.3	48.0
X-2	36	98.0	38.9	29	88.4	212.2

infections, as detected by the fluorescent antibody test, vary greatly from one season to another. The infection progresses slowly in calves born at the beginning of the rainy season and the peak coincides with the following rainy season (Figure 70). In the case of calves born at the end of the rainy season (Group II), the peak infections for hemoparasites coincide with an increased rainfall. It is thus possible that, from the standpoint of the development of immunity against hemoparasites, calves will be less affected if they are born at the beginning of the rainy season. This has to be correlated with fluctuations of vector populations, since hemoparasite levels are influenced by tick burdens.

Photosensitization in cattle grazing Brachiaria decumbens

Photosensitization appears to be increasing in recent years in Carimagua and other farms in the Llanos Orientales of Colombia. Table 78 shows the distribution of animals which were grazing *B. decumbens* during 1979 in Carimagua. Six experimental groups of animals were grazing *B. decumbens,* and two of them showed clinical cases of photosensitization. Five hundred fifty-four animals grazed *B. decumbens* and there were nine cases of intoxication (1.6%). One died before the appearance of any sign of skin lesion, but showed severe hepatic damage at necropsy. Clinical cases were observed in two specific pastures in Carimagua, with 8 and 2.7% morbidity and 6.7% mortality in the first group. The pastures held cows, calves, steers and heifers but only young animals (8-24 months of age) were affected. The clinical sign most evident in affected animals was skin necrosis. Two animals also had facial edema, particularly in the neck and ears. Six animals were found in poor body conditions.

Table 77. Total gastro-intestinal parasite counts in calves slaughtered at various age intervals in Carimagua.[1]

Species	Group I (from April/78) Age (months) 1	2	4	6	8	12
Cooperia	22	52	4774	6435	16040	2948
Haemonchus	1	0	25	648	2547	78
Oesophagostomum	0	0	35	100	262	50
Strongyloides	69	594	0	65	0	0
Bunostomum	0	0	0	0	0	30
	Group II (from December/78)					
Cooperia	212	290	280	120	5518	
Haemonchus	10	50	30	70	1090	
Oesophagostomum	0	2	5	32	32	
Strongyloides	1908	490	40	0	0	
Bunostomum	0	1	0	1	112	

1 One animal sacrificed in each age group. Includes counts from abomasum and large and small intestines.

Information from the farms studied in the ETES Project was collected during the year to determine the magnitude of the problem in those farms where *B. decumbens* is being utilized. A total of 11 from the 16 farms have animals grazing *B. decumbens*. Three farms reported clinical signs of photosensitization associated with grazing of *B. decumbens* (Table 79). Morbidity was high in Farm 7 (11%); two deaths were reported in this farm. Half of the animals in each of the *B. decumbens* pastures were cows. Cases of photosensitization corresponded only to young animals and were evident by signs of skin necrosis and facial edema.

A laboratory technique was adapted to detect the fungus *Pitomyces chartarum* which has been considered as partially responsible in association with *B. decumbens* (in some areas of Brazil) in causing a severe liver damage and consequently photosensitization. Several fungi were obtained from the *B. decumbens* samples analyzed from the paddocks that had photosensitization cases in Carimagua. The most prevalent fungi were *Fusarium* sp., *F. fusaroides, F. semitectum, F. solani, F. oxysporum, Curvularia* sp., *Penicillium* sp., *Drechslera* sp. and *Leptosphaeruleria* sp. Most of these species are saprophitic but *Fusarium* has been reported as a possible cause of toxicity in cattle. Spores resembling those of *P. chartarum* were observed in three samples. Pasture conditions and factors related to grazing might influence the prevalence of photosensitization. However, there is no relationship between time elapsed from establishment of the paddock and appearance of affected animals (Table 79). In six cases, the pastures were mature and one was at flowering. Previous reports and informations indicated that the majority of cases occur at the beginning of the rainy season, but in the case of observations presented in Table 79 photosensitization occurred at all times of the year. The time the animals remained on the pasture does not seem to have a direct effect on its prevalence.

Research will continue to establish the causal agent(s) of photosensitization.

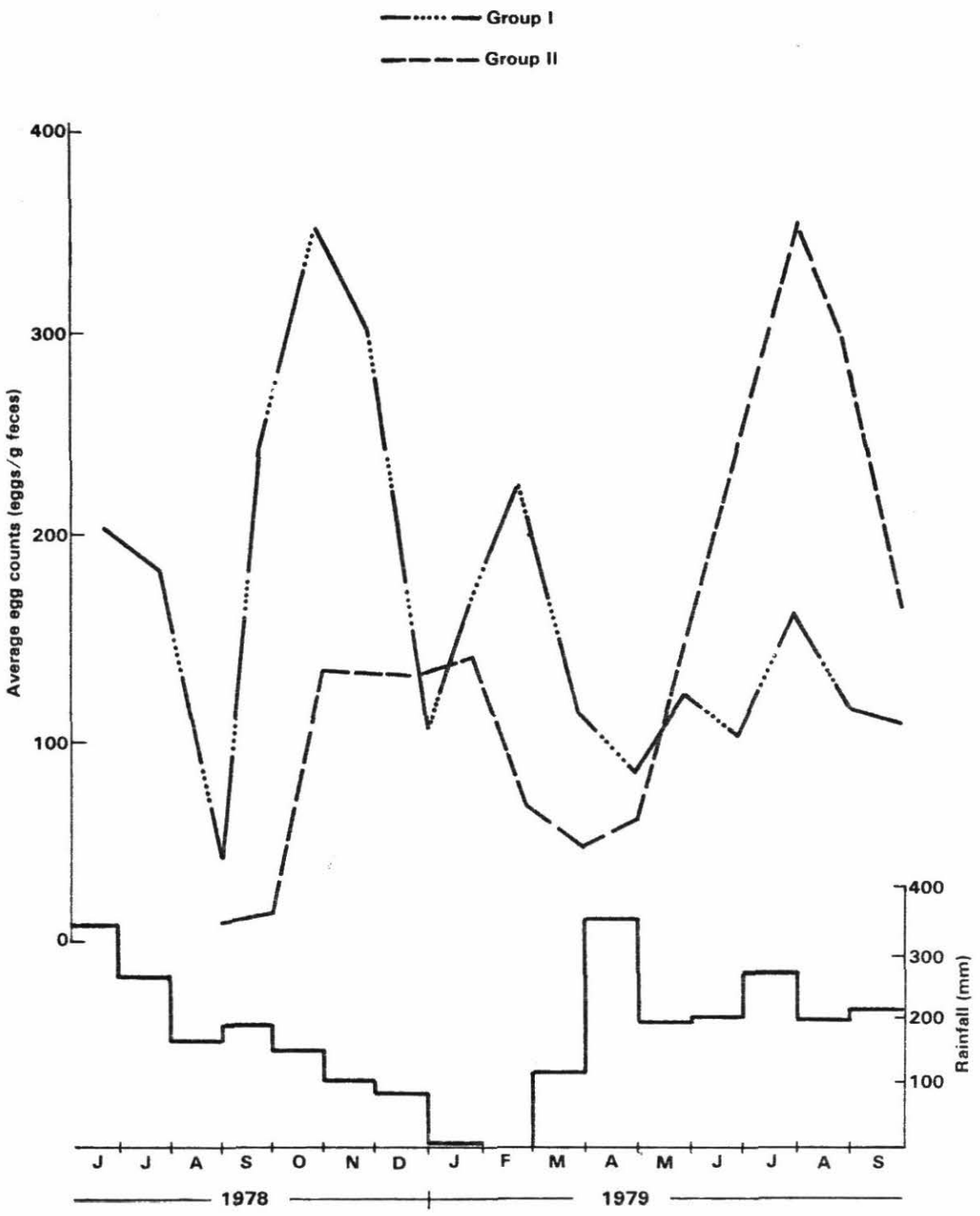

Figure 69. Trichostrongylidae parasite loads in calves from Carimagua on native pasture.

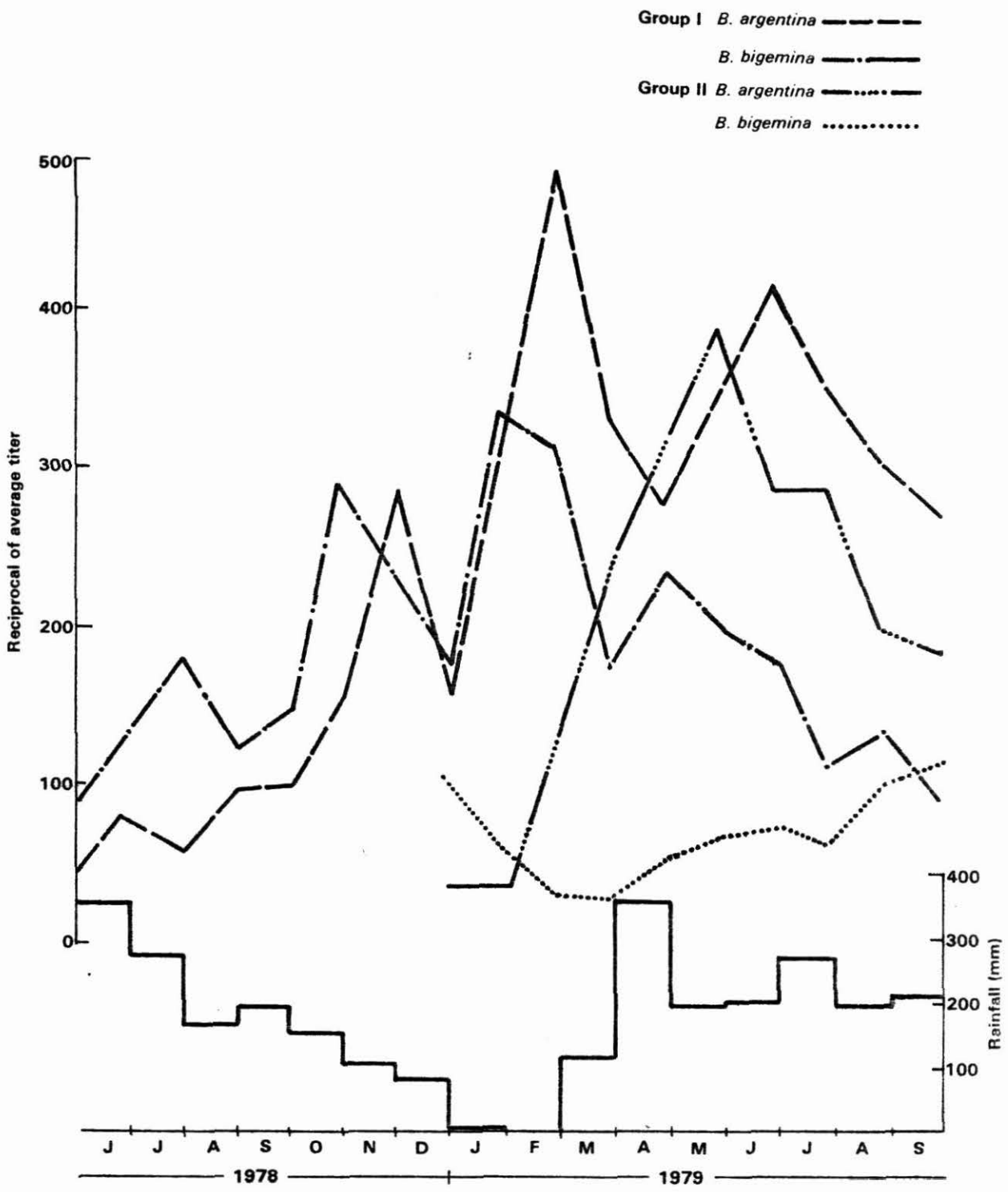

Figure 70. Development of a *Babesia* infection in calves (10 per group) on native pasture at Carimagua.

Table 78. Distribution of animals grazing Brachiaria decumbens and cases of photosensitization in Carimagua during 1979.

Pasture or herd	No. of animals	No. of cases	No. of deaths	Morbidity (%)	Mortality (%)	Group of animals
Breeding herd systems	163	0	0	0	0	Young heifers
La Alegría	47	0	0	0	0	Heifers, cows, calves
La Arepa	110	3	0	2.7	0	Heifers, cows, calves (up to 18 months)
Tomo 5	81	0	0	0	0	Cows, calves
Tomo 3	79	0	0	0	0	Cows, calves
Pasture Utilization	74	6	5	8.0	6.7	Young steers (up to 24 months)
Total	554	9	5	1.6	0.9	

Table 79. Animals grazing Brachiaria decumbens pastures in the Llanos Orientales of Colombia and affected by photosensitization.

Site	Establishment year	Stocking rate (animals/ha)	Condition of pasture	Animals with photosensitization	Date	Observations
Carimagua						
Pasture A	1975	1.2	Abundant, mature flowering	3	IX-X, 1979	Once a month
Pasture B	1973-74-75	0.7-3	Variable	6	XI 1978-	Animals pasturing since 1978
ETES Farms						
Farm 8		1	Mature, scarce	2	XII, 1976	
Farm 7	1978	0.5	Abundant, mature	6	VI, 1978	First grazing. One month after introduction
Pasture B	1975	0.5	Abundant, mature	4	IX, 1978	Several grazings of pasture
Pasture C	1975	0.5	Abundant, mature	1	IX, 1978	Several grazings of pasture
Farm 5	1977	0.28	Scarce, tender	1	XI, 1978	