PROJECT PROPOSAL

Tropical Pastures Regional Trials Network

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PROJECT PROPOSAL

A IDENTIFICATION

TITLE "TROPICAL PASTURES REGIONAL TRIALS NETWORK
A mechanism for technological feedback, validation and transfer with and among national programs in Tropical America"

Requesting Agency	Centro Internacional de Agricultura Tropical (CIAT)
Official recipient	CIAT
Project Leader	Jose M Toledo, CIAT
Amount of the Project	CD 491,000
Duration	3 years

B BACKGROUND

1 The Livestock Production Panorama of Tropical America

Beef and milk are staple food commodities in tropical Latin America Independent of the income level, the budget share of these two commodities is large among urban consumers Beef represents between 10 and 24 percent of total food expenditure, and milk represents between 7 and 15 percent (Appendix 1 and 2) When beef expenditures is expressed as proportion of family income, the highest values correspond to the lowest income quartile clearly indicating a strong preference for this type of commodity The high income elasticities of demand estimated for the low income groups corroborate this assertion

Table 1 shows for the period 1970 to 1978 the growth rate of demand and of production of beef in Latin America With the exception of temperate Latin America, in all the other countries and sub-regions a fast growing demand for beef is not being met by production The same occurs with milk

These imbalanced in demand vs production growth rates cause a continuous increase of prices, affecting both the diet as well as the general standard of living of the low income strata population Figure 1 shows the consumer real beef prices for the last 20 years for Brazil, Colombia and Venezuela

The cattle stock of Latin America is twice the USA cattle stock (Appendix 3), but production is less than 70% of the USA production, because of the low productivity of the Latin American herd (only about 30% of USA production/head/year) Such difference in animal productivity is due mainly to the predominantly intensive cattle production systems in USA and the extensive production systems in Latin America However, cattle productivity is substantially low also when compared with regions of similar extensive

Table 1 Beef Annual growth rates of demand and production in Latin America, 1970-1978

Region and Country	Growth rate of	
	Demand	Production
	----------%----------	
Tropical Latin America	5 9	3 3
Bolivia	6 1	5 9
Brazil	7 2	3 5
Colombia	7 2	3 5
Dominican Republic	7 5	1 2
Ecuador	8 3	2 6
Mexico	4 5	9 3
Paraguay	3 5	3 2
Peru	5 4	-3 2
Venezuela	4 6	4 1
Central America	4 6	3 3
Caribbean	4 0	1 7
Temperate Latin America	1 7	2 7
LATIN AMERICA	5 4	4 5

Source Latin America Trend Highlights for CIAT Commodities CIAT 1980

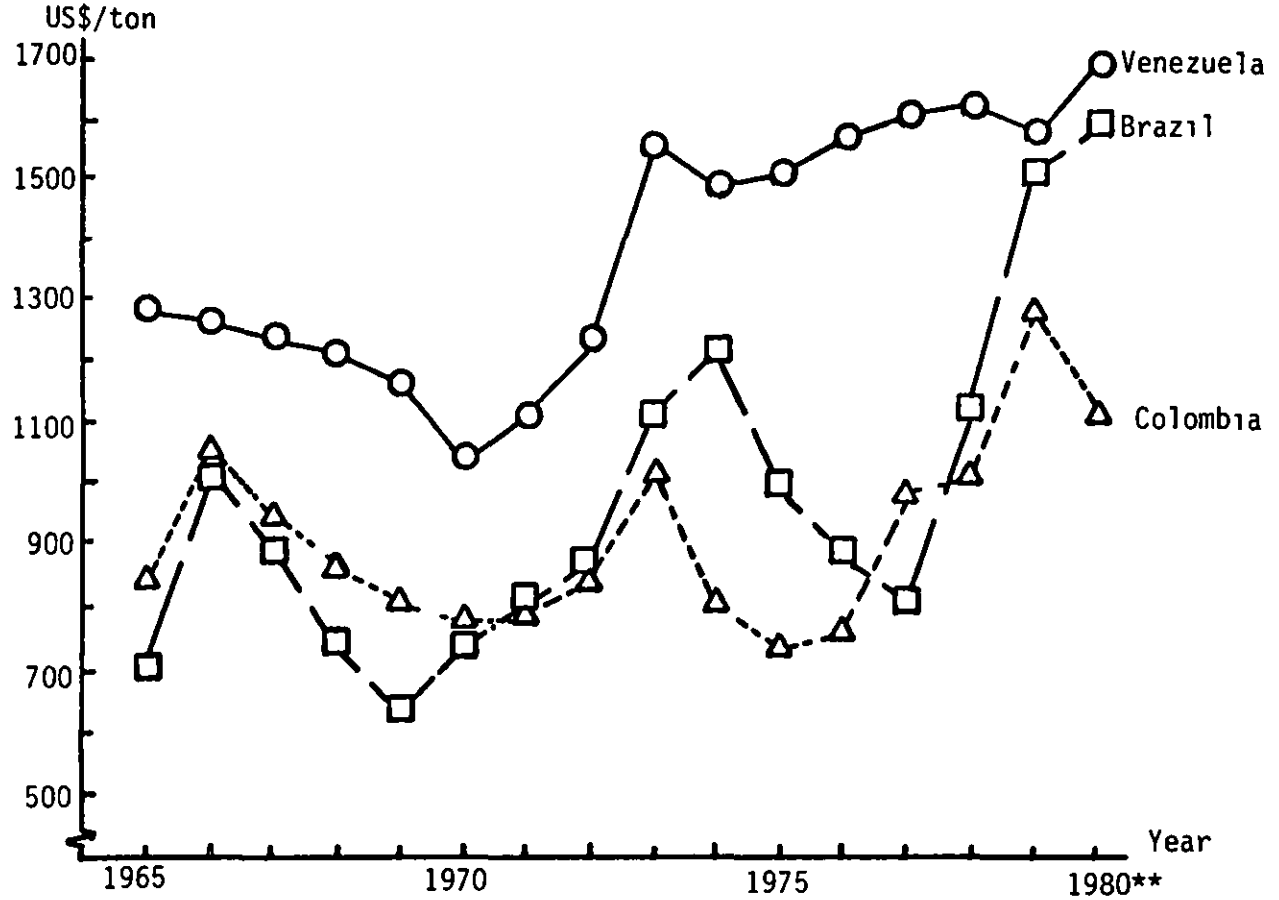


Figure 1 Beef Real* consumer prices in Venezuela, Colombia and Brazil 1965-1980

* Deflacted by wholesele price index
** First semester

Source CIAT, Trend Highlights 1980

production systems such as temperate Latin America Such lower productivity is due to the combined effect of management, nutrition, animal health and breeds Undoubtedly, nutrition plays a key role essentially determining the level of the remaining three factors

Latin America is a continent with vast areas of acid infertile soils (Oxisols and Ultisols) Table 2 shows the magnitude of this resource which accounts for 40-50% of the total land resources Stocking rate as well as animal productivity in these regions is even lower than the national averages

The current average stocking rate in the Oxisol savannas of 0 12 animal/ha can potentially be increased more than ten fold In addition, beef production per head could also be more than doubled Also, these acid infertile soils when close to the markets could contribute significantly to increase milk production

These areas have a large potential for agricultural production since they have plenty of solar radiation and, in general, good soil physical properties and extended growing seasons However, acidity and high aluminum levels in the soils, or in general lack of soil fertility, constitute a serious limitation to crop production

Consequently, most agriculture and intensive cattle production systems are today on more fertile soils The Oxisols and Ultisols of Latin America are the underutilized agricultural frontier land of the continent

Low quality and quantity of available forage for the animals is the prevailing constraing for beef and milk production on these acid infertile soils Another constraing is the lack of infrastructure, but its importance varies depending upon distance from the markets and from country to country

Table 2 Distribution and proportion of Oxisols and Ultisols in Latin America

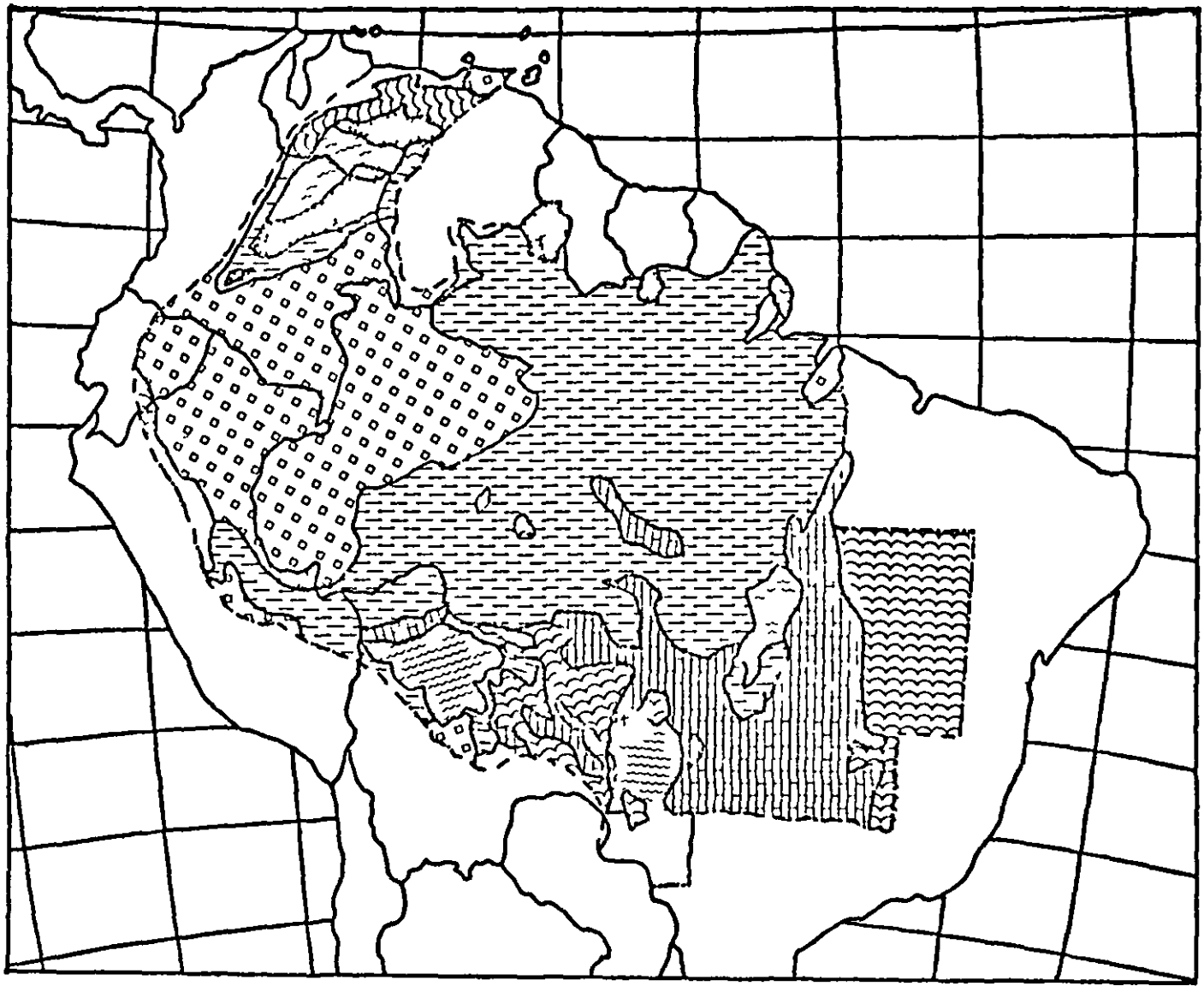
Region	Oxisol and Ultisol areas	Proportion of the region
	Million ha	(%)
Tropical Latin America	848 5	51
Tropical South America	828 2	59
Tropical Central America and Caribbean	15 8	23
Total Latin America	851 1	42

Source Latin America Trend Highlights for CIAT Commodities 1980

B 2 Area of interest

An analysis of the survey data existing in the area and compiled by the Land Classification Unit in CIAT, led in 1979 to a subdivision of the area of interest of the Tropical Pastures Program into five major ecosystems (1) Llanos (tropical well drained savanna isohyperthermic), (2) Cerrados (tropical well drained savanna thermic), (3) tropical poorly drained savanna, (4) tropical semi-evergreen seasonal forest, (5) tropical rained forest These five major ecosystems are shown in Figure 2 Up the present the program has concentrated its research activities only in the well drained savannas, llanos and cerrados type However, the Regional Trials Network has been during the last three years, in an exploratory manner, establishing regional trials to test germplasm in the other three ecosystems

It is important to indicate the need for testing germplasm in the two tropical forests ecosystems Livestock production is rapidly increasing in the Amazon basin mainly as a result of social economic and geopolitical pressure in the area Spontaneous and organized colonization along the newly built roads in occurring at rapid face After clearing and one to two years of crops, pastures are being established for livestock production Under the current situation, the colonizer in the Amazon has no more than four or five alternatives forage species, which are mostly adapted to the relatively high level of fertility that occurs immediately after the clearing and burning of the biomass Initially these species (*Panicum maximum, Hyparrhenia rufa, Axonopus scoparius, Brachiaria decumbens* and *Brachiaria humidicola*) perform very well, to the point of supporting more than two to three animals per hectare/year However, as the soil fertility decrease and reaches stability at levels often below the original under forest, the pastures decreases productivity, support no more than half animal per hectare, on a degraded soil condition The colonizer normally clears more



SEMI-EVERGREEN SEASONAL FOREST

WELL DRAINED SAVANNA (LLANOS)

WELL DRAINED SAVANNA (CERRADOS)

POORLY DRAINED SAVANNA

TROPICAL RAIN FOREST

DECIDUOUS FOREST

OTHERS

Figure 2 Ecosystems in Tropical South America

forest area for pasture establishment in order to compensate for the reduced carrying capacity of the pastures and allow for sustained animal production It is estimated by Adilson Serrão (CPATU)*, that only in the Brazilian amazon, two-hundred thousand hectares are cleared every year to compensate degraded pastures, and that this is a process that so far it is not possible to stop

Alternative germplasm which is tolerant to soil acidity, soil aluminum and low phosphorus and general fertility as well as tolerant to pest and diseases would appear to be the main component of technological strategy to prevent such a degradation Research should be conducted in order to understand the soil dynamics in this environment as well as to test as much pasture germplasm as possible to identify species and ecotypes of grasses and legumes that will assure persistent pasture production at levels in which soil fertility could even be increased above the original level found under forest (see Figure 3) Adapted and properly managed grass-legume pastures should recycle nutrients to prevent soil degradation (see Figure 4)

In addition to the testing in the well drained and poorly drained savannas, the Regional Trials Network is an exploratory test of germplasm throughout the Amazon region and other humid tropical conditions This Network allows the national institutions and CIAT to have a first reading of the response as germplasm to different environments in order to develop a solid base for germplasm and technology extrapolation

B 3 CIAT's Tropical Pastures Program

In response to the production problems associated with low fertility of tropical soils under livestock and the need to improve the quality and quantity of the cattle diet, CIAT's Tropical Pastures Program has set the following general objective "to develop low cost input pasture technology

* Centro de Pesquisa do Tropico Umido

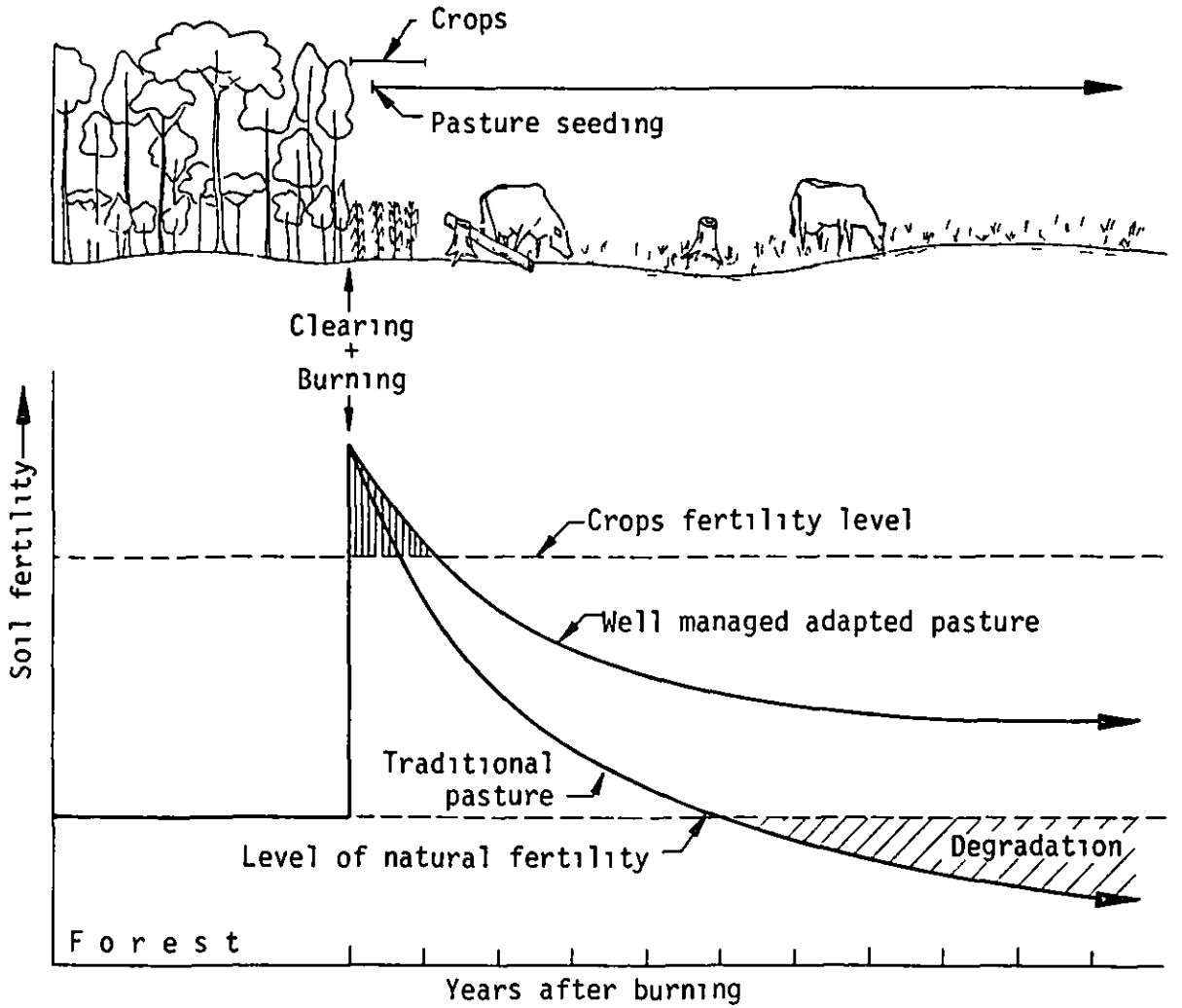


Figure 3 Model showing the soil fertility changes occurring by changing the forest vegetation by pastures (Source Toledo, 1977, Serrão, 1978 and Alvim, 1978)

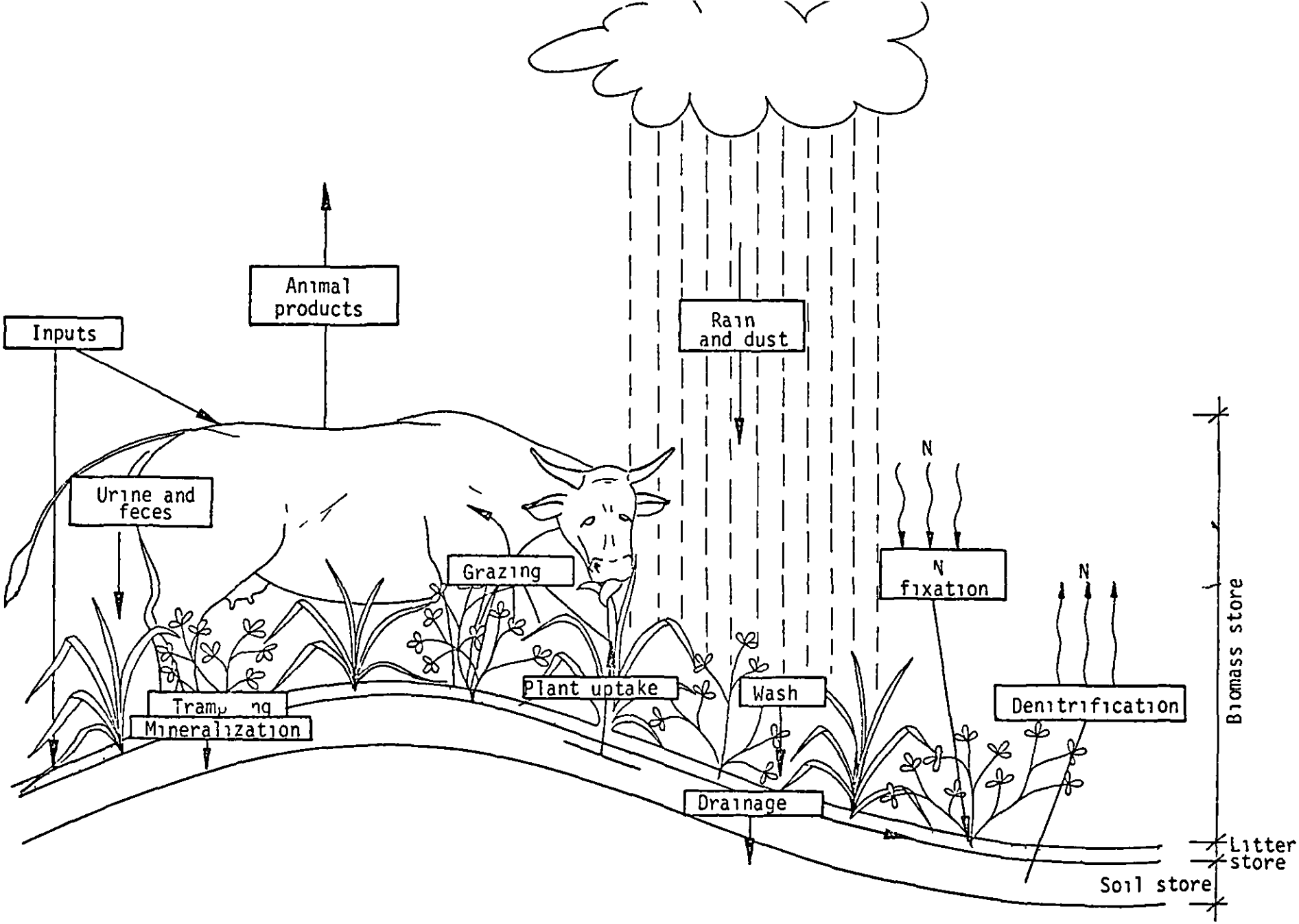


Figure 4 The nutrient cycle in a grass-legume pasture

to increase beef and milk production in acid infertile soils of tropical America"

The above objective is strategically approached through

a) Selection of pasture germplasm adapted to environmental constraints (climate and soils) as well as pests and diseases

b) Develop persistent and productive pastures

c) Study of the role of the improved pastures in the production systems and development of the complementary animal management and animal health systems components

The research steps of the program are shown in Figure 5 It should be noted the three dimensional feature of the diagram The germplasm flow and information flow on one plant for each major ecosystem, while the germplasm bank, the data bank as well as the Regional Trials Network is in a third dimension (depth) across ecosystems

Germplasm collected undergoes an initial characterization and seed multiplication stage All accessions are thereafter sent to the different ecosystems for screening for climate and soil adaptation as well as initial pest and disease tolerance Agronomic characters which assist persistence are also assessed in each ecosystem, as well as soil-plant and plant-animal interactions

At this level, promising germplasm is intensively characterized so as to have sufficient information for the first level of decision, answering the question ¿what is its alternative use in a pasture? Also, data banks should have enough information recorded to clearly show the features of accessions of key species which require some genetic improvement

After decision is made to promote germplasm to higher Category of evaluation, a bid seed multiplication effort is required to undertake larger scale pasture establishment and pasture management grazing trials At this

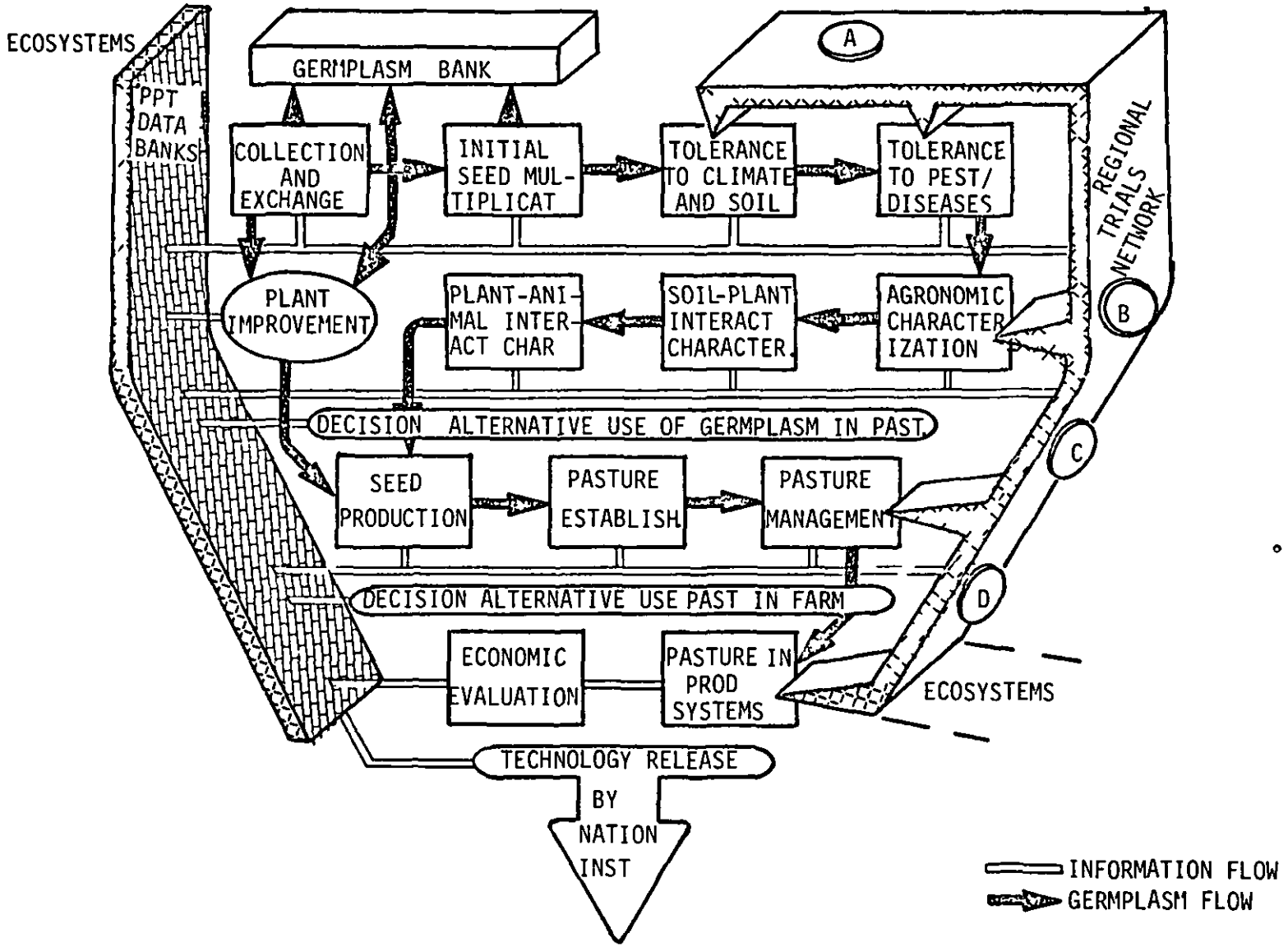


Figure 5 Research steps in Tropical Pastures Program by ecosystems

level, the number of accessions under evaluation is greatly reduced

The second decision is made by researchers in the farms systems-economics group, together with the pasture establishment-management group, and has to do with the alternative use of the pasture in the farm systems (Figure 5)

In fact, this naturally divide the Tropical Pastures Program into three groups of researchers

1 Germplasm evaluation group,

2 Pasture management evaluation group, and

3 Pasture in farm systems evaluation group

This functional organization helps to develop a constructive and coordinated line of questioning and thinking that integrates and increases efficiency of the whole program

The group working on "germplasm" centers its attention in the characterization of the germplasm with emphasis in the so called "key species"

The group working on "systems" analizes the production systems prevalent in the specific ecosystem under the socioeconomic frame of the respective country or region This group defines for the program the technological pasture components needed to solve strategically the main productivity constraint in the farm system Also, they evaluate the expected impact of alternative improved pasture technology in the production systems

The central group "Pastures" serve as a bridge group In close interaction with the other two groups, this group concentrates in developing pastures and evaluating pasture management requirements and animal productivity potentials

B 4 Tropical Pastures Regional Trials Network

The selection procedure in Figure 5, requires the parallel testing of forage accessions at a Regional level to identify those accessions which

are better adapted lo local environmental and socio-economic conditions and those which show wide adaptation within and across ecosystems

The Regional Network of Tropical Pastures operates in collaboration with national institutions and is in effect primarily aimed at providing national pasture programs with germplasm of potential value for their prevailing cattle production ecosystems

As depicted in Figure 6, the Regional Network operates trough 4 consecutive steps denominated Regional Trials A, B, C and D (RT-A, RT-B, RT-C and RT-D) RT-A and B are agronomic trials selecting germplasm for their tolerance to climate, soil, pests and diseases and providing agronomic characterization of the germplasm in relation to the environment RT-A and RT-B are distinguished mainly by the number of accessions included in the trial and by the number of trials established in any given ecosystem RT-A trials involve large numbers of accession (often more than 100) and are located at few geographical sites representing major ecosystems RT-B trials include a smaller number of accessions (often around 20) and are located profusely within a given ecosystem and should identify accessions with wide within ecosystem adaptation

The experimental design of Regional Trials A is a split plot in which the main plots are the genera and the split plot are the ecotypes within the same genera Each trial is conducted with at least three replications and the evaluations include a subjective assessment on survival every nine weeks and yield measure for the dry and rainy seasons In addition, the germplasm is evaluated for disease and pest damage The information on survival of different entries in this trial is recorded during two years During the second year one replication of the most promising material is used for seed production

Regional Trials B using the already selected material during the

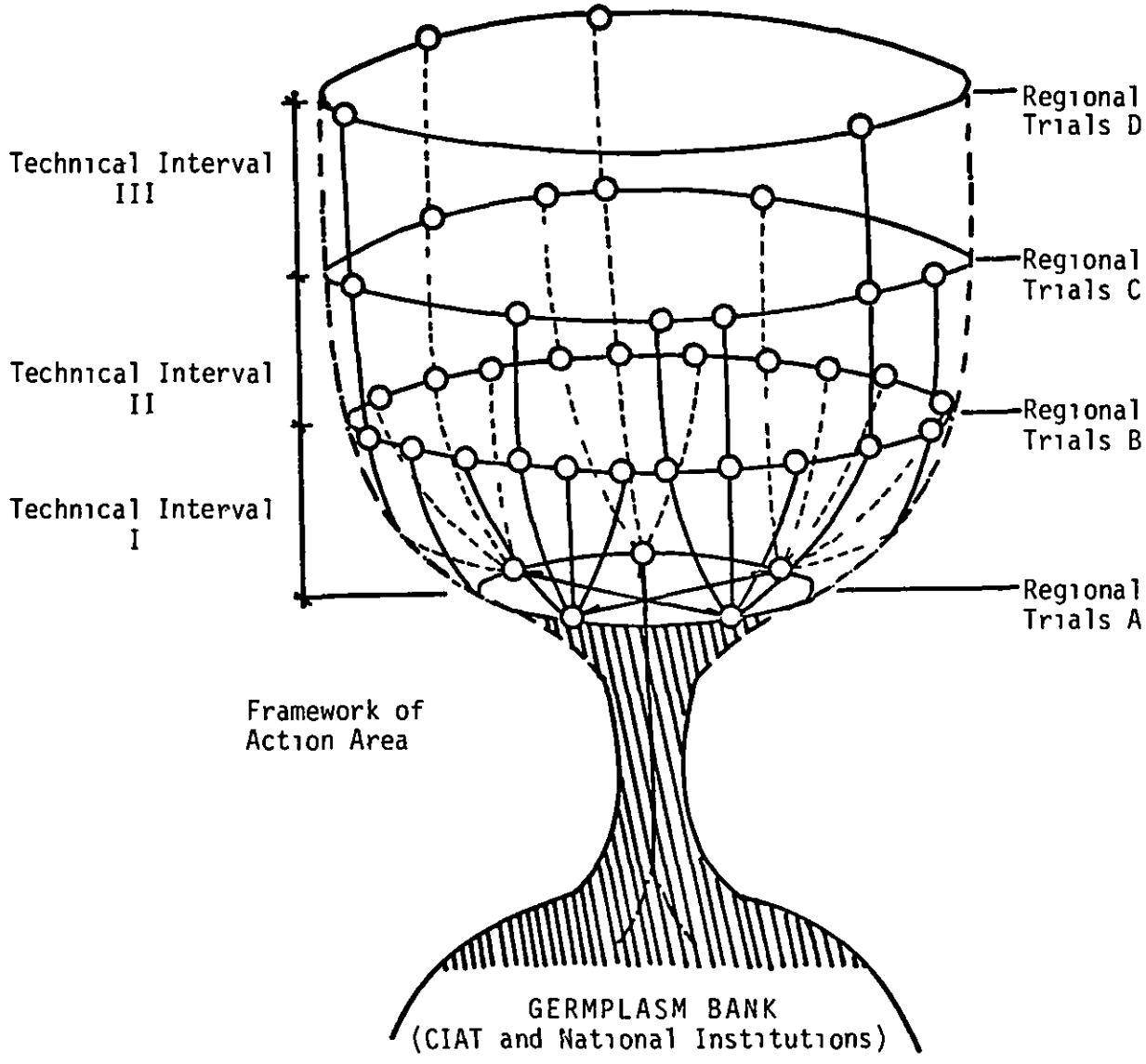


Figure 6 Germplasm flow through the Tropical Pastures Regional Trials Network

first eighteen month of evaluation of Regional Trials A are tested in many sites of the same ecosystem (subecosystem conditions) to describe yield curves during the rainy and dry season Evaluations diseases and pests damage are also performed and results are recorded and fed into the computerized data bank for multilocational analysis

In RT-A, germplasm is for the first time exposed to a given ecosystem Selection takes place on the basis of survival and visual characteristics of performance RT-B evaluate those introductions selected in RT-A, exposing them to many sites representing subecosystem condition Objective evaluations of seasonal productivity as well as resistance to prevailing pests and diseases, take place at this level (RT-B) with the purpose of selection of widely adapted ecotypes

RT-C should study under the disturbing effect of the grazing animal, those accessions selected from RT-B Since the numoer of accessions and mixtures to be included in a RT-C trials is large (generally superior to 10) testing should be done under a comunal-grazing small plot trial This large scale selection for adaptation to and persistence under grazing, will provide objective and factual means to select those ecotypes and mixtures which will be finally tested for their animal production potential in a grazing trial (RT-D)

Methodology for RT-C is lacking, with some attempts being made at CIAT and elsewhere Results to date have emphasized the need for a concentrated effort to develop methodology which will prevent the biases caused by selectivity and the resulting uncontrolled grazing pressures of the individual mixtures in the small plots, and the effects of transfer of fertility through animal excretions To solve the methodological shortcomings brief indicated above a special effort is required to set up a series of trials CIAT's Tropical Pastures Program has the basic research

capability to undertake this methodological studies Studies of this nature however, depart from the central flow of research activities (see Figure 5) and will require special financing

Regional Trials D constitute the first opening of the germplasm, which has gone through a long and painful selection procedure, to the continued normal pasturing by cattle and provides the first indication of its animal production capabilities At the same time RT-D is the indispensable step to demonstrate to producers and agricultural authorities the real and tangible merits of the adapted new ecotypes and mixtures

At the national institution level it is often found that budgetary constraints do not permit the establishment of RT-D, the selection procedure coming to a sudden stop resulting in a very expensive exercise which does not reach the producers Adding to the budget limitations is the lack of experience of researchers in the design, conduction and interpretation of grazing trials, which further discourages the institutions from involvement in grazing work

It can easily be demonstrated that the cost-benefit relation of RT-D's is very high, in spite of the rather high cost of establishment

CIAT's Network has progressed very rapidly with the establishment of RT-A and RT-B Figure 7, presents the location and collaborating institutions of RT-A and Appendix 4 and 5 the same information for RT-B

No RT-C trials have been established and will not be until appropriate methodology is available

In the lack of RT-C methodology, as mentioned above, intelligent decisions can be made using results of RT-B's and the experience of local and CIAT researchers, to select carefully outstanding germplasm to be tested as pastures for their animal production capacity (RT-D) in a few country locations It is very important to start promptly with the establishment

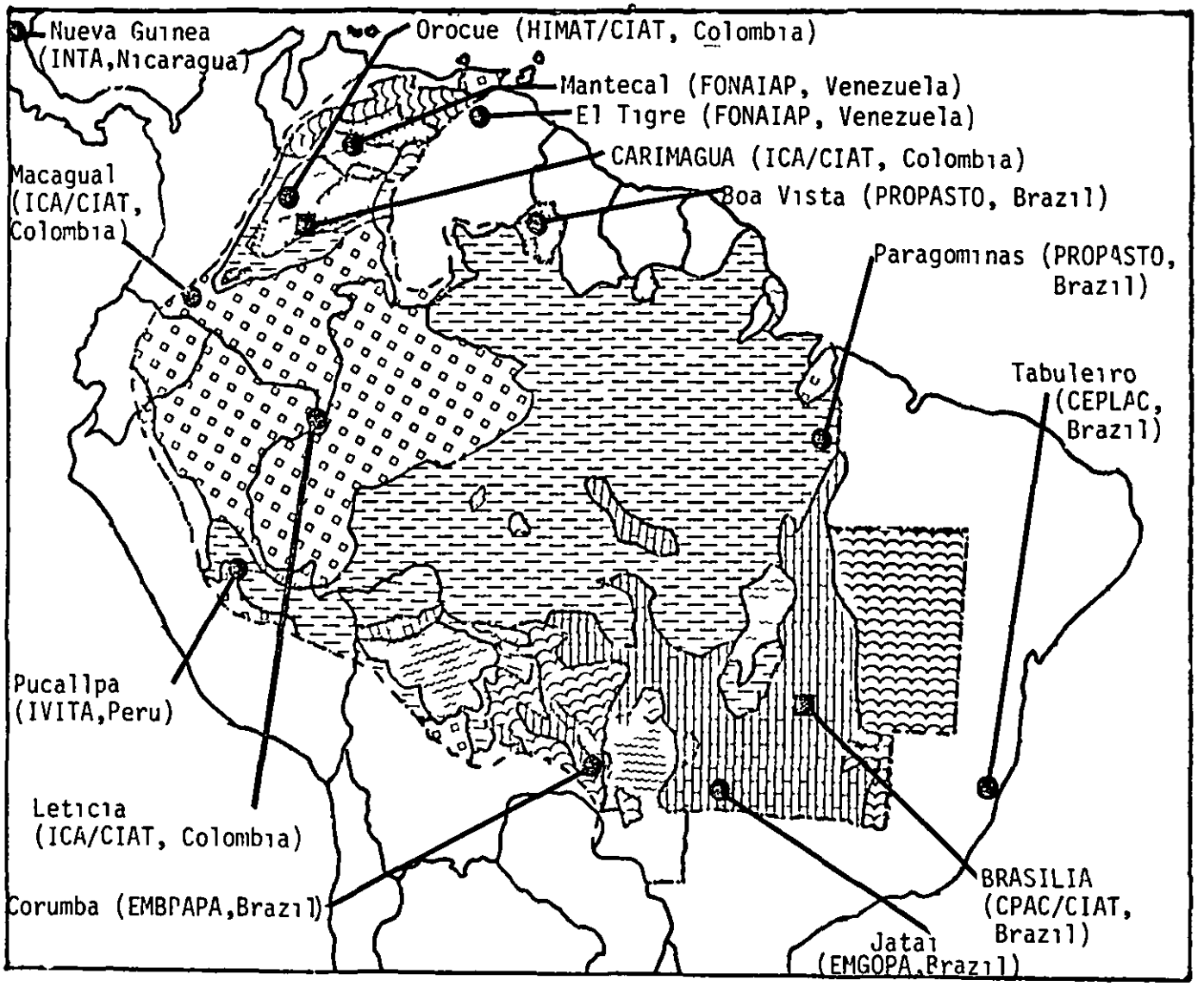


Figure 7 Location of Regional Trials A and major screening by ecosystems

of few RT-D so as to gain the necessary experience on the handling of regional grazing trials, for which there is no previous experience been reported There are also some methodological desagreement on the most appropriate way of handling the grazing management of the experimental grazing plots, these initial trials been of much use to help answer this question Moreover, the first workshop, proposed to be held at the early start of the Project, will also help to bring to a meeting of minds and to a decision on the grazing management to be followed in the RT-Ds

CIAT's Network will eventually contain a fairly large number of RT-D's which will conform a solid base for interpretation of Regional Adaptation of pastures for grazing Animal Production The five sites recommended for financing through IDRC's funding will be technically an initial integral part of the Network, but will be, at the same time, an individualized country activity with its own label and personality

B 5 National Institutions Participant of the Regional Network

Participating Institutions are in general of two kinds National Research Institutions and Research Programs of National Universities

Appendix 6 lists the institutions participating in the Network at present The number of participants will increase as more germplasm is available, as more seed available and as more countries are incorporate into the system

C PROJECT OBJECTIVES

The general objective of this Project is "to improve livestock production in underprivileged areas of tropical America so as to facilitate the provision of cattle products to the human population"

Specific objectives are

1 Select germplasm adapted to the prevailing conditions (soil, climate, pests and diseases) of the different ecosystems of low

land tropical America

2 The stenghtening of the Regional Network by the provision of support for the training of pasture research professionals primarily of lower income tropical countries

3 The development of appropriate methodology for agronomic trials involving the grazing animal's effects (RT-C)

4 Provide the technical and financial support to local institutions which, because of limited technical and/or budgetary facilities, cannot move the selection procedure to the point of release to the producers, through the establishment of animal evaluation trials (RT-D)

D METHODOLOGY

The Project is divided into three activities

1 Network activities

2 Development of Research Methodology, RT-C

3 Country Trials on Animal Production Potential, RT-D

The first two activities will be directly conducted by CIAT's Tropical Pastures Program in collaboration with national institutions

The country trials on Animal Production Potential (RT-D, activity No 3) will be technically oriented by CIAT and coordinated by the supervisor of this project under the leadership of the Coordinator of CIAT's Tropical Pastures Program Funding will be channeled directly to the national institution involved and each country trial will be supported by a bilateral agreement between IDRC and the national institution The sites of the trials will be recommended by CIAT and will constitute, integral parts of the Regional Trials Network

D 1 Network activities

The Project will concentrate on the training aspects of the Network,

providing support for three types of activities (a) meetings, (b) workshops, and (c) training of national institution's professionals in tropical pasture selection, production and management

a Regional Trials Meetings

Two Regional Trials Meetings are proposed to be conducted under the Project's financing These meetings will be open forums for collaborators of the Regional Trials Network to present their findings and experiences in relation with the evaluation of the germplasm As many of the collaborators as possible will be invited to these meetings, the numbers reaching around 60 participants from all collaborating national institutions A limited number (3-4) of well known scientists in the main subject of the meeting will be invited to present technical paper as basis for discussion

The first Regional Trials meeting will be held early 1982 and will designed to (i) evaluate the advances made by the Regional Network at RT-A and RT-B level, and (ii) to present and discuss future developments of RT-A and RT-B trials, in view of the results obtained, both in terms of methodology as well as in terms of scope and coverage

The second meeting will take place in 1983 with the following objectives (i) to further evaluate the advances made at the RT-A and RT-B level, (ii) to review the results of research on RT-C methodology discussing future Network developments of RT-C, and (iii) to evaluate the first results of the Network at the RT-D level

Level of firancing and IDRC's participation as well as composition of participants will be equal in Regional Trials Meetings

b Workshops

Four workshops are contemplated to be conducted during the three years of the project The main objective of the workshops is to discuss "in depth" specific technical problems arising from the conduction

of the ongoing Network It is estimated that each workshop will bring together around 15 highly qualified scientists, both from the national programs participants in the Network as well as well known outside scientist in the subject under consideration

Each of the workshops will focus the discussion, with the guidance of leading papers prepared by specialists on a major technical problem associated with the germplasm and the methodology employed for its evaluation throughout the Network

(i) Workshop 1 will be held during the first year of the project, after the first meeting The technical problem for discussion will be related to methodology for RT-C and RT-D Information/ cost trade off of using alternative methodologies will be assessed and discussed It is expected that, as a result of the workshop, some concrete suggestions for methodological research at RT-C level will be made to both to CIAT's Tropical Pastures Program and national programs and that agreement will be reached on alternative methods for RT-Ds

(ii) Workshop 2 will be held during the first semester of the second year of the project The technical theme will be aspects of plant diseases prevalent in the germplasm under evaluation The objective is to develop an objective idea of the pathological limitations of the germplasm, across ecosystems

(iii) Workshop 3 will take place during the second semester of the second year The technical discussion will center around soil-plant nutrition relationships and its changes across and within ecosystems in the Regional Trial's Network and in relation to the germplasm, soil and water resources

(iv) Workshop 4 will take place during the first semester of the third year of the project and before the second Regional Trials conference The technical subject will be the relationship between grazing management of experimental plots and the relative persistence of germplasm by plant competition, resistance to trampling and preferential grazing

c Training

Two levels or types of training should be considered in relation to the selection of forage germplasm and the introduction of the selected germplasm into farmers use

CIAT's Tropical Pastures Program offers in-service training of short duration which is divided into an intensive two months general pasture course and a subsequent period of in-service training under the supervision of one of the Program's specialized sections The duration of this stay varies between four and six months

In-service training is particularly adequate for professionals of institutions participating in the Network and taking responsability for the conduct of the local Regional Trials The period of training in CIAT exposes them to the philosophy of the Network and the Program's, puts them in direct contact with the germplasm and gives them the necessary technical and scientific knowledge to conduct and interpret the Regional Trials

Forage selection does not stop at the end of the Regional Trials but continues into the phase of introduction into farm use and adaptation to the area's farming systems Successful analysis of the area's problems and the translation of information into analysable language, requires personnel trained beyond the short in-service training provided Some disposition should be made for opportunities at the M Sc level for a limited number of participating professionals

Provision has been made under the project for 18 month man per year, which will provide for in-service training of 3 professionals participating in the Network for a 6 month period each

Under the bilateral agreements between IDRC and the national institutions, funds will be made available for 1-6 month in service training for each participating national institution In addition three scholarships for M Sc training will be provided, in which the student will take his course work at the appropriate University and will conduct his thesis research at CIAT Funds provided should cover an 18 month stay at the University The thesis research period will be financed totally by CIAT core foundings Candidates for the three M Sc scholarships will be selected out of professionals currently working at the collaborating national institutions

D 2 Development of Research Methodology, RT-C

This part of the Project Activities will be conducted principally at CIAT locations (Quilichao and Carimagua in Colombia, and in CPAC, Brazil) and will be lead by CIAT scientists, and will be in addition to the research objective, used as a principal components of training of the collaborating professionals

While specific trials will have to be designed by the research scientists after a tight problem definition and hypothesis development, the following ideas are included-with the purpose of providing a feeling of the type and scope of the research

a) Comparison of the selection accuracy of contrasting genotypes mixtures and when decision is made based on agronomic cutting trials and small plot communal trials Several grazing management systems should be included, and as a check for decision accuracy, animal production measurements under grazing should be done

b) Investigations on the degree of fertility transfer produced under communal small plot grazing experiments, in which several levels of fertilizer application are included and effect of this fertility transfer on selection accuracy

c) Studies on the mechanisms of species selection by grazing animals and its effect on the sward, as affected by grazing pressure and fertilizer as compared to cutting plots, when small plots are communally grazed

Taking as example one experiment comparing the accuracy of selection between cutting or grazing of small plots, involving only five legume species and two companion grasser, with only one level of fertilizer and using animal growth data as check, the field layout would contain the following approximate inputs 20 ha of land, 9 km of fences and 26 watering points

It should be pointed out that 90% of the pasture area and 80% of the fencing estimated for an experiment such as this, is employed in the check plots which serve to measure animal production, the point being that if the methodology of small plot communal grazing does work, the cost of selection would decrease considerably since the number of treatments to be included in animal production grazing trials would decrease

D 3 Country Trials on Animal Production Potential, RT-D Types

In previous sections of this Project Proposal, the activities of CIAT's Regional Network of Tropical Pastures was outlined and the division in 4 types of Regional Trials emphasized It was also pointed out that in many instances, the chain of germplasm selection come to an abroupt stop at the small plot, agronomic level, because national institutions find it difficult to finance further selection due to the need to use grazing experiments of larger magnitude and higher cost

It is clear that national programs will not capture producers interest

and local financing agencies support until the new germplasm has been tested under grazing and animal production figures made available

Grazing experiments should be designed in a very simple form to provide the desired answer, making special emphasis on determination of adaptation to grazing, stability in the mixtures, and measurement of animal production on a per-animal and per hectare basis, according to seasonal changes

A simple design will permit the conduct of the experiments by personnel with little experience Also, maintaining an uncomplicated set of treatments will favor comparisons across ecosystems, of key interest to the Network

Once simplicity of design has been advocated, it should be said that at this level of testing of the material, there cannot be one rigid design applied to all circumstances, but rather, within logical boundaries, national programs could set-up the experiments in the way which better adjusts to the physical and socio-economic conditions of the area of influence of the experiment To illustrate the point, consideration can be made of one of the most argued topics in management of grazing trails, that is continuous vs rotational of grazing The advantages of one system vs de other would fill many pages of discussion, but conceivably continuous grazing could be most suited for an area of extensive production while some form of rotational grazing could be most adequate for more intensive milk producing areas Imposing a different type of management would be illogical and will defeat the purpose of interesting producers in the new germplasm

From the results of the first workshop, a series of low cost alternatives designs should emerge, which will be documented and transfered on to national programs and which will be incorporated into the training of national program's personnel

As a basis for estimating magnitude and cost of RT-D type, a comparison of 3 new accessions and one control, in mixture with the same companion

species, is used The following would be the general description and needed inputs

Design randomized complete blocks

Treatments 4

Replicates 3

Duration of trial minimum 3 years

Total number of grazing paddocks 12

Area 24 ha + access roads

Fencing 6 8 km

Watering 1 tower and 24 watering points

Salting 24 mineral boxes

Animals 24-36 renewed annually

Vehicle 110 car-day/year

Personnel inputs are estimated at

Professional staff 6 man-month/year

Labor 24 man-month/year

Administrative back-up 8 man-month/year

Grazing trials require larger quantities of seed for the establishment of pastures Much of the species to be seeded will not have seed available commercially In every instance, the budget for an RT-D has included an allocation for the purchase of seed The seed required can be purchased commercially if available For new accessions, CIAT's Tropical Pastures Program commits itself to produce and sell at cost to the national programs the necessary seed for the RT-Ds Planning of RT-Ds will have to be made well in advance to give CIAT time for seed production

The project considers the direct financial support up to 5 RT-D located in areas with budget limitations but at the same time in which a significant impact of the new germplasm is expected

Specific locations cannot be named at this moment Analysis of the results of RT-B have not been completed to give basis for objective selection of the appropriate sites However, the following locations would rank among the most promising Lethem (Rupununi) - Guyana, Olancho-Honduras, Calabacito (Veraguas)-Panamá, Valle del Sacta-Bolivia, Estación El Napo-Ecuador, Moblissa-Guyana, La Ceiba-Honduras, El Recreo-Nicaragua

It should be pointed out also that the "Amazonian Production Systems Project" located in IVITA-Pucallpa, Peru, supported by IDRC, is an integral part of the Regional Network and the site of one of the major RT-A As part of that project, RT-Bs and RT-Ds are contemplated and will, therefore, be part of this effort, but with funds channeled by IDRC directly to IVITA'

Taking the Regional Network as a whole, there sould be at least 15 RT-D trials established within the period of 1981-1985 The 15 trials will permit some degree of generalization and analysis of common features of response of some of the germplasm to the continued effect of the grazing animal and will also facilitate the estimation of the potential economical impact of the new germplasm on a continent-wide basis

E BUDGET

1 Budget for Each Country RT-D

As indicated previously, IDRC will finance up to 5 RT-Ds in institutions where budgetary limitations will not permit the establishment of these trials For this purpose, an individual and specific project will be signed between IDRC and each of the National Institutions The following figures constitute an approximate budget for each country RT-D, and the expected animal contribution of National Institutions

Expenses	Year 1	Year 2	Year 3	Total
	← US$ →			
Training				
in-service, 6 trainees-month	5,000	-	-	5,000
M Sc , 18 trainee-month	-	16,000	8,000	24,000
Pasture establishment				
land preparation, $100/hl	2,400	-	-	2,400
seed, 10 kg/ha, $200/ha	4,800	-	-	4,800
fertilizer establishment $80/ha	4,320	-	-	4,320
maitenance $100/hl	-	2,400	2,400	4,800
Fencing, $1,000/km	8,000	-	-	8,000
Watering facilities	5,500	-	-	5,000
Mineral troughs	500	-	-	500
Animal balance	3,000	-	-	3,000
Animal shute	3,000	-	-	3,000
Mineral supplements	432	432	432	1,296
Subtotals	36,452	18,832	10,832	66,116
Contingencies, 16%	5,832	3,013	1,733	10,578
TOTAL	42,284	21,845	12,565	76,694

E 2 ANTICIPATED CONTRIBUTION OF NATIONAL INSTITUTIONS

Country Trials on Animal Production	Year 1	Year 2	Year 3
Potential, D, type trials			
- Professional staff, man-month	12	30	30
- Labor, man-month			
Pasture establishment	20	30	–
Maintenance, pastures, fences, animals	24	60	60
Pasture sampling and handling of samples	24	60	60
- Use of vehicles, car-days	220	550	550
- Drying and chemical analysis of forage samples, No samples	570	1440	1440
- Animals, No of steers	96	240	240
- Vaccines and medicines, doses	384	960	960
- Administrative back-up, man-month	16	40	40

E 3 TOTAL BUDGET FOR THE

"TROPICAL PASTURES REGIONAL TRIALS NETWORK A mechanism for technological feedback, validation and transfer with and among national programs in Tropical America"

Expenses	Year 1	Year 2	Year 3	Total
	US$			
Network Activities*				
Regional Trials Meetings (2)	50,000		60,000	110,000
Workshops (4)	15,000	33,000	18,000	66,000
Training (18 MM/yr)	15,000	16,500	18,000	49,500
Supervisor (1/3 time)	22,000	24,000	26,500	72,500
Secretarial assistance	5,000	5,500	6,000	16,500
	107,000	79,000	128,500	314,500
Development of Research Methodology*				
Small equipment	3,000	2,000		5,000
Infrastructure	17,000	19,000		36,000
Pasture establishment	5,000	7,000	5,000	17,000
Casual laborers (3 M/year)	11,000	12,000	13,500	36,500
	36,000	40,000	18,500	94,500
Overhead*				82,000
Subtotal*				491,000
5 Country Regional Trials D**				
	84,568	170,542	90,665	345,775
TOTAL	227,568	289,542	237,665	836,775

* Money channeled through CIAT

** Money directly to the countries

E 4 Budget Notes

a Regional Trials Meetings

It is estimated that the average cost per participant is of 850 U S calculated in the following manner

air travels= 600, per diem = 40 US/day - 600 + (40 x 6) = 840

840 x 60 = 50,400 (Ten percent inflationary increase is calculated per year)

b Workshops

The figures in the budget are calculated as follows

participants = 15

air travel = 800 x 15 - 12,000

per diem = 15 participants x 40 US x 5 days = 3,000

The air travel is estimated higher than in the previous heading since at least one participant may come from Australia Inflationary increases have also been calculated for years 2 and 3

c Training

It is estimated that the project will provide specialized training to 3 scientists per year during a 6 month period each

air travel = 600 x 3 = 1,800

Monthly stipends including medical insurance and book allowances = 730

730 x 18 = 13,140

d Supervisor

This heading refers to consulting fees for a senior scientist during an equivalent of 1/3 time (80 day/year) The costs have been calculated as follows

consulting fees = 150, 150 x 80 =	12,000
per diem = 70/day (60 travel days), 70 x 60 =	4,200
air tickets (5 trips/year) 5 x 800 =	4,000
Other =	1,800
	22,000

e Secretarial Assistance

f Small Equipment

This heading upon to items such as hoes, shovels, small field balances, manual mowers, portable water pumps, or would be required at Brasilia, Carimagua and Quilichao stations (please see page 25)

g Infrastructure

This refers to materials for approximately 3 km of fencig, 26 watering points and small water reservois for each of the above stations

h Pasture Establishment

It has been estimated at CIAT the average cost of establishment one ha of experimental pastures is 200 US dollars Figures for year one correspond to the establishment of 25 ha, and for year 2 that of 35 ha Figures for year 3 correspond to the maintenance of the 60 ha at an average rate of 80 dls/ha

i Casual Labor

These figures contemplate the equivalent of 3 laborers/year at a monthly salary of 305 US

305 x 12 x 3 = 10,980

J Overhead

The overhead charged by CIAT is 20%

k Country Regional Trials "D"

The Table in page 30 describes how the yearly costs per trial have been estimated Please refer to page 36 regarding the scheduling of the corresponding activities of these trials

The figures for year one were them calculated as follows

Initiation of 2 trials x 42,284 = 84,568

Year two initiation of 3 new trials

3 x 42,284 = 126,852, plus

second year operation of the 2 former trials = 2 x 21,845 = 43,690

126,852 + 43,690 = 170,542

year three operation of the first two trials

2 x 12,565 = 25,130, plus

second year operation of the other 3 trials

3 x 21,845 = 65,535

25,130 + 65,535 = 90,665

F SCHEDULE OF ACTIVITIES

Activity	Year 1	Year 2	Year 3
Conferences	X	-	X
Workshop 1	X	-	-
Workshops 2 and 3	-	X	-
Workshop 4	-	-	X
Publication of RT-D methodologies	X	-	-
In-service training	X	X	X
Technical supervision	X	X	X
RT-C Methodology studies	X	X	X
Publication of RT-C results studies and methodology	-	-	X
Country RT-D 1			
Pasture Establishment (P E)	X	-	-
Infrastructure Development (I D)	X	-	-
Years of grazing (Y G)	-	X	X
Country RT-D 2			
P E	X	-	-
I D	X	-	-
Y G	-	X	X
Country RT-D 3			
P E	-	X	-
I D	-	X	-
Y G	-	-	X
Country RT-D 4			
P E	-	X	-
I D	-	X	-
Y G	-	-	X
Country RT-D 5			
P E	-	X	-
I D	-	X	-
Y G	-	-	X

APPENDIX

Appendix 1 Allocation of family income and food expenditures to beef, and income elasticity of demand for beef by city and income strata

City	Income Quartile	Expenditure in Beef as % of Food expenditure	Expenditure in Beef as % of Total income	Income elasticity of demand
Cali (Colombia	I	24 2	16 4	1 28
	II	24 3	14 7	0 77
	III	23 3	11 4	0 42
	IV	18 6	5 5	0 41
São Paulo (Brazil)	I	9 5	6 7	0 86
	II	12 5	7 0	1 18
	III	12 8	4 8	0 47
	IV	13 4	3 6	0 43
Lima (Peru)	I	18 6	11 7	0 92
	II	19 4	8 7	0 88
	III	20 9	7 8	0 79
	IV	18 3	4 4	0 04
Caracas (Venezuela)	I	12 4	5 7	0 80
	II	14 3	5 7	0 54
	III	14 0	4 7	0 72
	IV	14 0	3 8	0 48

Source CIAT Annual Report 1978 and 1979

Apperdix 2 Allocation of family income and food expenditures to milk and dairy products, and income elasticity of demand for milk by city and income strata

City	Income Quartile	Expenditure in dairy products as percentage of		Income elasticity of demand
		Food expenditure	Total income	
Bogota	I	9 6	6 1	0 91
	II	10 0	5 3	0 69
	III	11 6	5 3	0 69
	IV	10 6	3 1	0 52
Cali	I	7 0	4 9	1 02
	II	9 5	6 0	0 91
	III	13 1	6 6	1 15
	IV	12 5	4 1	0 37
Medellin	I	8 5	4 8	1 55
	II	11 2	6 2	1 45
	III	13 5	6 2	1 20
	IV	13 1	3 8	0 56

Source CIAT Annual Report 1979

Appendix 3 Cattle stock production and productivity per head in Latin America and USA, 1974-1977

Region and Country	Stock (1974/1977)	Production* (1974/1977)	Production per head in stock (1974/1977)
	Million heads	Million ton	kg/year
USA	127 6	11 23	88
Tropical Latin America	184 7	4 64	25
Bolivia	3 0	0 69	23
Brazil	94 3	2 22	24
Colombia	23 3	0 50	21
Dominican Republic	1 9	0,04	20
Ecuador	2 7	0 06	23
Mexico	28 5	0 94	33
Paraguay	5 3	0 11	21
Peru	4 2	0 09	21
Venezuela	9 5	0 26	28
Central America	10 7	0 32	30
Caribbean	1 4	0 03	23
Temperate Latin America	73 1	3 12	43
LATIN AMERICA	257 8	7 76	30

*Carcass weight equivalent

Source Latin America Trend Highlights for CIAT Commodities 1980

Appendix 4 Regional Trials B during 1980 Well drained savannas, isohyperthermic

Country	Locality	Collaborator/Responsible	Date of Establishment
Colombia	Carimagua*	Soils and Plant Nutrition Section, CIAT	May, 1980
	"Paraiso", Puerto Gaitan	ETES project, CIAT	May, 1980
	"Guayabal"	ETES project, CIAT	May, 1980
	"El Viento", Puerto Lopez	ETES project, CIAT	May, 1980
Guyana	Lethem (Rupununi)	J W Smith, Clive Devers, CARDI	
Honduras	Olancho	M R Alvarado, Min de Recursos Naturales (DARCO)	Sept -Oct , 1980
Panama	Calabacito, Veraguas	M A Avila, IDIAP	Sept -Oct , 1980
	Los Santos	J Quintero, Fac Agronomia, Univ de Panamá	Sept -Oct , 1980
	El Chepo*	J Quintero, Fac Agronomia, Univ de Panamá	Sept -Oct , 1980
Trinidad	Aripo	N Persad y C Devers, CARDI	Sept -Oct , 1980
Venezuela	Mantecal (Banco), Apure	R Torres, FONAIAP	Oct , 1980
	"Las Marias", Calabozo	C Sanchez, Min Agricultura y Cría (MAC)	May, 1980
	"Gran Sabana"	J Rodríguez, CVG, y Z Florez, MAC	
	"San Jose", El Palmar	Z Florez, MAC y J Rodriguez, CVG	
	"Monserrate", Ciudad Bolivar	V Gamboa y Z Florez, MAC	
	Atapirire, Anzoategui	D Sanabria, FONAIAP	May-June, 1980
	Jusepin, Monagas	C Alcala y M Corado, UDO	
	La Esperanza	I Urdaneta y R Paredes, Universidad Zulia	May, 1980

* With three levels of fertilization

Appendix 5 Regional Trials B during 1980 Tropical forests

Country	Locality	Collaborator/Responsible	Date of Establishment
Bolivia	Valle del Sacta	J Espinoza, Universidad San Simón	Sept -Oct , 1980
Brasil	Barrolandia	J Marques Pereira CEPLAC	Oct , 1980
Colombia	Caucasia	L F Ramirez, Fac Med Vet y Zoot U Antioquia	Julio, 1980
	Puerto Asis	D Orozco, Fondo Ganadero del Putumayo	Enero, 1980
Costa Rica	Buenos Aires	V M Prado, Ministerio Agricultura y Ganaderia	Sept -Oct , 1980
Ecuador	Estacion "Napo"	K Muñoz, INIAP	Sept , 1980
	Estación "Pastaza", El Puyo	M Freire, ESPOCH	May, 1980
Guyana	Moblissa	J W Smith, Livestock Development Co Ltd	Sept , 1980
Honduras	La Ceiba	N Nolasco, Secretaria de Recursos Naturales	Sept -Oct , 1980
Nicaragua	El Recreo	A Cruz Mallona, INTA	Sept -Oct , 1980
Peru	Tarapoto	J C Rodriguez, E Delgado y W Lopez, INIA/ COPERHOLTA	Oct , 1980
	Yurimaguas	M Ara y D Bandy, INIA/NCSU	Sept , 1980
Trinidad	Centeno	N Persad y C Devers (CARDI)	Oct , 1980
Venezuela	Casigua	I Urdaneta, R Paredes, Universidad Zulia	May, 1980
	Guachi	I Urdaneta, R Paredes, Universidad Zulia	May, 1980

Appendix 6 Institutions collaborating in CIAT's Tropical Pastures Regional Trials Network

	Institution	Country
1	Universidad Mayor de San Simon	Bolivia
2	Empresa Brasilera de Pesquisa Agropecuaria	Brazil
3	Proyecto Pastagen (PROPASTO-Norte)	Brazil
4	Centro de Pesquisas de Cacao	Brazil
5	Empresa Goiania de Pesquisa Agropecuaria	Brazil
6	Instituto Colombiano Agropecuario	Colombia
7	Facultad de Veterinaria y Zootecnia, U de Antioquia	Colombia
8	Fondo Ganadero del Putumayo	Colombia
9	Instituto Colombiano de Hidrología, Metodología y Adecuación de Tierras	Colombia
10	Ministerio de Agricultura y Ganaderia	Costa Rica
11	Instituto Nacional de Investigaciones Agropecuarias	Ecuador
12	Caribbean Agricultural Research and Development Institute	Guyana and Trinidad
14	Ministerio de Recursos Naturales	Honduras
15	Instituto Nacional de Tecnología Agropecuaria	Nicaragua
16	Instituto de Investigación Agropecuaria	Panama
17	Facultad de Agronomía, Universidad de Panamá	Panama
18	Instituto Veterinario de Investigaciones Tropicales y de Altura, Univ de San Marcos	Peru
19	Instituto Nacional de Investigación Agropecuaria	Peru
20	Fondo Nacional de Investigaciones Agropecuarias	Venezuela
21	Ministerio de Agricultura y Cria	Venezuela
22	Universidad de Oriente	Venezuela
23	Universidad del Zulia	Venezuela
24	Corporación Venezolana de Guyana	Venezuela