A Flexible Grazing Management System Model for the Advanced Evaluation of Associations of Tropical Grasses and Legumes under Grazing Have a Number of Limitations. The Rapid Growing System can only meet these demands if the dynamics of pastures as they interact with climate, soils, and biotic factors, and management. Consequently, the true potential of new grassland systems is often underestimated. A flexible grazing management system is proposed to overcome some of the limitations of traditional fixed grazing methodologies. The methodology proposed involves managing each association under evaluation in a flexible but pre-defined manner. Stocking rates and grazing systems are adjusted depending on the parameters to be measured or estimated in the pasture. A stocking rate is adjusted when the legume component reaches selected limits (e.g., 15 and 50% of the green forage on offer). Then the pasture reaches the lower limit of the rest period. The rest period is increased when the legume component reaches the upper limit of the rest period. The rest period is reduced. Both stocking rate and grazing system adjustments are likely to be infrequent (two-three times yearly) in the humid tropics if the rate of forage on offer and legume are properly measured. A simple two-paddock alternate grazing system is employed. The methodology is presently being tested in a sub-humid tropical environment in Bahia, Brazil.

**Objectives:**

- Coralgrass evaluation methodology flexible grazing management system evaluation advanced grazing evaluation

**Introduction:**

The need for evaluation of tropical forage management under grazing is an essential step in the process leading to selection and release of new cultivars. Most graziers to this use a fixed stocking rate and continuous grazing system adjusted out of grazing rate to estimate the potential of this methodology. There is a need to develop a more flexible system that will provide an additional evaluation system. The potential of this system to improve the current evaluation system is being tested in a tropical environment in Bahia, Brazil. Among the experiments undertaken by Askew et al. (1976) and others, a continuous grazing system (C.G.) and a re-rotation (R.R.) grazing system were used. The potential of the N. latifolium x N. rufus and N. paniciatum x N. rufus were described. The results of these experiments show that the potential of rotational grazing is probably due to the low palatability of this species compared with P. maximum and sugarcane that more efficient under continuous grazing than under rotational grazing. He concluded that the high proportion of N. latifolium x N. rufus is probably due to the low palatability of this species compared with P. maximum and sugarcane that more efficient under continuous grazing than under rotational grazing. He concluded that the high proportion of N. latifolium x N. rufus is probably due to the low palatability of this species compared with P. maximum and sugarcane that more efficient under continuous grazing than under rotational grazing.
period longer than 3 years. Recent experience in the humid tropics of Latin America where table 11 clearly shows that under continuous grazing and where legume associations have been quite satisfactory, in other areas it leads rapidly to legume dominance of pasture. This has been the experience in Garrania, Colombia with pastures of Andropogon gayanus and Leucaena leucocephala (CAI 1983). However, pastures of Brachiaria decumbens with L. leucocephala have been quite stable and productive during 6 years under continuous grazing (CAI 1983).

Evaluation using stock units often understates the potential of the system. For adjusting stocking rates downward for lack of resources to absorb the animals removed. However, an extensive and semi-intensive grazing system which characterizes most livestock production in the humid tropics the percentage of the pasture is small (but expensive) relative to native resources and can be managed flexibly, taking advantage of the buffering capacity of the species.

LIMITATIONS OF TRADITIONAL METHODOLOGY

Designs based on a range of stocking rates and one or more pasture systems. Available resources usually permit only one system or grazing with two or three stocking rates with both factors uniform for all associations under evaluation. Thus, an association which functions best under continuous grazing may be evaluated using some form of rotational grazing system or vice versa. If this occurs, it is likely that the association will be unstable or that higher stocking rates leading to an under-estimation of its potential. It could easily be destroyed due to low productivity and/for lack of stability.

Another major limitation is the rigidity of this type of evaluation. It does not recognize the dynamics of the pasture and the ecosystem in which it is being evaluated and can easily lead to erroneous conclusions because of the cumulative effects of periods of over- or under-management. Thus, a simple study of a single period with a low probability of occurrence may unduly affect the outcome of a long-term grazing trial as a result of the temporary over-grazing of what might otherwise have been some of the best treated combination. The residual effects of this one period of stress could lead to serious understatement of the potential of the association. Some species are much more susceptible to mis-management than others, and the effects of periods of stress can be irreversible or persist for many years in pasture formed by less resilient species.

Art and Telijk designs. This methodology is used to estimate the production potential of pastures under one or more consistent grazing pressures without regard for species balance and persistence. It requires intensive management which is usually not relevant to commercial pasture management.

WORKING HYPOTHESES

As a basis for the development of alternate methodology, the following hypotheses have been formulated:

1. Management requirements may be different for different associations in a given ecosystem.
2. A given association may require different management in different ecosystems.
3. Grazing selectivity is the function of many factors, including grazing system and management which strongly affect species balance in most tropical pastures.
4. Continuous grazing usually favors the legume while deferred grazing favors the grass in most tropical association.
5. The effect of trampling on pastures is minor on structurally weak soils if adequate cover is maintained.

THE PROPOSAL

It is proposed that each association be managed in a flexible manner. Stocking rates and grazing systems are adjusted depending on two pasture parameters: the stock rate, set at a level adjusted to grazing pressure based on pasture forage on offer, reaches selected limits (e.g., 3 and 6 kg DM/100 kg liveweight/day). When the pasture reaches either limit, the stocking rate will be adjusted to maintain the grazing pressure within the pre-established range. The grazing system will be adjusted when the legume content reaches selected limits (e.g., 15 and 30% leucaena in given forage on offer). If the percentages exceed the upper limit, the rest period is increased, and when legume content reaches the lower limit the rest period is reduced. The range of forage on offer and botanical composition is relatively broad, therefore adjustments in stocking rate and grazing systems will be infrequent and simple, may only be seasonal. It is important to note that the proposed system of management is much less intensive than that required for put and take designs. The management responses required are presented schematically in Figure 1. The field design being used is a test of this methodology in Cariquima and in the Degregorio Fodur Experimental Station of CAIAC next.
Barroldania, Bahia, Brazil, is shown in Figure 2. In the basic design, each association is planted in one paddock in each replicate. The paddock should be large enough to carry at least two animals. Size will depend on association and ecosystem. In Barroldania and Carinagain each paddock is 0.75 ha with two replicates for a total of 1.5 ha per association. In Carinagain each paddock is divided and a grazing group (beginning with three animals) will alternate between the two divisions in each replicate. The initial stocking rate will be approximately two animals/ha (four recently weaned calves). Larger paddocks and more animals could be used to obtain greater precision if resources were available.

The measurements to be taken are botanical composition and availability of green forage as animals enter each division at the beginning of each season and periodic animal weight gains. A record of all aspects of management is required to calculate animal grazing days and average stocking rate (number of animals and animal units derived from liveweight gain data). A record of climatic and biotic events should be maintained in order to correlate these data with animal performance, the performance of each association and the management required to maintain the basic pasture parameters within pre-established limits.

**POTENTIAL ADVANTAGES OF THE PROPOSED METHODOLOGY**

1. The management proposed recognizes the dynamics both long- and short-term of the different pastures under trial as well as the differences between associations in any given ecosystem. 2. The system is self-adjusting responding to feedback from pastures under trial in the form of changes in basic pasture parameters. 3. It is similar to commercial systems which are flexible to assure adequate animal production consistent with acceptable persistence and balance of the association. 4. Flexible management requires the definition of "good management" of associations in practical terms, i.e., in terms of observable pasture parameters, thus should be valid for commercial production systems as well. As a consequence, the information should be of immediate value in the transfer of technology 5. The methodology is efficient in terms of land utilization time and personnel in determining the grazing feasible for a particular ecosystem its management requirements approximate potential stability and persistence. 6. Flexibly managed trials should be less influenced by seasonal and random climatic and biotic stresses and random land variation than rigidly managed trials. Therefore, the results are expected to provide a better basis for temporal and spatial extrapolation of grazing and management recommendations within an ecosystem.

**LITERATURE CITED**


Spain J N (1980) "The effect of grazing management on persistence stability and productivity of legume-grass associations on well-drained soils in the northern humid tropics" Internal document Tropical Pastures Program CIAT 12 pp Cali, Colombia (available on request)


Stobbs T H (1969) "The effect of grazing management upon pastures productivity in Uganda" III Rotational and continuous grazing Trop Agric (Irwin) 46(4) 293