

Cattle production in the pre-Amazon and sub-Andean ecological region

By: Ing. Rober Sejas y Ing. Jose Espinosa

Cochabamba, August 2007

Content

1. INTRODUCTION	2
2. COMPONENTS OF THE PRODUCTION AND ITS MANAGEMENT.....	2
2.1. THE COMPONENT PASTURE.....	2
2.1.1. <i>Species composition of the cultivated pastures</i>	3
2.1.2. <i>Species composition of the degraded pastures</i>	3
2.2. THE ANIMAL COMPONENT	3
2.2.1. <i>Races</i>	4
2.2.2. <i>Management of the animals</i>	4
2.3. PRODUCTION INDICES	4
3. DEGRADATION OF PASTURES	5
3.1. CAUSES OF THE DEGRADATION AND COMMON PASTURE MANAGEMENT	5
3.2. CONSEQUENCES OF THE DEGRADATION	5
3.3. ACTUAL USE OF DEGRADED PASTURES.....	6
4. PRODUCTION OF DRY MATERIAL IN DIFFERENT PASTURES.....	7
4.1. OVERGRAZING	7
4.2. SUB - GRAZING.....	7
4.3. PRACTICAL EXAMPLE IN ORDER TO CALCULATE THE ANIMAL LOAD IN FUNCTION OF PROFIT OF PASTURE FORAGING	8
4.4. EFFECTS OF THE ANIMAL LOAD IN TRIAL GRAZING PLOTS	9
5. IDEAL PASTURE MANAGEMENT	11
6. POTENTIAL USE OF DEGRADED PASTURE AREAS	12
7. BIBLIOGRAPHY	13

1. Introduction

Approximately 15 to 20 years ago, two types of cattle breeding could be distinguished; cattle farms (purely for meat or for milk as well) and multiple purpose farms.

Actually the agricultural farms combine in different grades agriculture with cattle farming (agriculture-cattle farms), with as consequence the gradual degradation of the soils and agricultural activities like coca production (Cochabamba tropics), fruit yards and others; giving space, in this way, to the expansion of livestock farming activities with low production indices, based on pastures consisting out of native species with low yield and low nutritious value.

On the other hand, on the pure cattle farms the expansion of the pasture areas also has been significant because of the permanent degradation of the pastures, which, unfortunately, leads to the conversion of forest areas in new pastureland.

2. Components of the production and its management

2.1. The component pasture

The cattle farming which is being developed in the portfolio area is based almost entirely on pastures. Only a small amount of farms use energetic supplements and even less use mineral supplements.

The use of energetic supplements is limited only to some farms which have an agricultural component (stubs and harvest residues). The mineral supplements are occasionally used, according to the availability of economic resources of the farmers.

The pastures that support the cattle farming in the zone are in majority cultivated. It is estimated that over 50% of these pastures are degraded or clearly in process of degradation.

The degraded pastures or those in process of degradation generally have formed part of the frontal part of the farms, nearby the farm house and the infrastructure of the farm management (corals, milking sheds and others), some have perimeter fences, and on only a few farms there are division fences.

Like indicated before, in those farms where cattle's farming is complementary to the agricultural activity, pastures consist of native gamine and other species and occupy also, the frontal part of the farms.

2.1.1. Species composition of the cultivated pastures

The cultivated pastures are integrated, almost in its totality, by grasses of the type *Brachiaria*, all adapted to the agro climatic conditions of the region. The majority is *Brachiaria decumbens*, followed by *Brachiaria humidicola* and in lesser proportion *Brachiaria brizantha*.

Also there are small surfaces of *Panicum maximum*, particularly in relatively fertile areas free of inundations.

The new pastures or the recently established ones have *Brachiaria decumbens* and *Brachiaria brizantha* in their composition, associated with leguminous species: *Pueraria phaseoloides* (Kudzu), *Desmodium ovalifolium* or *Arachis pintoii* (foraging peanut).

The participation of the Kudzu, the most frequent protein source in pasture areas, declines with the age of the pasture; reaching levels close to 0 in degraded pastures.

Some farms have small scale areas with grasses for reaping, predominantly existing out of *Axonopus scoparius* (Sara K'achu) and varieties of the *Pennisetum purpureum* (Merkeron).

2.1.2. Species composition of the degraded pastures

Degraded pastures and pastures on left crop land, have in their composition of grasses native grasses of the types; *Axonopus*, *Homolepsis* or *Paspalum*, characterized by its low production, and its poor nutritious values which not satisfy the minimum nutritious requirements of the animals.

2.2. The animal component

The cattle farming which is developed in the zone corresponds to a multiple purpose production system; including milk production and/or meat production parallel to cattle raising. Consequently in those cattle

farms with a double goal; the milk is commercialized or destined to family consume and afterwards the calves are allowed to stay with their mother during predetermined times per day.

2.2.1. Races

The animal herds are racially mixed, resulting on some occasions in the indiscriminate crossing of ancestors with dominating blood of Pardo Suizo, Holando, Gyr, Nellore, Pitangueira y Criollo and with others a continuing selection based on phenotypic characteristics, the productive and reproductive behavior and the dominant health of the ancestors and the resulting animals.

2.2.2. Management of the animals

The different categories of animals, except the calves, form one single group; all categories graze and rest together during the day.

In those cattle farms with a double goal, the statistics indicate that the percentage of adult cows in the herd, represent only 40% and the amount of producing cows only just reach 35% of the total of adult cows. This shows a management system which is absolutely inappropriate and counterproductive.

2.3. Production indices

Corresponding to the production system and the genotypic characteristics of the animal component, the production indices are very low in cattle farms as well as in mixed farms (García, G. 2001).

The average daily milk production per milking cow is approximately 4.1 liters and the milking periods don't exceed 200 days.

It is estimated that the daily gain in weight hardly is more than 250gr in periods of abundance of foraging material, the reason for which the commercialization of young bulls generally occur at the end of the third year with weights on the hook between 120 and 160Kg.

3. Degradation of pastures

Because of inappropriate management of the native pastures and the introduced pastures, at least 50% of the pastures in the area are degraded. This degradation shows in its excessive soil compaction, which is favorable to laminar hydraulic erosion, and facilitates the invasion of herbs because of the low vigor and cover of the desirable foraging species. All this reduces the loading capacity and the stable productive persistence in those pastures (CIAT, 1995).

As a rule pasture is degraded when the production capacity and the quality of the pasture are minimal. This particularity or this detriment of pasture is generally translated in low indices and insustainability of production.

3.1. Causes of the degradation and common pasture management

In the zone, the principle cause of degradation of pastures is bad management, which leads to extreme compaction of the soil, giving way to the gradual invasion of native grasses which end up choking and displacing the cultivated foraging species.

Continuous grazing is most common on cattle farms in the portfolio area. The majority of the farms only has perimeter fences and don't have dividing fences. The management in the zone exists out of burning the pastures between 2 to 3 years in order to eliminate ticks and its eggs, and a burning every 4 to 5 years in order to renew and improve the pastures, period of productivity of the pastures is considered 20 years.

Nevertheless, in those few farms that are divided in different grazing areas the pasture management also is not efficient, in terms of animal load and grazing system.

3.2. Consequences of the degradation

In the region the degraded pastures, unfortunately, gives way to the intervention or deforestation in new areas of primary forest or forest in stages of succession because of the economical state of the farmers, the local economy and the reining environmental conditions in the region. The resulting pastures are management like described before and after

3 to 4 years are also degraded or are found in an ongoing process of degradation.

Therefore the pastures recently established, which are those that practically sustain the cattle farming, are located far inside of the farm properties, very close to the posterior part of the farms.

3.3. Actual use of degraded pastures

The areas of degraded pasture whose surface area is fluctuating between 10 and 50 hectares (according to the region), actually are used as leisure areas, shelters or where the nursing cows and or meat animals pass the night, in order to facilitate the milking activities or of the next day; which, in general, is very early in the morning.

4. Production of dry material in different pastures

According to Quezada (1991), the agricultural evaluation of the 25 ecotypes of *Brachiaria* in the valley of Sacta in the Carrasco province, area being part and being representative for the portfolio area, indicate that, in a production period of 12 weeks (3 months), a maximum production of 5.85 to 5.87 T/Ha of Dry Material (DM) can be obtained in the period of maximum precipitation and a minimum production of 5.46 to 5.55 T/Ha in the period of minimum precipitation (table 1).

Table 1.- Production of dry material according to species in 2 precipitation periods

Period	Varieties	Production (T/Ha)
Maximum precipitation	<i>Brachiaria humidicola</i>	5,87
	<i>Brachiaria decumbens</i>	5,85
Minimum Precipitation	<i>Brachiaria decumbens</i>	5,55
	<i>Brachiaria humidicola</i>	5,46

4.1. Overgrazing

The pastures generally are overgrazed with very high animal loads (3 to 4 AU*/ha) which is not related to the availability of foraging material, loading capacity or pasture yield in foraging systems that vary in time, with long occupation periods with respect to the rest period**. This results in the significant deterioration of the improved species, in terms of quantity and quality, which is permanent and sometimes irreversible (Raymond R. Jones 1982). In the project zone animal loads of 4 to 5 AU/Ha are common, according to personal information of Sr. Eloy Montes (2007).

* AU= Animal Units One UA= 400 Kg. Of live weight

** The grazing system most recommended is: 7 days of occupation and 21 days of rest, which implies the availability of 4 paddocks.

4.2. Sub - grazing

Opposite to the indicated on some farms the pastures are clearly sub grazed; which means, that these pastures are submerged to inferior grazing intensities in comparison to its real grazing capacity. This practice is less frequent but also leads to deterioration of the pastures in terms of quality and quantity and in some cases give way to the

proliferation of plagues and sicknesses which affect the sanity and persistence in other grazing areas.

In the same way in the project zone there is prove of sub-grazing, with some cattle farmers, the main reason for this is lack of sufficient economical means to obtain cattle.

4.3. Practical example in order to calculate the animal load in function of profit of pasture foraging

- Imagine that we have 4 hectares of pasture associated of *Brachiaria decumbens* and *Pueraria phaseoloides* (kudzu).
- We decide to manage this pasture in a system of rotational grazing with 7 days of occupation and 21 days of rest, which implies dividing the pasture in 4 grazing areas of equal size*.

* Once defined the days of occupation and rest, the number of paddocks is calculated in according to the following mathematical formula:

$$\text{Nº of paddocks} = \frac{\text{Days of occupation} + \text{days of rest}}{\text{Days of rest}}$$

- With regard to the indicated example the surface of every one of the grazing areas is 1 hectare.
- We suppose that the profit of the pasture is 1000 Kg/ha.
- In order to suit our interests we decide to use a grazing pressure of 4Kg.* of dry material for every 100Kg. of living weight.

*According to Paladines, O. y Lascano, C. (1982):

- ✓ 3 Kg. Of dry material for every 100 Kg. of living weight is considered a high grazing pressure
 - ✓ 4 Kg. of dry material for every 100 Kg. of living weight is medium
 - ✓ 6 Kg. of dry material for every 100 Kg. of living weight is low
- With this information and the following formula we are able to calculate the weight of live animal which enter the pasture for grazing.

$$\text{PVT} = \frac{\text{MSV} \times \text{A} \times 100}{\text{PP} \times \text{DO}}$$

Where: PVT = Live weight total Expressed in Kg
 MSV = Dry green material Expressed in Kg/ha
 A = Area Expressed in ha
 PP = Grazing pressure Expressed in
 Kg de MSV/100Kg PV
 DO = Time of occupation of
 the paddocks Expressed in days

- Putting values in this formula gives us

$$PVT = \frac{1000 \times 4 \times 100}{4 \times 28}$$

$$PVT = 3572 \text{ Kg}$$

- From the calculated PVT we can deduct the animal load expressed in Animal Units (AU), knowing that one AU is equal to 400Kg of living weight.

$$\text{Animal load (CA)} = \frac{3572}{400} = 9 \text{ AU/4 ha}$$

- In that sense the animal load for unit of surface would be

$$CA = \frac{9}{4} = 2,2 \text{ AU/ha}$$

4.4. Effects of the animal load in trial grazing plots

According to García (2001), the effects of animal load in different trial plots are summarized in table 2.

Table 2.- Effects of the animal load in trial grazing plots.

Type of Pastures	Production MS/AU/year	Animal Load AU/Ha/year
Pastures of foraging grasses, natives or naturalized, existing on acid marginal soils under extensive management (continuing grazing, zero fertilization and irrigation)	2 up to 6 tons	0,3 up to 1,0

exclusively by seasonal rains)		
Pastures of introduced grasses, established on acid marginal soils Under a semi intensive management (continuous and alternated grazing, occasional fertilization, without irrigation)	8 up to 15 tons	2,5
Pastures of introduced grasses, established on medium up to high fertility soils under intensive management (intensive rotational grazing, high and adequate fertilization, oportune discompaction of the soil and required seasonal irrigation)	25 up to 50 tons	4,0 up to 8,0

According to the trial plots realized in the region Entre Rios located in the Carrasco province of the department of Cochabamba, specifically at a distance of 282 Km. of the city of Cochabamba, with a precipitation of 2000 to 2500mm, an average year temperature of 25°C, with a maximum of 37°C and a minimum of 21°C, in soils of alluvial origin, low in fertility and high in acidity with drainage problems and toxicity of aluminium (Thesis de Geovana Garcia, 2001). Table 3 shows the production of Dry Material.

Table3.- Relation of the animal load and the production of TN in MS/Ha

Parcel	TN in MS/Ha	Animal Load
Recovered Pasture	13,81	2,5
Degraded Pasture	5,36	1,0

The quantity of the total foraging production in the recovered parcels is a lot higher than in a degraded parcel, this can be attributed to the improved pasture management.

The anterior data coincide with the data of the animal load of the authors, who did evaluations in the region of Ivirgazama, Valle Ivirza and Entre Rios. See table 4, for the mentioned data.

Table 4.- Animal Load according to the different pastures

Parcel	Animal Load
Recovered Pasture	2,5
Pasture	1,7
Degraded Pasture	<1,0

5. Ideal pasture management

A pasture is considered to have a good management when the following practices are carried out: realize divisions in the pasture land, rotation of grazing in different grazing areas (weekly rotation), incorporation of reaping pastures, recovery of pastures by renewing foraging species, incorporation of silvopastoral systems, diversification of species and varieties of grasses (f.e. 3 species of *Brachiaria* combined with a specie of leguminous like the kudzu), and besides that capacitation of small farmers in pasture management. Realizing those practices it is possible to have an Animal Load of 2 to 3 AU/Ha in this zone.

6. Potential use of degraded pasture areas

Those areas that are seriously compacted and therefore not very productive but soils which, without doubt, are substantially enriched in fertility because of the assimilation of feces and urines of the cattle during a lot of years of grazing. This particularity can be taken advantage of by successful implementation of agrosilvopastoral systems with annual crops or crops with a longer live cycle like the passion fruit, the pineapple and others.

7. Bibliography

CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL, 1995, BIENNIAL INFORM: PROGRAM OF FORAGING IN THE TROPICS, WORK DOCUMENT N° 153, CALI, COLOMBIA PP3-8

GARCÍA, G. 2001. Evaluation of the foraging attributes of a tropical pasture recovered by mechanized soil preparation and its relation to animal production. Thesis in order to obtain Ingeniero Agronomo title. University Mayor de San Simon, Cochabamba, Bolivia

MONTES, E .2007, Personal communication

PALADINES, O. y LASCANO, C. 1982. Recommendations in order to evaluate foraging germoplasma under grazing. International network of the evaluation of tropical Pastures (RIEPT). International centre of tropical agriculture. Cali, Colombia.

QUEZADA W., 1991, AGRONOMICAL EVALUATION OF 25 ECOTYPES OF THE TYPE *BRACHIARIA* IN THE VALLEY OF SACTA. THESIS IN ORDER TO OBTAIN INGENIERO AGRONOMO TITLE. UNIVERSITY MAYOR DE SAN SIMON, COCHABAMBA, BOLIVIA

RAYMOND, R. Jones. 1982, Effects of the climate, the soil and the grazing management on the production and persistence of tropical foraging germoplasma. In foraging germoplasma under grazing in small plots. International network of the evaluation of tropical grasses (RIEPT). International centre of tropical agriculture. Cali, Colombia.