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PRODUCTIVITY OF INTENSIVE GRAZING SYSTEMS BASED UPON IRRIGATED PANGOLA PASTURES IN THE FRENCH WEST INDIES

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Abstract

This work deals with the comparison of the productivity of intensive grazing systems (IGS) in the French West Indies, used for meat production with cattle, goat and sheep. IGS are based upon the use of irrigated, fertilized, and high stocked (1.8 to 1.4 t live weight/ha/year) and rotational grazing *Digitaria decumbens* pastures. They lie upon good performance levels of local breeds, Creole cattle and Creole goats of Guadeloupe and Martinik ewes, and upon improved general husbandry. Both sheep and goat in IGS exhibit high levels of productivity. They reached up to 1000 kg LW of weaned offsprings and 1400 kg LW of fattened offsprings per ha and per year. Results for cattle were 522 and 1061 kg LW, respectively. The relative interests of species are presented with the aim of increasing meat production in the tropical zone and in limited land resource conditions.

Keywords: *Digitaria decumbens*, intensive system, creole genotype, productivity

Introduction

Breedingon pastures are the most leading feature of tropical animal systems of production (Humphreys, 1990). In the West Indies, ruminants are raised in suckling system for meat production. (Devendra and Mc Leroy, 1982). Production systems are almost totally dependent on the natural resources of the region and the animal productivity is affected by the effect of fluctuations in forage supply. However, a small proportion of farms are commercially oriented. Subsequently, as significant expansion in meat output is to be achieved, more productive systems of semi-intensive and even intensive nature start developing. The land resources for viable agricultural production are critically limited in many islands of the lesser Antilles. In such conditions and for many reasons reported by Humphreys, (1990), more emphasis is given to systems based on grazing forages and crop residues, than to grain feeding, Therefore, intensive grazing systems (artificial pastures, fertilisation and irrigation) have been investigated by INRA (Institut National de la Recherche Agronomique) in Guadeloupe with Creole cattle and Creole goat and in Martinique with Martinik hair sheep. The objectives of this paper were to determine the levels of productivity obtained in such intensive systems.

Material and methods

Guadeloupe and Martinique are humid tropical islands of the Caribbean area (16.1° N; 61.6° W and 14.4° N; 61.0° W, respectively). The experimental farms where researches have been carried out are located in the dry zone of the islands. The climate of these regions is characterised by a marked dry season (monthly rainfall lower than 70 mm during 6 months). Different experiments were carried out by INRA on Creole cattle, Creole goat and on Martinik hair sheep in the fields of reproduction, feeding, pathology and genetics.

For the small ruminants, reproduction was managed in order to obtain three parturitions within two years and was determined by the regular use of male effect. For the cows, natural service was applied once a year during 2.5 months. Offsprings were weaned between 60 and 90 days of age for kids and lambs, and at 220 days for calves. Treatments against ticks and anthelminthic drenching were regularly carried out for the different herds.

For each specie, the herd was grazing all over the year on *Digitaria decumbens* pastures managed in a rotative system. Various ages of forage regrowth have been tested with different number of paddocks but on the basis of 7 days of grazing and 35 or 28 days of resting, per paddock. These pastures were irrigated and fertilized with 300 kg N/ha/y. The stocking rate was 4.5 cows; 40 ewes and 60 goats per ha during the suckling stage. Only results obtained in each IGS for male animals were taken into account during the post-weaning with 5.4 bulls, 45 lambs and 100 kids per ha.

Animal performances were regularly monitored on the experimental flocks and allowed the building up of database on each specie over many years. Data have been separately analysed with different linear models according to SAS procedures. Means of such works were gathered in this present paper in order to be compared.

Moreover, productivity indexes defined by Wilson *et al.,* (1985) were calculated on the basis of weight of offsprings born (BWP) or weaned (WWP). All indexes have been calculated relative to adult female metabolic live weight ($LW^{0.75}$) and also to surface unit for each IGS.

Results and Discussion

Mean reproductive and growing performances of the different species and values of the different indexes are tabulated in table 1.

During the preweaning period, productivity indexes calculated on the weight basis were 27.9 *vs* 19.5 kg LW offsprings weaned /female/year or 1.60 *vs* 1.34 kg when related to female $LW^{0.75}$ for sheep and goat, respectively. However, indexes calculated at the GS level, were very similar (up to 1.0 t of weaned offsprings and 1.4 t of fattened offsprings per ha and per year) for the two small ruminants (probably linked to the numerical results per ha and per year). As a matter of fact, goats have higher numerical performances than sheep while the latter exhibit higher live weight and growth rate (twice more). Both sheep and goat intensive grazing systems exhibit high levels of animal performances and system productivities. Few data exist about these opportunities in the tropical literature (Devendra and McLeroy, 1982; Wilson *et al*., 1985). Small ruminants GS results exceed (twice more during the suckling phase and 33% more during the postweaning stage) those of cattle GS, because of their high frequency of reproduction, high prolificacy rate and their high number of heads per ha.

On the other hand, productivity indexes performed by Creole cattle upon intensive Pangola grazing system, are higher than those reported by Zimmer and Euclides Filho (1997) for brazilian herd in improved system, and by Humphreys, (1990) for jamaican studies.

These highly productive grazing systems, tested at the research-station level, lie upon genetic potential of local breeds and improved general husbandry. A global approach of the different components of the grazing system is necessary in order to take into account environmental as well as genetic effects upon total animal output. Fertilisation and irrigation of pastures allow high levels of carrying capacities all yearlong and improved feeding value of offered forages. So there is an opportunity for improvement of ruminant's production in tropical regions. Nevertheless, one must consider that there would have some difficulties to directly transfer these IGS at the farm levels in tropical conditions. Adaptations could come from the use of local feeding resources during the dry period or as supplements, rather than the application of irrigation, which is not available in all conditions. As the land resource is

critically limiting in many Caribbean islands other opportunities lie upon multiple use of surface area for rearing together different herbivores such as mixed or alternate grazing system with both large and small ruminants (Mahieu *et al*., 1997).

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Table 1 - Animal performances and grazing system productivity indexes obtained for Martinik sheep, Creole goat and Creole cattle grazing irrigated pastures of Pangola (*Digitaria decumbens*) in the French West Indies

Items	Martinik sheep	Creole goat	Creole cattle
	Individual animal performances		
	(Mahieu *et al*., 1997a,b)	(Alexandre *et al*., 1997, 1999)	(Naves *et al*., 1989; 1997)
Adult liveweight (kg)	45	28	415
Fertility rate (%)	85	92	83
Prolificacy rate (%)	170	210	100
Preweaning mortality rate	10.4	15.7	3.0
Matings interval	8	8	14
Birth weight (kg)	3.8	1.75	28.7
Weaning weight (kg)	14.3	7.9	169
Age at weaning (d)	70	82	223
Post weaning daily weight gain for male (g)	99	36	503
Postweaning period	4	8	12
	System productivity: Indexes calculated on the weight basis		
	At the flock level (LW/female /year)		
At birth (BWP)	8.2	5.1	20.3
At weaning (WWP)	27.9	16.3	116
WWP /female $LW^{0.75}$	1.60	1.34	1.26
	Output at the grazing system level (kg LW/ha /year)		
At birth (BWP)	325	304	91
At weaning (WWP)	1115	978	522
Post- weaning (PWP)	1482	1332	1061