Preliminary Observations On The Biometric Characteristics Of Zebu Populations (Girolandia And Nellore) Reared In The Northeast Of Brazil (Fortaleza - Ceará).

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Summary

A trial was carried out in Brazil (Fortaleza – Ceará) on 20 Girolandia and 19 Nellore calves, in order to describe the evolution of body weights and measurements. The animals were weighed and measured at birth and every three months up to the year of age. Finally the average daily gain and biologic growth efficiency were computed. Both populations showed a low growth impetus and better performances at lower ages (0.914 kg/d vs 0.514 kg/d for Girolandia and 0.847 kg/d vs 0.447 kg/d for Nellore, at the age of 50 and 150 days respectively). Data analysis also showed a wide genetic variability.

The outcome of this study is the need of an intensive work of genetic improvement and selection. Girolandia crossbreed need more rationalization and stabilization. Better cattle-breeding management is also required for a rational selection work.

Résumé

Vingt veaux Girolandia et dix-neuf veaux Nellore ont été utilisés dans une expérimentation effectuée au Brésil (Fortaleza – Ceará) dans le but de décrire l'évolution de leurs caractéristiques morphologiques et pondérales. Les animaux ont été pesés et mesurés à la naissance et tous les trois mois jusqu'à l'âge d'un an. De plus les gains moyens de poids vif par jour et le rendement biologique de la croissance ont été évalués. Les deux populations ont présenté des croissances modestes et des meilleurs performances à l'âge jeune (0.914 kg/d vs 0.514 kg/d et 0.847 kg/d vs 0.447 kg/d respectivement pour Girolandia et Nellore à l'âge de 50 et 150 jours).

L'analyse des données a mis en évidence une grande variabilité génétique et a montré aussi la nécessité pour Girolandia de rationaliser et de stabiliser le croisement. Enfin une rationalisation plus élevée des techniques d'élevage est nécessaire pour réaliser un travail de sélection plus rationnel.

1. Introduction

Beef cattle production is one of the most important resources of brazilian northeastern regions (2) but its production is often poor. A satisfactory improvement could be obtained operating both on exogenous (feeding, healthiness, breeding techniques and professional preparation) and on endogenous factors (genetics). Genetic improvement can be carried out through the selection among the autochtonous populations and the introduction of more productive allochtonous breeds.
Both processes have to be developed simultaneously.
The knowledge of actual biological and productive parameters is the basis of the subsequent work.

2. Material and methods

2.1. Facilities
Trial has been carried out at the experimental farm of the Educacional Center Pe. João Piamarta from October 1992 to December 1993. The farm is near Fortaleza, capital of Ceará state – Brazil (Lat.3°45'47" S Long.38°31'23" W). Ceará state is included in the *caatinga* region (1) whose en-

vironment scales from the forest to the semidesert. According to Maia Santos (4) this zone is included in the "subhumid dry" tropical region and presents an annual average rainfall of 750 mm. (assembled in only one period of the year: Feb-Apr) and a water annual deficit, according to Thornthwaite, ranging from -33 to -66 mm. The dominant vegetation of the region is represented by shrubby dense caatinga and coastal vegetation.

2.2. Animal population
20 Girolandia calves (semistabilized crossbreed between Friesian cattle and zebu Gir) and 19 Nellore calves were employed for the study. The calves were selected on the basis of phenotypic resemblance with the breed of origin. The reason of this choice is that the differences between subjects of the two populations were too wide.

2.3. Experimental design
All subjects were individually weighed and measured, every three months, from the birth up to the year of age. Linear measurements were executed with a Lydtin stick and a tape measure. Experimental results were analyzed with intraclass

analysis of covariance (3) according to the general model:

$$\gamma_{ijk} = \mu + A_i + S_j + b_i X_{ijk} + \varepsilon_{ijk}$$

μ = overall mean;

A_i = fixed effect of ith breed;

S_j = fixed effect of ith sex;

X_{ijk} = k^{th} observation of the independent variable of ith breed;

ε_{ijk} = random residual with mean=0 and variance=δ_e^2;

2.4. Measurements

The following parameters were recorded:

- weight

- height at withers   measured at the highest point of the withers;

- chest depth   measured at shoulders, behind the shoulder blade;

- chest girth   measured at shoulders, behind the shoulder blade;

- body length   cross line from the shoulder to the ischium tuberosity;

- rump length   cross line from the tip of the iliac wing to the caudal end of the ischium tuberosity;

- width at ilium   measured between the tips of the iliac wings;

- width at ischium   measured between the caudal ends of the ischium tuberosity;

- head width   measured at the extremity of the ocular bulbs.

The first derivative of the growth function was used to describe the body growth intensity. The average daily gain (ADG) was reported graphically, as well as the ratio between ADG and metabolic weight ($W^{0.75}$). This ratio is an index of the biologic growth efficiency (BGE), considered as the position given by the unit of the maintained metabolic weight (5).

3. Results and discussion

Tables 1 and 2 show the evolution of the calves body weights and measurements estimated at various ages. The groups were quite different: Nellore presented lower weights, with values similar to those reported by literature (6). These subjects showed however a lower growth deceleration in the final phases of the period of the investigation (0 to 360 d), confirming the tardivity of the breed. The average daily gain of the two populations (Figure 1) is similar with higher values in Girolandia calves. Figure 1 also reports the index of the biologic growth efficiency. BGE presents low values: higher in Nellore starting from the age of 100 days. Low values of BGE are probably due to a reduced average daily gain. Factors limiting the growth are low values of pastures and the genetic peculiarities of these zebu populations. The results show a reduced daily gain and remarkable individual differences in the growth, expression of a wide genetic variability.

TABLE 1

Morphological characteristics of Girolandia population at different ages

Factors of study		n°	Birth	90	180	270	360	R²	R.S.D.
			Age in days		
Weight	kg	60	33	117	169	188		0,96	10,40
Height at withers	cm	83	71	87	99	105	108	0,94	3,55
Chest depth	cm	83	28	38	45	49	50	0,95	2,02
Chest girth	cm	83	71	100	119	127	128	0,96	4,80
Body lenght	cm	83	61	83	99	109	112	0,94	4,73
Rump lenght	cm	83	21	29	33	34	36	0,91	1,70
Width at ilium	cm	83	16	23	28	32	34	0,89	2,20
Width at ischium	cm	83	9	15	19	21	22	0,83	2,02
Head width	cm	83	14	16	17	18	19	0,70	1,29

TABLE 2

Morphological characteristics of Nellore population at different ages.

| Factors of study		n°	Birth	90	180	270	360	R²	R.S.D.
			Age in days		
Weight	kg	60	27	105	150	164		0,92	15,06
Height at withers	cm	83	73	91	105	113	119	0,93	4,47
Chest depth	cm	83	27	35	41	47	52	0,93	2,70
Chest girth	cm	83	66	92	112	128	139	0,97	5,04
Body lenght	cm	83	56	74	88	99	106	0,91	2,35
Rump lenght	cm	83	20	26	31	35	38	0,89	2,36
Width at ilium	cm	83	16	21	25	29	32	0,91	1,85
Width at ischium	cm	83	8	12	15	17	18	0,81	1,79
Head width	cm	83	12	14	16	17	18	0,87	0,99
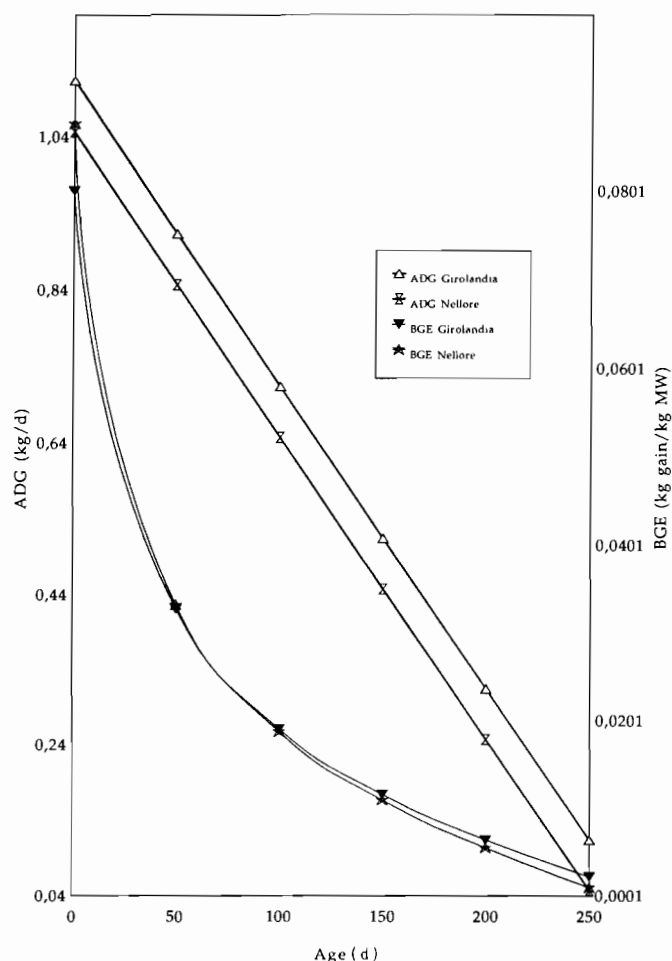
Fig. 1: Evolution of ADG (kg/d) and BGE (kg gain/kg MW) in relation to the age.

4. Conclusions

These observations give a preliminary view of the growth performances of the two populations involved. A more accurated description of the biometric parameters should be given by an analysis carried out on larger samples of animals and on wider ranges of ages.

Our first results put in evidence the need of a genetic improvement of the local populations in order to take profit of their rusticity and to improve production. Crossbreeding (european x local) can also improve quantity and quality of production.

Particularly we are going to use Italian Chianina to produce Chianina x Nellore crossbreeding. Therefore, Chianina breed, satisfactory reared in south of Brazil, will be tested also in the semiarid environment of the North East of the country.

5. Acknowledgements

Literature

1. De Araujo F.J.A., 1982. Estudos de pastagem nativa do Ceará. Thesis, Univ. Fed. do Ceará Departamento de Zootecnia, Cientro de Ciencias Agrarias.

2. IBGE, 1991, Annuario Estatistico do Brasil, Rio de Janeiro.

3. Harvey W.R., 1990, User's guides LSMLMW (for) & MIXMDL PC-2 Version. Mixed model least-squares and maximum likelihood computer program. W.R. Harvey ed.

4. Maia Santos Lima V. de P., 1984. Fruteiras, uma opção para o reflorestamento no Nordeste. pp.9-22. Ministerio do Interior, B.N.B. S/A Fortaleza, Brasil.

5. Pilla A.M., 1991. Nuovi criteri di valutazione dei riproduttori bovini in performance. 1.Formulazione teorica. Zoot. Nutr. Anim. **17,** 7-12.

6. Villares J.B., 1973. Estudo do comportamento e desempenho do bovinos Chianina and seus mestiços em região tropical brasileira. Produz. Anim. **12,** 171-269.

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