

WEIGHT GAIN OF NELLORE BREED, NELLORE X ANGUS CROSS BREED AND MIXED CATTLE AT CONFINEMENT TERMINATION

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Abstract

This work was carried out to evaluate productive characteristics in Nelore, Cross breed (Nelore vs. Aberdeen Angus) and mixed cattle in order to compare animals performance in fed lot. It was analyzed the fattening of 2797 Nelore cattle, 2774 crossbred cattle ($\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore) and 2614 Crossbred cattle (no defined breed). The data referring to IAW (Initial Average Weight), FAW (Final Average Weight), and DG (Daily Gain) demonstrated the superiority of $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore animals related to Nelore and mixed cattle. The CY (Carcass Yield) the mixed cattle had similar performance in comparison to $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore. The AHCW (Average Hot Carcass Weight) cross breed animals were higher. The cost of production for the three genetic groups was similar but profitability was higher in the cross-breed group. Nelore showed a profit of R \$ 241.30; cross-breed, R \$ 451.71 and, mixed cattle R \$ 15.44 per animal. It is concluded that when the main characteristics related to the profitability of production in intensive system were evaluated, the most prominent genetic group was the cross-breed $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore, and regarding the economic viability of the activity, it becomes profitable when animals are from the most nutritionally efficient genetic groups, due to the high DAG, reduce production costs, thereby increasing the profitability of the activity.

Keyword

industrial crossing, daily average gain, intensive system.

GANHO EM PESO DE RAÇAS BOVINAS NELORE, MESTIÇOS ANGUS VS. NELORE E SEM RAÇA DEFINIDA TERMINANDOS EM CONFINAMENTO

Resumo

Este trabalho foi realizado para avaliar características produtivas em bovinos da raça Nelore, Cruzados (Nelore vs. Aberdeen Angus) e Mestiços (Sem Raça Definida - SRD) sobre o desempenho destes animais em confinamento. Foram analisados dados referentes a engorda de 2797 bovinos Nelore, 2774 bovinos cruzados ($\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore) e 2614 bovinos SRD. PMI (Peso Médio Inicial), PMF (Peso Médio Final) e GPD (Ganho Médio Diário) demonstraram a superioridade dos animais $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore frente aos grupos genéticos Nelore e SRD. O RC (Rendimento de Carcaça) dos Mestiços tiveram médias semelhantes aos $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore. O PMC (Peso Médio de Carcaça) dos animais $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore foi superior. O custo de produção para os três grupos genéticos foi semelhante; porém, a lucratividade apresentou-se superior no grupo $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore. Animais Nelore demonstraram R\$ 241,30, $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore R\$ 451,71 e SRD R\$ 15,44, por animal. Conclui-se que quando avaliadas as principais características relacionadas à lucratividade da atividade de engorda em sistema intensivo, o grupo genético de maior destaque foi o $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nelore. A viabilidade econômica da atividade torna-se lucrativa quando se utilizam animais de grupos genéticos mais eficientes; pois os mesmos podem, com seu elevado GMD, reduzir os custos de produção, aumentando com isso, a lucratividade da atividade.

Palavras-chave

cruzamento industrial, ganho médio diário, sistema intensivo.

INTRODUCTION

Brazil leads the international commerce having the biggest cattle herd, which has made cattle ranching one of the sectors that most contributes to the country's economic development. To maintain this status, producers must supply a quality product on a continuous basis throughout the year. Thus, the need arose to evaluate technological alternatives to meet the demand, and one of them was the implementation of intensive systems of creation, the feedlots (EUCLIDES FILHO, et al., 1997; CATTELAM et al., 2017).

In Brazil, due to the low cattle performance on pastures during the dry season, the practice of confinement for finishing becomes more favorable at this time of year. In addition, when thinking about confinement, it is necessary that other definitions related to the system are agreed, such as the objectives to be achieved, the availability of resources, the facilities, the animals and the diet (THIAGO and COSTA, 1994).

The breed selected for this type of breeding system should be the one that best suits the climate and production reality of each region. As a complement to this, the use of heterosis (crosses) is an excellent way to unify Zebu characteristics (fertility, rusticity and adaptability) with the meat quality, precocity and carcass finish of European breeds, which produces animals of excellent performance for fattening in intensive systems (PEREIRA, 2012; FAÇANHA et al., 2014).

The animal's genetic potential interferes with its performance, as certain groups present better conditions for food intake and conversion of this food into weight gain. Crossbreeding of Zebu cattle with European breeds has shown high performance in weight gain tests. Assessments between Nelore and crossbred have shown that there is a great difference between them, reaching several months at the age of slaughter, to achieve similar final carcass weight (PEREIRA, 2012; FAÇANHA et al., 2014).

Currently, the crossing of Aberdeen Angus and Nelore breeds has been highlighted by the great potential of the progeny. They produce precocious animals with great use of carcass and weight gains, in addition to the standardization of meat in a short period and with better quality. It is in this context that genetic improvement helps in the productivity of cattle meat (NIETO et al.,

2013).

The purpose of the industrial cross between the Aberdeen Angus vs. Nellore is related to improved performance and carcass finishing in confined animals. The Nellore is a more heat resistant breed; because it has a greater number of sweat glands and has a digestive tract 10% smaller than European breeds, in addition to presenting greater resistance to parasites. The negative point of the Nellore breed is the low amount of marbling fat, which is a characteristic extremely valued by the industries (GALIANNI, 2017).

The Aberdeen Angus breed has high feed efficiency, precocity, carcass finish and rapid deposition of subcutaneous fat and marbling. The negative point of this breed is the less adaptability to the tropical climate and the low resistance to parasites. Thus, the crossing of Aberdeen Angus vs. Nellore makes the characteristics of each breed complete and obtains an animal with more desired characteristics (COSTA E SILVA, 2013; NIETO et al., 2013).

This work was carried out to evaluate productive characteristics in Nellore, cross breed (Nellore vs. Aberdeen Angus) and Mixed cattle - WDB (without Defined Breed) in order to compare the performance of these animals in confinement.

MATERIAL AND METHODS

The research was carried out by analyzing data on the fattening of confined animals, with an average of 20 months of age, in a property located in the Northwest region of São Paulo State during the second half of 2018.

The fattening data of 2800 Nellore non-castrated cattle, 2700 non-castrated cattle from crossbreeding ($\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nellore) and 2600 non-castrated WDB cattle were analyzed. Data collected were: diet formula, days of confinement, average initial live weight in confinement (IAW), number of animals, average final live weight in confinement (FAW), average hot carcass weight (AHCW), average yield of hot carcass (CY), average daily gain (DAG), cost invested per day in feedlot, encompassing expenses only with nutrition, labor and diesel oil, expenditure per animal (daily cost multiplied by the days of feedlot) and profitability (production cost deducted from the gain in arrobas).

Upon arrival at the property, the animals were kept in a semi-intensive system for 15 days in pasture of *Urochloa brizantha* cv. Marandu, receiving 2 kg of

concentrate (even used in confinement), in order to adapt to the concentrate and the feeder. Then, they were taken to the confinement pens, with 100 animals per stall, measuring about 750m², with 50m of trough extension, dirt floor, and started to receive the fattening diet and water at will.

The fattening diet consisted of 25% roughage and 75% concentrate. Corn silage produced on the property was used as a source of roughage, and a balanced feed, also produced on the property. Food was provided six times a day at 6:00 am; 9:00 am; 11:00 am; 1:00 pm; 3:00 pm and 5:00 pm. It was adjusted according to the level of consumption by reading the trough score (conservative leftover handling), as indicated by Gomes et al. (2015).

The nutritional formula of the concentrate (per ton) was: 31% corn; 20% soybean shell; 25% citrus pulp; 10% peanut bran; 10% cotton seed; 2.5% kg of core; 1.15% kg of urea; 0.35% kg of ammonia sulfate. The guarantee levels are shown in Table 1.

Table 1. Guarantee levels per kilogram of the nutritional formula used in the feed of the confined animals

NUTRIENTS	ATTENDANCE (%)
Calcium	0.93%
Ethereal Extract	4.29%
NDF	29.15%
Phosforus	0.38%
TDN	77.86%
Crude Protein	16.65%

Adaptation to the diet occurred through a gradual increase in the content of concentrate in the total ration, where it started with the roughage: concentrate ratio (70:30) and every 7 days the proportion of concentrate was increased to 55:45; 40:60 until reaching the final goal, 25:75.

The average food consumption of Nellore animals during the total period of confinement was 2.5% PV / MS / day. Cross breed ½ Angus vs. ½ Nellore and the WDB, had an average consumption during the confinement period of 2.625% PV / MS / day.

When the animals were placed in the feedlot, they were weighed (IAW), dewormed and vaccinated against respiratory diseases (Bovine Infectious Rhinotracheitis (IBR), Bovine Viral Diarrhea (BVD), Type 3 Parainfluenza (PI3) and Bovine Syncytial Virus (BRSV). After 100 days, on average, they were weighed to obtain the PMF and for the difference between the FAW - IAW the DAG was obtained. After weighing the

animals were slaughtered and the slaughter weight used to calculate the AHCW and CY.

The data obtained were digitized into a Microsoft Office Excel® spreadsheet, analyzed and evaluated by calculating simple averages and percentages. In addition, within each group and period the data were analyzed using the SAS program (2014), using analysis of variance (ANOVA), with PROC ANOVA tool. When it presented statistical significance, the Tukey average test was applied at significance of $P < 0.05$.

RESULTS AND DISCUSSION

After applying the methods and procedures described above, the results regarding PMI, PMF, GPD, PMC and RMC were obtained, which are described in Table 2.

Table 2. Average Initial Weight (IAW), Average Final Weight (FAW), Average Daily Gain (DAG), Average Hot Carcass Weight (AHCW) and Carcass Yield (CY) according to the evaluated genetic groups.

GENETIC GROUP	IAW (Kg)	FAW (Kg)	DAG (Kg)	AHCW (Kg)	CY (%)
½ Angus vs. ½ Nellore	357.5±4.7	602.1±14.2a	2.43±0.1a	351.3±9.2a	58.3±0.4a
NELLORE	313.3±10.0	507.4±13.2b	1.93±0.1b	292.1±6.8b	57.5±0.1b
WDB	366.2±7.0	519.6±1.8b	1.52±0.06c	299.8±1.0b	57.6±0.05ab
<i>P Valor</i>	-	0.0001	0.0001	0.0001	0.023

Related to IAW, it is noted that animals ½ Angus vs. ½ Nellore and WDB presented greater weight at the entrance to the feedlot, although all animals of all genetic groups were with an average age of 20 months. According to Euclides Filho (1997), when the cross between *Bos taurus* vs. animals takes place *Bos indicus* makes the selection of desirable characteristics, among them the precocity in weight gain. In addition, greater growth potential and carcass finishing are added, as well as adaptability and resistance to parasites.

Analyzing the FAW, the group of animals ½ Angus vs. ½ Nellore stood out before the others ($P < 0.05$), as well as in the DAG, which makes it a good option for intensive farming systems.

Which may explain the superiority of animals ½ Angus vs. ½ Nellore is the genetic selection for weight gain that the Aberdeen Angus breed has and that it transmits to its descendants, in addition to producing meat of excellent quality, due to the high degree of marbling, which provides the desirable flavor (COSTA et al., 2013).

The animals $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nellore demonstrated a high DAG of 2.43 kg/day. Breeds with Taurine genetics have a tendency to present higher DAG, as these breeds suffer selection pressure to gain weight for a long time, and such characteristic manifests itself in favorable feeding conditions, as is the case of intensive breeding.

Nellore animals, on the other hand, had 1.93 kg/day DAG, a value higher than that found in WDB animals ($P < 0.05$). Silva et al. (2014) and Valero et al. (2015) found inferior results of DAG in Nellore animals (1.20 and 1.50 kg/day, respectively), data that differed from this study.

The data referring to the AHCW and CY, also demonstrated the superiority of the animals $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nellore ($P < 0.05$).

The AHCW results show (Table 2) that the genetic group $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nellore had higher weight compared to the other breeds and that the Nellore and WDB animals were similar. As for the CY, the animals $\frac{1}{2}$ Angus vs. $\frac{1}{2}$ Nellore showed higher yield than Nellore animals and were similar to WDBs, while Nellore breed showed similar yield to WDBs.

Usually $\frac{1}{2}$ Angus vs. bovine $\frac{1}{2}$ Nellore when compared to Nellore slaughtered with similar age have advantages related to AHCW and CY due to the fact that they have higher IAW and better DAG during the confinement period.

When comparing Nellore with WDBs, in terms of AHCW and CY, no difference was detected between the groups. Generally planned and efficiently performed crosses tend to add 20 to 25% in the final productivity of the animals, however the WDBs animals came from random crossings, so they did not show better rates than those of the Nellore breed (LOPES et al., 2012).

The high value of carcass yield of the groups analyzed may be related to the photo of the feedlot being with non-castrated males. Generally, non-castrated males have CY and a greater rib eye area than castrated animals because castration reduces the growth of animals, due to the negative action on endogenic anabolic hormones (COETZEE, 2011).

In a confinement, only the application of technologies does not guarantee profitability, so understanding management using cost control as a tool can be the key to the success of the activity (LOPES and CARVALHO, 2002).

According to data in Table 3, the daily cost of producing these animals in the second half of 2018 (including only nutrition, labor and diesel), of the Nellore breed

was R \$ 8.35 on average, while the WDBs and ½ Angus vs. ½ Nellore, had a 26% higher average food consumption, according to what was evaluated in the trough reading and daily food supply, thus presenting an average daily cost of R \$ 10.50.

The data related to the production cost are shown in Table 3

Table 3. Average production cost of confined animals in relation to Genetic Groups

GENETIC GROUP	CONF. DAYS	MEDIUM PRICE	COST/ANIMAL
½ Angus vs. ½ Nellore	100.58	R\$10.50	R\$1056.09
NELLORE	100.35	R\$8.35	R\$837.92
WDB	100.53	R\$10.50	R\$1055.56

Evaluating the information, Nellore genetic group had an average cost of R \$ 837.92 per animal during the confinement period. The genetic group ½ Angus vs. ½ Nellore had an average cost of R \$ 955.51 and Mixed cattle R \$ 955.03. The final cost of each animal had a small variation between them, because they, regardless of genetic groups, were slaughtered with practically the same number of days in confinement.

Regarding the profitability of the activity, also described according to the genetic groups, it is found in Table 4.

Table 4. Average profitability of animals confined in relation to Genetic Groups

GENETIC GROUP	MEDIUM PRICE @2018*	GAIN @	GAIN R\$	COST/ANIMAL	PROFIT/ANIMAL
½ Angus vs. ½ Nellore	R\$144.90	9.51	1377.99	1056.09	321.19
NELLORE	R\$144.90	7.44	1078.05	837.92	240.13
MATED	R\$144.90	5.89	853.46	1055.56	-202.10

*Font: CEPEA-Esalq/USP.

Analyzing the profitability presented in Table 3, through the gain in arrobas, we notice the difference in relation to the genetic groups. Crossbred animals showed, on average, a loss of R \$ 202.10 per animal. The Nellore on the other hand, had an average profit of R \$ 240.13 and the ½ Angus vs. ½ Nellore posted a profit of R \$ 321.19 per head.

Greater profitability cross breed animals was evident (½ Angus vs. ½ Nellore). This fact may be related to the breed's effectiveness in terms of feed conversion and ADG. In addition, it is known that whole animals have a higher rate of weight gain, especially during the great development phase (TURINI et al., 2015).

Another important factor to note is the low profitability of crossbred animals. This shows that not always a genetic group that is adapted to be more efficient in cases

of food restriction, will perform well when offered food in an abundant way, as is the case with confinement systems.

The Nellore breed obtained 25.23% less profitability than the ½ Angus vs. genetic group. ½ Nellore. This fact is related to the lower daily weight gain of Nellore animals when compared to ½ Angus vs. ½ Nellore.

It is essential within a production system that the manager assesses the daily weight gain of the animals, always hoping that the most efficient animals will gain more weight in less time, as the daily weight gain has a negative correlation with the length of stay in the confinement, that is, the greater the weight gain, the smaller the number of days of confinement. The production cost has a positive correlation with the confinement time, because the smaller the number of days of confinement, the lower the expenses with the fattening of this animal.

CONCLUSIONS

This study demonstrated that main characteristics related to the profitability of fattening activity in an intensive system (IAW, FAW, DAG, AHCW, CY) were evaluated, the most prominent genetic group was ½ Angus vs. ½ Nellore.

The Nellore genetic group showed superiority only in relation to average daily weight gain when in comparison to crossbred animals. WDB on the other hand, were similar in relation to ½ Angus vs. ½ Nellore when it comes to average carcass yield.

When animals from more nutritionally efficient genetic groups are used, they can, with their high DAG, reduce production costs, thereby increasing the profitability of the activity.

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