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# EVALUATION OF THE WELFARE OF CALVES RAISED IN THE SYSTEMS "ARGENTINE" x "HOUSE": A CASE STUDY

# AVALIAÇÃO DO BEM-ESTAR DE BEZERROS CRIADOS NOS SISTEMAS "ARGENTINO" x "CASA": UM ESTUDO DE CASO

# EVALUACIÓN DEL BIENESTAR DE LOS TERNEROS CRIAN EN LOS SISTEMAS "ARGENTINO" X "CASA": UN ESTUDIO DE CASO

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**Abstract:** This study aimed to evaluate the thermal environment inside the different facilities and the influence of these different environments on the calves in relation to rectal temperature and weight gain of the animals in the house and Argentinean systems. Two types of shelter systems for calves were used, the house style and the Argentinean system. For each shelter system, three animals were used, two females and one male, totaling 6 animals. There were no differences in the average values found for rectal temperatures (39.38 °C), but there was a small numerical difference in the average weight gain of the animals, with greater weight gain for the animals housed in the Argentinean system. For the ambient temperature values, the thermal amplitude of the houses was greater. Both systems provided similar characteristics of the performance variables and

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body temperature in the calves, and can be indicated after evaluating the economic aspects of production without harming the welfare of the production animals.

**Keywords:** Heat Stress, Efficiency, Performance, Productivity.

**Resumo:** Este trabalho teve como objetivo avaliar o ambiente térmico no interior das diferentes instalações e a influência desses diferentes ambientes para os bezerros em relação a temperatura retal, e o ganho de peso dos animais nos sistemas de casinhas e argentino. Foram utilizados dois tipos de sistemas de abrigos para bezerros sendo o estilo Casinha e o sistema Argentino. Para cada sistema de abrigo foram utilizados três animais sendo eles duas fêmeas e um macho, totalizando ao todo 6 animais. Não houve diferenças nos valores médios encontrados para as temperaturas retais (39,38ºC), porém houve uma pequena diferença numérica no ganho de peso médio dos animais, com maior ganho de peso para os animais alojados em sistema argentino, para os valores de temperatura ambiente, a amplitude térmica das casinhas foi maior. Ambos os sistemas proporcionaram características semelhantes das variáveis de desempenho e temperatura corporal nos bezerros, podendo ser indicados após avaliação dos aspectos econômicos da produção sem prejuízos ao bem-estar dos animais de produção.

**Palavras-chave:** Estresse Térmico, Eficiência, Desempenho, Produtividade.

**Resumen:** Este estudio tuvo como objetivo evaluar el ambiente térmico al interior de diferentes instalaciones y la influencia de estos diferentes ambientes sobre los terneros en relación a la temperatura rectal y ganancia de peso de los animales en los sistemas de casa chica y argentino. Se utilizaron dos tipos de sistemas de refugio para terneros: el estilo Casita y el sistema argentino. Para cada sistema de refugio se utilizaron tres animales, dos hembras y un macho, totalizando 6 animales. No se encontraron diferencias en los valores promedio encontrados para las temperaturas rectales (39,38°C), sin embargo, hubo una pequeña diferencia numérica en la ganancia de peso promedio de los animales, siendo mayor la ganancia de peso para los animales alojados en el sistema argentino, para los valores de temperatura ambiente la amplitud térmica de las viviendas fue mayor. Ambos sistemas proporcionaron características similares de variables de desempeño y temperatura corporal en los terneros, y pueden indicarse luego de evaluar los aspectos económicos de la producción sin comprometer el bienestar de los animales de producción.

**Palabras clave:** Estrés Térmico, Eficiencia, Rendimiento, Productividad.

## INTRODUCTION

Welfare is determined from birth to adulthood, and standards are needed to indicate how to proceed, from the breeding facilities, followed by feeding, adequate management, sanitary and genetic aspects, providing animals with a better quality of life (HERNANDES et al ., 2010). Facilities intended for raising calves during the suckling phase assume great importance for animal welfare, because the animals require greater care at this stage of life (PEREIRA, et al., 2014).

For better animal comfort, calves must be raised in suitable places, providing them with hygiene, health and efficient management conditions so that the animal can express its production potential, especially during the suckling phase, when the calves require greater care, as this is the period with a high animal mortality rate (SOUZA, 2004).

In Brazil's subtropical and tropical climates, the effects of temperature and humidity are often limiting to the development, production and reproduction of animals, due to the stress associated with them. The environment is the set of all factors that directly and indirectly affect animals. The reason for building a shelter for animals is to be able to change or modify the environment for their benefit, in order to achieve greater productivity and safety for the producer. The animals are thus partially protected from the weather (KAWABATA, 2003).

Before construction, it is necessary to take into account the high levels of temperature and humidity, in addition to seeking the scheme that best fits the characteristics and objectives of the property. In order to raise calves in terms of thermal comfort, it is easy to control diseases, especially respiratory diseases and diarrhea (SALVASTANO, 2008).

The materials used in buildings for animal husbandry must have, in addition to the requirements of mechanical resistance and durability, excellent thermal insulation capacity. This is because the performance of animal production is directly associated with the thermal comfort inside the building (PADILHA et al ., 2000). Solar radiation represents about 75% of the transferred thermal load and the main factors that interfere in this thermal transfer are the roofing material, the orientation of the building, the

projection of the roof, the sunlight and the vegetation present near the construction area (ARAUJO, 2001).

Traditional calf pens, made of wood, zinc sheets or shade cloth , are the most commonly used on Brazilian farms. These constructions require investment and skilled labor, since they often involve the expense and inadequate construction. There are some types of calf pens used in the country, such as the "Argentine" and "Casinhas". The Argentine system is characterized by the animals being tied to wires stretched in front of the water and concentrate troughs. This system allows for greater movement of the calf and greater dispersion of waste (urine and feces), which do not accumulate in the same place. Therefore, it is not necessary to move the animal due to the accumulation of organic matter. This system may be the most suitable option when there is not enough space to move the animals periodically (SOUZA, 2004).

The shade , located between the extremes, is positioned in a north-south direction. Thus, sunlight, when falling from east to west, disinfects the entire area where the calf is and, at the same time, provides shade all day, however, in different places, according to the position of the sun (CAMPOS & CAMPOS, 2004).

The hutch is an alternative for individual mobile rearing, where calves enter at one day and leave at 60 days, after which they move to collective paddocks. The area must be well drained, protected from winds and sun exposure in winter. The hutches must be at least 2.00 m apart. The hutches must be arranged so as to allow the morning sun to enter, protect the calves from strong winds and prevent rain from entering the covered area.

They should be changed at least once a week, to prevent animals from coming into contact with moisture and feces (SOUZA, 2004). The construction is simple and low cost, and can be made from various types of materials such as plywood, iron and cement, considered a good material in terms of environmental comfort, which will protect the animal from both radiation and rain, especially during the hot seasons of the year (CAMPOS & CAMPOS, 2004).

The advantages of these houses are: ease of cleaning and disinfection and the possibility of moving them, which makes it possible to break the life cycle of pathogenic organisms. However, the main disadvantage of using the house is the discomfort for the calf handler on rainy and cold days (PEREIRA et al., 2020).

Due to the above, the objective of this study was to verify the influence of the different housing systems (Argentine and House) on the parameters of average

temperature, rectal temperature and final weight gain of calves through a case study in a calf farm.

## MATERIALS AND METHODS

This research was developed in the dairy cattle sector of the Federal Institute of Education, Science and Technology of Minas Gerais - Bambuí Campus , in the Southeast region of Brazil . The geographic coordinates are: Latitude: 20º 00' 23" South, Longitude: 45º 58' 37" West, Altitude: 706 m, Area: 1459.6 km 2 . It has a tropical climate with rainfall in winter being less than in summer, with an annual average of 2125 mm. Bambuí has an average temperature of 21.5 °C.

The facilities were planned in such a way that they had access water, air circulation within the facilities, allowing the animals to be separated, avoiding the transmission of diseases, easy to manage both for cleaning and providing food. The little houses were made of zinc tiles, both on the roof and on the sides. And the Argentine system used 80% shade cloth .

The animals remained with their mother on the first day of their lives, where they received their first care, such as umbilical cord care and colostrum . From 25 days of age to 85 days of age, the calves were raised individually, totaling a 60-day experimental period.

The calf pens used in the "Casinha" and Argentine systems are shown in Figures 1 and 2 (Figure 2).

**Figure 1.** "Little House" type calf pen.

**Figure 2.** "Argentine" type calf pen.

The experiment was carried out from April to June 2016. A total of 6 animals were used, 2 females and 1 male for each shelter system.

**Figure 3.** Animals used in the research.

During the experiment, the animals received four liters of milk per day, two in the morning and two in the afternoon. During the first 40 days, the animals received 500g of feed and in the last 20 days, they received 1kg of feed per day. Water was provided ad libitum throughout the experimental period.

The average temperature variables of the facilities were measured during the morning at 8:00 am and 5:00 pm , the rectal temperature of the animals was collected using a thermometer and the weight gain of the animals was assessed daily by weighing the animals at the end of each day and throughout the experimental period.

## RESULTS AND DISCUSSIONS

The average maximum temperature of the facilities presents numerically very similar values during the experimental period, where it can be seen that the highest value was found for the small house type shelter. For the average minimum temperature, a greater amplitude was found for the shelter systems (Table 1). The small house system presented the lowest value numerically. The temperature amplitude values were respectively Argentino: 11.62 ºC and Small House: 15.5 ºC.

**Table 1.** Average maximum and minimum temperatures.

| **Average maximum and minimum temperatures ( ºC)** | | |
|---|---|---|
| | **Argentine** | **Little houses** |
| **Maximum** | 27.3 | 27.74 |
| **Minimum** | 15.68 | 12.24 |

Kamchen et al. (2018) highlight that in Brazil, several types of coverings are used, aiming to reduce the heat load on animals, reducing the thermal stress suffered by them, thus improving performance indices. Souza et al. (2010) establish temperature indices around 18 to 26 ºC as thermoneutral zones for calves, with temperatures above 26 ºC representing thermal stress.

According to the data obtained in table 2, the animals' rectal temperature (39.38) is within that accepted in the literature (39.9 ºC), indicating that both systems provide adequate conditions so that the animals do not face heat stress

**Table 2.** Rectal temperature of animals.

| **Rectal temperature of animals ( ºC)** | | | | | | |
|---|---|---|---|---|---|---|
| | **Argentine** | | | **Little houses** | | |
| **Calves** | **A1** | **A2** | **A3** | **C1** | **C2** | C3 |
| **Averages** | 39.19 | 39.65 | 39.31 | 39.31 | 39.4 | 39.44 |

According to Dukes (1996), variations of 38.0 to 39.3ºC in the rectal temperature of dairy calves are considered normal. Rectal temperature is one of the physiological parameters evaluated to determine whether the animal is in a state of well-being. When

there is an increase in this parameter, it means that the animal is storing heat, and if it is not dissipating it, thermal stress will be represented by its elevation (FAÇANHA, et al., 2011).

The weight gain of calves is greater when the Argentine house system is used, demonstrating that in conditions of thermal comfort the animals are more predisposed to using the energy made available through the consumption of maternal milk, with this energy being converted into performance variables, as shown in table 3. The average weight gain averages were respectively: Argentino 49.7 kg and Casinha 44.33 kg.

**Table 3.** Weight gain of calves in two different housing systems.

| **Weight Gain (Kg)** | | | | | | |
|---|---|---|---|---|---|---|
| | **Argentine** | | | **Little houses** | | |
| **Calves** | **A1** | **A2** | **A3** | **C1** | **C2** | **C3** |
| **1st Weighing** | 64 | 37 | 51 | 62 | 39 | 33 |
| **2nd Weighing** | 113 | 84 | 104 | 115 | 78 | 74 |
| **Weight gain** | 49 | 47 | 53 | 53 | 39 | 41 |

Gir calves in an Argentine housing system compared to animals housed in a small house system, demonstrating that the type of housing may be a variable that does not have a direct effect on this variable. The data obtained here disagree with what was stated by the author, since animals housed in an Argentine system demonstrate greater weight gain during the evaluation period.

Bidin (2019), evaluating the influence of different housing systems for Jersey calves, found that the different housing systems do not have a direct influence on the weight gain of calves, however the Argentine system shows a lower degree of contamination by prenatal diarrhea in relation to the hutches, which may influence the better performance of animals housed in the Argentine system.

## CONCLUSION

Both systems provided similar characteristics of performance variables and body temperature in calves, and can be indicated after evaluating the economic aspects of production without compromising the well-being of production animals.

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