

Evaluation of the welfare of calves raised in the systems “Argentino” x “House”: a case study

Avaliação do bem-estar de bezerros criados nos sistemas “Argentino” x “Casa”:
um estudo de caso

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ABSTRACT

The ambiance has a direct effect on the performance of calves, as it is considered the most critical phase of cattle culture, and the constructions are of paramount importance for dairy activity. Therefore, they must be low-cost and efficient for greater production. This work aimed to evaluate the thermal environment inside the different facilities and the influence of these different environments on calves' rectal temperature, and weight gain of animals in the house and Argentine systems. Two calves and one calf were used, three in the house-style shelters, and three in the Argentine system. There were no differences in the cleft temperatures, but there was a small difference in the weight gain of the animals, with greater weight gain for the animals housed in the Argentine system, for the values of room temperature, the thermal amplitude of the houses was higher, this causes the animal to have higher energy expenditure to maintain its physiological conditions.

Keywords: Efficiency; Thermal stress; Performance; Productivity.

RESUMO

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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 (39,38°C), 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.

1 INTRODUCTION

Animal welfare is determined from birth to adulthood, requiring rules that indicate how to proceed, from the breeding facilities, followed by food, proper management, health, and genetic aspects, providing animals with a better quality of life (HERNANDES *et al.*, 2010). Facilities for raising calves during the suckling phase are of great importance for animal welfare, as animals need greater care at this stage of life (PEREIRA, *et al.*, 2014).

For better animal comfort, calves must be reared in suitable places, providing conditions of hygiene, health, and efficient handling so that the animal can express its production potential, especially in the suckling phase, when the calves need greater care, as this is the period in which there is a high animal mortality rate (SOUZA, 2004).

In the climates in Brazil, which are subtropical and tropical, the effects of temperature and air 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, and 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. So it is a creation of calves in terms of thermal comfort, easy to control against diseases, especially respiratory and diarrhea (SALVASTANO, 2008).

The materials used in buildings for animal husbandry must have, in addition to the requirements of mechanical strength and durability, excellent thermal insulation capacity. This is because the performance of animal production is directly associated with thermal comfort inside the building (PADILHA *et al.*, 2000). Solar radiation represents about 75% of the thermal

load transferred and the main factors that interfere with this thermal transfer are the covering material, the orientation of the building, the projection of the roof, the insolation, and the vegetation present near the construction area (ARAUJO, 2001).

Traditional calf hutches, made of wood, zinc sheets, or shading, are the most used on Brazilian properties. For these constructions, investments and qualified labor are needed, since, many times, there is expense and inadequate constructions are still made. There are some types of calves used in the country, such as “Argentino” and “Casinhas”. The Argentine system is characterized by the animals being attached to wires stretched in front of the water and concentrate troughs. This system allows greater movement of the calf and greater dispersion of waste (urine and feces), which do not pile up in the same place. Thus, it is not necessary to move the animal due to the accumulation of organic matter. Such a system may be the most indicated option when there is not enough area to move the animals periodically (SOUZA, 2004).

The shade, located between the ends, 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 throughout the day, however, in different places, according to the position of the sun (CAMPOS & CAMPOS, 2004).

The hutch is an alternative to mobile individual creation, where the calves enter at one day and leave at 60 days, after which they move to collective paddocks. The area should be well-drained and protected from winds and winter sun exposure. The houses must be at a distance of at least 2.00 m from each other. Hutches should be arranged to let in the morning sun, protect the calves from strong winds and prevent rain from entering the covered part.

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

The advantages of these little houses are the 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 kennel 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 (Argentino and Casita) on the parameters of average temperature, rectal temperature, and final weight gain of calves through a case study in a calf farm.

2 MATERIALS AND METHODS

This research was developed in the dairy cattle sector of the Federal Institute of Education, Science, and Technology of Minas Gerais - Campus Bambuí, in the Southeast region of Brazil. The geographic coordinates are Latitude: 20° 00' 23" South, Longitude: 45° 58' 37" West, Altitude: 706 m, Area: 1459.6 Km². It has a tropical climate with less rainfall in winter than in summer. The average annual temperature of Bambuí has an average temperature of 21.5 °C.

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

The animals remained with their mother on the first day of their lives, where they received the first care, such as curing the navel and colostrum. From 25 days of age to 85 days of age, the calves were reared individually, totaling an experimental period of 60 days. The calves used in the Casinha system and the Argentine system are shown in Figures 1 and 2 (Figure 2).

Figure 1 - "Casinha" type calf.



Figure 2 – “Argentine” type calf



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 started to receive 1kg of feed per day. Water was provided ad libitum throughout the experimental period.

The variables of the average temperature of the facilities were measured during the morning at 08:00 hrs and 17:00 hrs, a rectal temperature of the animals was collected using a

thermometer and the weight gain of the animals was evaluated daily by weighing the animals at the end of each day and throughout the trial period.

3 RESULTS AND DISCUSSIONS

The average maximum temperature of the installations presents numerically very close values during the experimental period, where it can be verified that the highest value was found for the shelter-type house. For the average minimum temperature, a greater amplitude was found for shelter systems (Table 1). The little house system numerically presented the lowest value. The temperature amplitude values were respectively Argentine: 11.62 °C and Casinha: 15.5 °C.

Table 1 - Average maximum and minimum temperatures.

Average maximum and minimum temperatures (°C)		
	Argentine	little houses
Maximum	27,3	27,74
Minimum	15,68	12,24

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

According to the data obtained in table 2, the animals are at rectal temperature (39.38) within the range accepted by the literature (39.9 °C), representing that both systems provide adequate conditions so that the animals do not face a stressful situation by heat.

Table 2 - Temperatura retal dos animais.

Animals' rectal temperature (°C)

	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 from 38.0 to 39.3°C in the rectal temperature of calves from dairy herds are considered normal. Rectal temperature is one of the physiological parameters, evaluated to know if the animal is in conditions 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, then the thermal stress will be represented for its elevation (FAÇANHA, et al., 2011).

The weight gain of the calves is greater when the Argentine kennel system is used, demonstrating that under conditions of thermal comfort the animals are more predisposed to realizing the energy available through the consumption of mother's milk, converting this energy into performance variables, as shown in the table. Average weight gain averages were respectively: Argentinean 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

Santos (2021) does not identify any difference in weight gain of Gir calves in an Argentine housing system compared to animals housed in a kennel system, demonstrating that the type of housing may be a variable that has no direct effect on this variable. The data obtained here disagree with what was exposed by the author since the animals housed in the Argentinean system show a greater weight gain during the evaluation period.

Bidin (2019), evaluating the influence of different housing systems on Jersey's calves, found that the different housing systems do not have a direct influence on the weight gain of calves, but the Argentine system shows a lower degree of contamination by pre-existing diarrhea. -natal about hutches, which may influence the better performance of animals housed in the Argentinean system.

4 CONCLUSIONS

Both systems provided similar characteristics of performance variables and body temperature in calves, which can be indicated after evaluating the economic aspects of production without harming the welfare of production animals.

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