

## Losses caused by carcass bruising in a packing plant in Goiás State

### Perdas ocasionadas por lesões em carcaças em matadouro-frigorífico no estado de Goiás

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#### Abstract

The quality of meat is influenced by several aspects, among which post-vaccination abscesses and bruises stand out as primary factors for the condemnation of carcasses. However, economic losses resulting from improper handling practices can severely compromise the profitability of both the packing plant and the producer. The objective of this study was to estimate the frequency of occurrence of abscesses and bruises in carcasses of animals slaughtered in a packing plant and analyze the economic losses generated by them. The number of animals examined was determined according to the slaughter flow in the packing plant (10-20% of animals/day). Data pertaining to region and number of bruises, abscess location, weight of excised portions and distance from the municipalities of origin of the animals were collected and evaluated by descriptive statistical analysis. The occurrence of lesions was 78% trauma- and 45% abscess-derived. The presence of these lesions resulted in economic losses, representing a depreciation of BRL 2.99/animal in the profit obtained by the cattle farmer. A comparison between the “sex classes” and “bruising” factors revealed that the females had higher occurrence and distribution of bruises and abscesses than uncastrated and castrated males. Bruises were more frequent in the hindquarter region, regardless of the distance, while abscesses were restricted to the forequarter. The weight of discarded tissues was higher on farms less than 200 km away from the packing plant; however, these results were influenced by the number of animals evaluated in the group.

**Key words:** Beef cattle. Bruises. Meat. Health. Vaccine reaction.

#### Resumo

A qualidade da carne é influenciada por vários aspectos, dentre eles destacam-se abscessos vacinais e hematomas, pois são considerados fatores primordiais para a condenação de carcaças. Todavia, a perda econômica resultante de práticas errôneas de manejo poderá comprometer severamente a lucratividade tanto do frigorífico, como do produtor. Objetivou-se com o presente estudo estimar a frequência de ocorrência de abscessos e hematomas em carcaças de animais abatidos em um matadouro-frigorífico

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e analisar suas perdas econômicas. A quantidade de animais examinados foi determinada de acordo com o fluxo de abate do matadouro-frigorífico (10 - 20% de animais/dia). Foram coletados dados referentes à região e número de hematomas, localização do abscesso, peso das porções excisadas e a distância dos municípios de origem dos animais. Os dados foram analisados utilizando o método de estatística descritiva. Foi observado que a ocorrência das lesões foi 78% de natureza traumática e 45% de natureza abscedativa. A presença dessas lesões culminou em prejuízos econômicos, especialmente representando a depreciação no lucro do pecuarista de R\$ 2,99 / animal. As análises de comparação entre as classes sexuais e as lesões, constataram que as fêmeas apresentaram maior ocorrência e distribuição de hematomas e abscessos em relação aos machos inteiros e castrados. Os hematomas foram mais frequentes na parte traseira dos animais, independente da distância, enquanto os abscessos restringiram-se ao quarto dianteiro. O peso dos tecidos descartados foi maior em fazendas com distâncias inferiores a 200 km do matadouro-frigorífico, contudo esses resultados foram influenciados pelo número de animais avaliados no grupo.

**Palavras-chave:** Bovinocultura de corte. Carne. Contusões. Reação vacinal. Sanidade.

## Introduction

Brazil occupies a prominent position in the worldwide beef market due to its growth in the last few years. Today, the Brazilian commercial cattle herd is the largest in the world, with 221.81 million head (ABIEC, 2018). According to the Brazilian Association of Meat Exporting Industries (ABIEC, 2018), the country is considered the biggest producer of beef, accounting for around 14.4% of the world production, with 9.71 million tons of carcass weight equivalent (TCE). Brazil is also the largest exporter of the product in volume, with 2,032 million TCE, corresponding to 20.93% of the total exported slaughtered animals (ABIEC, 2018). The domestic market, in turn, consumes 79.06% of its production, which represents 7.73 TCE and an average per capita beef consumption of 37.55 kg/ha/year in 2017, when the country slaughtered 39.24 million head of cattle (ABIEC, 2018). The agro-industrial livestock system is considered one of the most important activities of national agribusiness, accounting for 30.6% of the GDP from the sector (CEPEA, 2018).

It is essential to point out that in order for meat products to remain competitive and integrated in the world market, the quality of the meat offered to consumers should be the main focus. In the last years, these consumers have shown greater interest in sustainable, high-quality foods that ensure animal

welfare in all the stages of the production system (GONÇALVES; SALOTTI-SOUZA, 2017).

According to Rocha et al. (2008), concerns with meat products are growing alongside the socioeconomic development of the population, which has changed the profile of consumers in the country mainly due to the requirements of animal-product importing countries. Accordingly, Brazilians started to gain access to questions pertaining to quality and to the standards of ethical farming. Meat derived from well-treated animals reared under humane conditions from birth to slaughter is believed to have a better aspect, texture and flavor.

At present, concerns surrounding beef cattle farming go beyond biological factors inherent to the animal. There is also a great concern by the segment of the production chain regarding final product quality, since the cattle industry has recommended the production of carcasses with more backfat and less general fatness. To meet the established requirements, farmers have adopted castration practices following allegations by packing plants that this procedure favors uniformity and the qualitative aspect of meat. Although castration addresses all these quality requirements and has a direct impact on animal reactivity by reducing aggressiveness and facilitating the handling of both males and females, a drawback from the commercial

standpoint is that many farmers are not financially compensated by adopting the method. Thus, a large part of the animals slaughtered in the country do not meet this quality standard (PEREIRA et al., 2014).

However, the meat goes a long way before reaching the consumer table, which involves stages that start from handling the animals on the farm to their transport to the packing plant, where they will be slaughtered. Throughout this course, when inadequately performed, pre-slaughter handling procedures can compromise both animal welfare and factors related to carcass quality, since animals have an increase in body temperature when subjected to stressful situations. This has a direct impact on rapid glycolysis at the time of slaughter (pH decline), ultimately depreciating the final product (PEREIRA; LOPES, 2006).

The main causes of economic losses in packing plants in Brazil are partial condemnation of carcasses due to abscesses caused by vaccinations and medications, besides the presence of bruises resulting from inadequate pre-slaughter handling practices (RESENDE-LAGO et al., 2011).

In the opinion of Lusa et al. (2016), one of the most relevant amidst the numerous factors leading to losses of meat products and raises in production costs is incorrect animal vaccination, which may predispose to the formation of abscesses, influencing final meat quality. Moro et al. (2001) and Amorim et al. (2009) also considered that, in addition to the route and form of (mis)administration of medication, vaccines with adjuvants or oily carriers are considered the main catalysts of abscess formation.

According to Nanni et al. (2006), bruising may be caused by violent impacts in facilities or from other animals as well as by improper use of instruments by handlers. These depreciations of carcasses may occur during any stage of the production chain, and their presence indicates failures in animal handling besides problems related to animal welfare and economic losses, considering that all injured regions

are condemned (MACIEL et al., 2018).

The Brazilian law addresses the topic of bruises and abscesses as follows: organs or carcasses exhibiting abscesses or suppurative lesions must be removed and only the affected organs and parts shall be condemned. Furthermore, carcasses or parts thereof which are accidentally contaminated with pus shall also be condemned, in compliance with the criteria provided for in articles no. 148 and 134 of RIISPOA (BRASIL, 2017). Thus, the handling practices adopted during the vaccination and transport of animals should be pondered so that the economic impact resulting from quantitative losses from affected tissues can be assessed.

In view of the above-described scenario and the relevance of this topic, the present study proposes to examine losses stemming from the removal of muscle tissue from the carcass due to the presence of bruises and abscesses, considering mainly the economic impact.

## Material and Methods

The study was conducted in a packing plant under the Federal Inspection Service (SIF), located in the municipality of Inhumas - GO, in a region known as Centro Goiãno, Brazil. The slaughtering capacity of the packing plant was 600 animals per day. A total of 865 (381 males and 484 females) cattle without breed distinction were monitored for the presence of abscesses and bruises. The animals originated from 21 municipalities in the state of Goiás (Aurilândia, Bonópolis, Córrego do Ouro, Faina, Fazenda Nova, Goianésia, Goiás, Iporá, Itapirapuã, Itapuranga, Jussara, Montes Claros de Goiás, Novo Brasil, Paraúna, Petrolina de Goiás, Piracanjuba, Piranhas, Pirenópolis, Porangatu, Santa Tereza de Goiás and Uruana).

The research data were collected for a period of 15 days (February/March 2017), including location and number of bruises, abscess region, carcass weight post cleaning/trimming procedures, economic value

and distance between farm and packing plant. The number of animals was determined according to the slaughter flow in the packing plant (10-20% of animals slaughtered per day), considering the day of slaughter and observing the work routine. The cattle were transported from the farm to the packing plant by dual-axle cage trucks which provided an average space of 1.5 m<sup>2</sup> per animal, at a maximum capacity of 18 animals with an average weight of 500 kg (BRASIL, 2018; GOIÁS, 2016).

Prior to slaughter, the cattle were subjected to an antemortem inspection and a fasting period of 12 h during which water was available *ad libitum*. The animals were spray-showered with water at room temperature, following the daily routine adopted by the packing plant. After slaughter, the carcasses were inspected for lesions, abscesses or traumas on the carcass inspection lines G and H (examination of the medial and lateral faces of the caudal part of the half carcass) and I (examination of the medial and lateral faces of the cranial part of the half carcass). Immediately after inspection, the carcasses were sent to the cleaning/trimming platform to remove the abscesses and or bruises.

The lesions were removed by a knife by employees at the packing plant together with assistants from the SFI. All material that was condemned due to traumas or abscesses was stored in red boxes (condemnation), whose final destination was the rendering plant. Based on the removed portions of meat, we recorded the number of bruises and abscesses present in each

half carcass along with the weight of the excised-portion. The removed parts were weighed on a previously calibrated digital scale. Each half carcass was evaluated and numbered following the normal speed of slaughter in the packing plant. The bruised region (forequarter or hindquarter) and the location of abscesses (chuck, hump, shoulder and neck) were also recorded. Results were recorded in a spreadsheet developed especially for this.

The total weight of the evaluated carcasses (hot carcass) and respective losses caused by lesions were calculated as the sum of the values obtained in the slaughtered lots. Hot-carcass weight was calculated as the sum of all evaluated animals divided by the total number of animals. Average loss per carcass was determined as the total lost weight divided by the total number of animals. The number of carcasses with losses was calculated considering the total carcasses, without differentiating those exhibiting lesions from those without any type of lesion, so a real average representing the packing plant would be obtained.

Parallel to these collections, a comparison analysis was made between the sex classes and the possible effects of the distance between the farms and the packing plant on the occurrence and distribution of different types of lesions (traumas or abscesses). The farms were grouped in terms of transport distance to the packing plant (0-200 km: 14 farms sampled; >200 km: seven farms sampled). The number of animals divided according to transport distance and sex is presented in Table 1.

**Table 1.** Number of evaluated animals as a function of distance between farm and packing plant, and sex.

Sex	Distance	
	< 200 km	> 200 km
	Head	
Female	396	109
Male	64	34
Total	475	390

Two groups were thus considered for the comparisons, namely, 1 - females and males  $\times$  number of lesions; 2 - transport distance  $\times$  number of lesions. For the economic impact analysis, we considered the values paid to the producer per @ (15 kg) of carcass acquired from the packing plant during the studied period (BRL 130.00 for males and BRL 120.00 for females; results are presented based on the average of those values). Therefore, the analysis consisted of the total amount of meat (kg) with the presence of lesions multiplied by the price of the @ acquired in the market. The sale price of fresh meat pieces from the packing plant to the consumer market and the by-products from the rendering plant were also collected. It should be noted that the producer is not paid for the excised part of the carcass. The packing plant, on the other hand, adopts this artifice through commercial sterilization to benefit from the sale of by-products for the making of meat and bone meal or tallow.

A descriptive statistical analysis of data was performed, since it was not possible to quantitatively control the animals upon each truck loading or their sex. For this reason, relative and absolute values were used.

## Results and Discussion

Overall, the bruises were found in the hindquarter region of the animals, whereas the abscesses were restricted to the forequarter.

In the total 1,730 half carcasses evaluated, approximately 1,346 (78%) bruises and 778 (45%) abscesses were detected, generating a total discard loss of 310.10 kg of excised meat portions, considering that each carcass had an average of 0.179 kg removed. This value would correspond to a loss of 0.358 kg of material removed per affected whole carcass. A comparison between

the type of lesions revealed that the occurrence of abscesses was, on average, 38% (568) lower than the occurrence of bruises. In a study comparing traumas and abscesses, Melo et al. (2015) found conflicting results compared to the present findings, as they observed that 84.9% of the lesions resulted from trauma and 94.9% were caused by abscesses. Thus, in their study, the occurrence of abscesses in carcasses during slaughter was, on average, 10% higher than the occurrence of bruises.

As can be seen in Table 2, when we consider the different groups of distances between the farms and the packing plant (0-200 and >200 km), the average number of bruises and the occurrence of abscesses per carcass were similar between the groups. However, the weight of discarded tissues was higher on farms less than 200 km away from the packing plant. This result was influenced by the number of animals evaluated in the groups, which consisted of 475 and 390 cattle for distances shorter and greater than 200 km, respectively.

The obtained percentages were also influenced by the number of animals of each sex evaluated during the study, which consisted of 484 females and 381 males. Traumatic lesions affected 74.63% of females and 25.38% of males. Abscess lesions, in turn, were found in 57.87% of females and in 42.13% of males.

The number of bruises found in the present study is higher than those presented by Resende-Lago et al. (2011), who evaluated 26,000 half carcasses in a packing plant in the region of Barretos - SP Brazil. In their investigation, of the total evaluated half carcasses, approximately 1,280 (5%) exhibited bruises and 6,769 (26%) showed abscesses, totaling 3070.5 kg of excised meat portions and a proportional average loss per half carcass of 0.118 kg, corresponding to a loss of 0.236 kg per carcass.

**Table 2.** Relationship between sex class and occurrence of bruises and abscesses in carcasses in a packing plant in Centro Goi ano, Brazil, 2017.

Sex	Hind. bruises	Fore. bruises	Tot. bruises	Abs. chuck	Abs. hump	Abs. should.	Abs. neck	Total abs.	Loss (kg)
<b>Average number of bruises per carcass</b>									
<b>Female</b>	1.66	0.65	2.31	0.73	0.11	0.11	0.07	1.01	2.16
<b>Male</b>	0.76	0.24	1.00	0.58	0.09	0.19	0.07	0.94	1.32
<b>% of number of animals</b>									
<b>Female</b>	73.45	77.80	74.63	61.31	61.53	41.06	54.72	57.87	67.48
<b>Male</b>	26.55	22.20	25.37	38.69	38.47	58.94	45.28	42.13	32.52

Hind. bruises = bruises on the hindquarter; Fore. bruises = bruises on the forequarter; Tot. bruises = total bruises; Abs. chuck = abscesses in the chuck; Abs. hump. = abscesses in the hump; Abs. should. = abscesses in the shoulder; Abs. neck = abscesses in the neck; Total abs. = total abscesses.

Mendonça et al. (2018) studied 4,438 cattle carcasses, consisting of 2,221 females (49.95%) and 2,217 males (50.05%) and found that, between the sexes, the females showed 1,418 (64%) bruises, while the males had a total of 987 (44%) bruises. Likewise, Nicholson (2008) observed that females are more susceptible to lesions than males. Those authors reported that 65.8% and 50.8% of the female and male carcasses, respectively, had bruises.

According to Menezes (2014), one of the main factors influencing the higher number of bruises in the carcasses of female cattle is reactivity. H ard and Hansen (1985) attributed such reactive behaviors to hormonal components, as female hormones fluctuate more than male hormones, which are often more stable. Thus, the meat quality could be compromised, considering that, during road transport, females are in most cases conditioned to the same transporting compartment as males and reactivity might prevent proper handling due to attempts of escape during boarding as well as bumping against the walls (MACH et al., 2008). These occurrences might lead to muscle fatigue, resulting in falls on the truck floor and in the corral.

In the analysis of bruised carcass regions, the forequarter and hindquarter also differed as to the distance between the farm and the packing plant. The animals which travelled a longer way showed a higher number of bruises in the forequarter (0.56)

and hindquarter (1.53), whereas those transported over shorter distances had 0.53 and 1.35 bruises in the fore- and hindquarter regions, respectively. It should be stressed that bruises were found mainly in the hindquarter region of the animal, regardless of the distance. Thus, measures aimed at improving animal welfare, especially during pre-slaughter handling, are essential to ensure the production of good-quality carcass, considering also that the hindquarter region contains the most valued (prime) cuts.

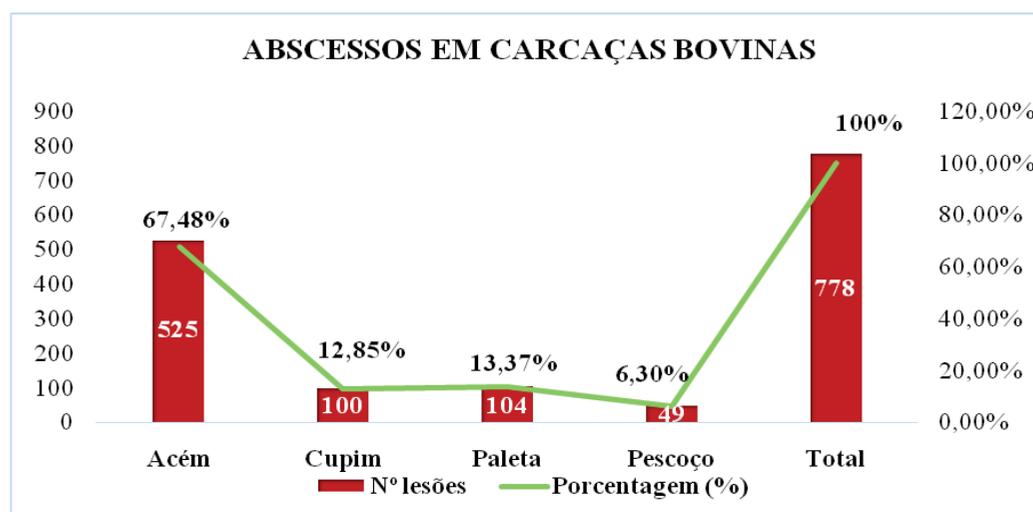
In the current study, a higher number of bruises per carcass was found in the hindquarter region. These findings corroborate those published by Melo et al. (2015), who attributed this higher number of bruises to possible improper handling practices, especially in loading the animals into the truck, with some farms using pointed objects such as sticks with attached nails for handling.

Melo et al. (2015) attributed the distribution of lesions to the existing relationship between the transport distance from the farm and the packing plant, which may affect the incidence of lesions only up to a certain distance. Those authors suggested that animals are more agitated only in the first moments, but are also directly influenced by the road conditions, besides the handling procedures adopted during loading and the truck's capacity. In a similar study, Almeida (2005) observed that lesions occurred in the first 300 km of the journey,

after which distance the number of lesions would remain constant. This was mostly because the animals could be much more agitated in the early moments of the loading process and consequently less balanced against the movements inside the truck. Additionally, the author also reported that the number of lesions practically did not increase as the distance was increased, which the present results confirm.

Abscesses were restricted to the forequarter, specifically in the chuck, shoulder, hump and neck areas (Figure 1). The primal cut known as “chuck” was the most affected by abscesses, which was present in 67.48% of the animals which showed at least one abscess, followed by the shoulder (13.37%) hump (12.85%), and neck (6.30%).

**Figure 1.** Number and percentage of abscesses found in and removed from the carcasses of animals evaluated in a packing plant located in the municipality of Inhumas - GO, Brazil, 2017. Pereira et al. (2014). A relação da condição sexual de bovinos com a qualidade da carne. A relação da condição sexual de bovinos com a qualidade da carne. 8. ed. Pirassununga: Editora D, 5, 41-53.



In a similar study, Assis et al. (2011) evaluated 6,769 half carcasses of cattle and also observed that the chuck region had the greatest incidence of abscesses (80.7%), followed by the neck (11.7%), hump (6.8%) and shoulder (0.8%). Also in a similar experiment, França Filho et al. (2006) described that the lesions were found only in the forequarter region of the animals, in the chuck/shoulder (48%), neck (24%), entrecôte (18.6%) and hump (9.4%).

In the present study, the females had a higher number of abscesses than the males, conversely to the results reported by Avalhaes Filho et al. (2017), who evaluated 2,055 cattle carcasses. Those authors found that 64.14% showed abscesses originating

from medications and/or vaccines. Of those 620 (47%) were found in females and 702 (53%) in males. These results are thus opposite to those presented here, considering the sex class.

Monte et al. (2018) stated that the higher number of abscesses in the females is likely attributed to differences in immune responses between males and females triggered by some types of hormones, e.g., cortisol and estrogen, which can modulate inflammatory response. In females, the levels of these hormones are much higher than in males; thus, the higher number of abscess lesions in the females is understandable.

Most studies indicate that the majority of abscesses is found in the forequarter. Moro et al. (2001) emphasized that this fact may be related to inadequate handling during vaccination as well as incorrect administration routes. Therefore, we may consider that medications and vaccines with adjuvants or oily carriers are the main factors causing abscesses in beef carcasses, leading to the depreciation and elimination of considerable portions of meat in the packing plant.

Table 3 shows the relationship between the distance travelled from the farms to the packing plants and the occurrence of bruises and abscesses in the carcasses. The weight of discarded tissues was higher on farms less than 200 km away from the packing plant. This result might have been influenced by the number of animals evaluated in the group, which consisted of 475 and 390 animals travelling distances greater and lower than 200 km, respectively. However, further investigations are necessary to confirm this hypothesis.

**Table 3.** Relationship between distance from farm to packing plant (Centro Goi ano, Brazil, 2017) and occurrence of bruises and abscesses in carcasses.

Distance (km)	Hind. bruises	Fore. bruises	Tot. bruises	Abs. chuck	Abs. hump	Abs. should.	Abs. neck	Total abs.	Loss (kg)
<b>Average number of bruises per carcass</b>									
≤ 200	1.35	0.53	1.88	0.60	0.11	0.13	0.08	0.92	2.08
> 200	1.53	0.56	2.09	0.83	0.11	0.12	0.05	1.11	1.70
<b>% of number of animals</b>									
≤ 200	51.78	53.53	52.26	47.01	53.57	56.78	66.47	50.23	59.75
>200	48.22	46.47	47.74	52.99	46.43	43.22	33.53	49.47	40.25

≤ 200 = distance shorter than 200 km; > 200 = distance greater than 200 km; Hind. bruises = bruises in the hindquarter; Fore. bruises = bruises in the forequarter; Tot. bruises = total bruises; Abs. chuck = abscesses in the chuck; Ab. hump. = abscesses in the hump; Abs. shoulder = abscesses in the shoulder; Abs. neck = abscesses in the neck; Total abs. = total abscesses.

These results agree with those presented by Bertoloni et al. (2012), who evaluated 120 cattle and reported a higher number of bruises in the hindquarter region, in animals subjected to different transport distances. In a study on the prevalence of lesions and pre-slaughter welfare, Romero et al. (2012) observed that the hindquarter (loin and leg; the areas of highest commercial value) was the most affected region (70.2%). However, those authors believe the transport time does not influence the number of lesions in animals and noted that other characteristics such as sex, lairage time and loading density during transport are possible risk factors that can influence the number of bruises.

Likewise, Joaquim (2002) observed that the road conditions are important factors from the animal-welfare perspective. However, in addition to

factors related to transport such as preservation of roads; driver experience and training; preservation and maintenance of trucks; and compliance with the loading density allowed in transporting, the adoption of good animal handling and welfare practices are fundamental to prevent losses due to lesions in cattle carcasses.

The tissues affected by both traumatic lesions and abscesses are found in edible parts, which means significant economic losses to both the packing plant and the farmer (NANNI et al., 2006).

The economic loss caused by the discard of lesions originates mostly from the forequarter region of the animal, which concentrates a higher number of abscesses and, consequently, heavier quantities of removed tissue. However, despite the lower incidence

of abscesses in the hindquarter, this region is more valued, as it concentrates a great part of the main prime cuts of beef. Melo et al. (2015) mentioned that economic losses are similar in both the number of abscesses in the less-valued cuts and in the presence of elevated quantities of traumas located in the region of greatest value in the animal carcass.

Tissue losses were converted to economic losses. In the evaluation, 310.10 kg were removed as lesions from 865 evaluated animals, resulting in an average loss of BRL 2.99 per slaughtered animal, regardless of the sex class. Thus, for a medium-sized packing plant slaughtering 450 animals/day, daily losses would be estimated at 177.46 kg. Considering the average price of the acquired @ as BRL 125.00 and an average of BRL 8.33/kg paid to the producer, the average daily loss in financial terms would be BRL 1,478.80. If this packing plant operates on 22 days monthly (Mondays to Saturdays), the average total monthly loss would be BRL 35,491.21 and annual losses would amount to BRL 425,894.52, which exceeds the annual loss of BRL 400,000 to the producer.

Avalhaes Filho et al. (2017) reported similar findings pertaining to economic losses: approximately BRL 2.61 per animal. Assumpção et al. (2011), in turn, reported losses of USD 1.68/animal (BRL 5.02). Santos and Moreira (2011) described losses of approximately BRL 1.86/animal. Regarding the sex, Sornas et al. (2016) obtained average losses of BRL 2.71 per slaughtered male and BRL 6.94 per slaughtered female. However, higher values were described in the study of Melo et al. (2015), who estimated economic losses of approximately BRL 11.67/animal.

When compared between farmers and packing plants, economic losses are greater to the former, who are remunerated at the end of the carcass cleaning process based on its weight after the removal of all lesions and alterations perceived during inspection, which further reduces the farmer's profit (RESENDE-LAGO et al., 2011).

The losses found in the present study reveal a major failure in pre-slaughter animal handling procedures, warranting reflection, training and improvements in the handling conditions throughout the beef production flow chart. By adopting these measures, losses can be minimized and the profit obtained by the packing plant increased, considering that fewer meat cuts will be discarded, thereby increasing the farmer's revenues. More importantly, humane conditions can be provided to the animals during slaughter.

## Conclusions

Considering the removal of lesions, the average economic loss per slaughtered animal was BRL 2.99, irrespective of sex class. The transport distance influenced the number of bruises, although it is not considered a major influencing factor. Females showed a higher number of bruises and abscesses than males. The occurrence of abscesses was, on average, 33% less frequent than bruises.

Bruises were found more often in the hindquarter region of the carcasses, regardless of the distance between farm and packing plant, whereas abscesses were restricted to the forequarter and more frequent in regions like the chuck, followed by shoulder, hump and neck.

The average number of lesions and the occurrence of abscesses per carcass practically did not increase as the distance between farm and packing plant was increased. The weight of discarded tissues was higher on farms less than 200 km away from the packing plant. However, this result was influenced by the number of animals evaluated in the group.

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