STUDY OF THE EFFECT OF THE SEXUAL CONDITION ON THE pH AND TEMPERATURE OF MEAT FROM CROSSBRED BRAHMAN TO THE 0 AND 24 HOURS POSTSLAUGHTER

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Background

The carcass and meat quality of ruminants is influenced by various factors such as transport (vehicle type, animals/m^2, and journey times), loading and unloading, stay of the animals in the slaughterhouses, type of stockyard, climate, and breed, among others. In a wide review, Ciria and Asenjo (2000) indicates that the genetic type, feeding, sex, age, season, handling during breeding or prior to slaughter can affect that quality. The low checking of these factors is a constant threat to the organoleptic, technological and sanitary quality of meat in Venezuela, and particularly in Lara state, opposed to the European Union and USA where some minimum conditions prior to the sacrifice are imposed by means of the "Animal Well-being" and the "Law of Humanitarian slaughter (Humane Slaughter act)", respectively. On the other hand, transport is an event highly stressor for the bovine (Van de Water et al., 2003), and might have a tremendous significance in Venezuela because of the existence of lines of high crossbred Brahman that they are easily excitable and susceptible to suffer of stress. Preslaughter conditions, therefore, can affect muscle pH, color, texture and water-holding capacity of meat.

Objectives

With the purpose of evaluating in the Venezuelan tropic the influence of the preslaughter parameters on the carcass and meat quality of crossbred Brahman, a series of experiments are carrying out. The pH and temperature at 0 and 24 hours postslaughter of young bulls, cows, heifers, and steers that arrive to the slaughterhouse were observed in this particular study.

Materials and methods

This study was developed at the Western Center Slaughterhouse localized in the semi-arid climate of Lara state, Venezuela with an annual half temperature between 22º and 28º Celsius, annual precipitations greater than 1000 mm and a relative humidity between 77 and 85%. A total of 78 crossbred Brahman animals were slaughtered as discriminated as followed. Thirty-eight young bulls (whole males) of 2.5 to 3.5 years old and average half carcass weight of 135.6 Kg and 15 steers (castrated males) of 2.5 to 3.5 years and average half carcass weight of 134.4 Kg. Twelve 2.5 year-old heifers with average half carcass weight of 83.4 Kg, and thirteen 3 to 6 years old cows with average half carcass weight of 95.8 Kg. The animals were loaded among 14:30 to 17:00, and traveled for 4 to 6 hours. Arrival in slaughterhouse occurred between at 20:00 and 20:30. The animals were placed by discharge lots in stockyard separated by metallic rails with free readiness of water. Stay time in slaughterhouse went from 11 to 12 hours. After giving a shower with cold water, the animals were stunned with gun of captive bullet in the cranial region. Chronological age was estimated through the dental characteristics, and approximately 25 minutes after the stunned state of the animal, both initial pH and temperature (pH O and Temp O) were measured in the Gracilis muscle of the half left carcass by using a pHmeter (3030N Neukum) with penetration electrode and sensor of temperature. A final pH and temperature (pH 24 and Temp 24) were also measured after 24 hours refrigerated. Values obtained were analyzed by the general lineal model of variant analysis of computer software SPSS, version 10.0 for Windows.

Results and discussion

Temp 0 of carcass were lower ($p < 0.01$) for young bulls than for cows, heifers and steers probably due to differences in the way genders handle the preslaughter stress. Sañudo (1992) explains that the females of calmer character increases the corporal temperature when suffering stress in the moment prior to the

sacrifice, accelerating glycogen degradation and glycolisis. The fat cover of the carcass might also affect the initial and final temperature by avoiding heat dispertion, since according to Aalhus et al. (2001), thicker back fat corresponded with slower temperature decline. Young bulls may deposit less fat cover because of their hormonal condition. On the other hand, Temp 24 was higher ($p < 0.01$) in steers and cows as compared to heifers and young bulls.

Table 1.Values of pH 0, pH 24, Temp 0, and Temp 24 in crossbred Brahman of different gender

	Young bulls	Cows	Heifers	Steers	Signification
pH 0	6,66a	6,52a,b	6,48b	6,51b	**
	±0,21	±0,26	±0,15	±0,21	
pH 24	5,90a	5,85a	5,64b	5,63b	**
	±0,20	±0,14	±0,08	±0,19	
Temp 0	35,01a	38,38 b,c	37,59b	39,50c	**
	±2,22	±1,91	±0,60	±0,99	
Temp 24	3,86a	6,58b	3,09a	9,58c	**
	±2,36	±1,79	±0,58	±1,93	

* * Significative difference ($p = 0.01$)
Differents letters in the same row means significant differences between young bulls, cows, young bulls and heifers. ($p = 0.01$).

The pH 0 and pH 24 were higher ($p < 0,01$) for the young bulls than all the other groups evaluated. These results suggest a greater glycogen consumption preslaughter (Mojto et al, 1998), because of greater physical activity, biggest excitability, maintained muscular contraction and catecolamines hipersecretion before the sacrifice (Tarrant, 1981). In fatigued animals prior to sacrifice, the pH descends little and very slowly, because glycogen depletion which causes elevated values of final pH (Sañudo 1992).

The steers and heifers had lower values of pH 24 ($p < 0,01$) as compared to the cows and young bulls, however, the total average of pH 24 (5,79) is higher than the observed in other studies (Page et to the, 2001), which could indicate that the preslaughter conditions are significantly affecting muscle glucogen in this group of animals.

Conclusions

With the material and used methods, and starting from the results obtained in this study and lower these experimental conditions, we can conclude that the sexual condition has influence in the initial and ultimate pH and temperature of the meat of crossbred Brahman.

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