

## EFFECT OF RATION PROCESSING ON pH AND COLOR OF THE GOAT MEAT

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### Background

The world herd of goats according with FAO (2000 and 2001) is of 715.3 millions of the animals, with meat production of approximately 3.7 millions of ton. The Brazil has the 10<sup>th</sup> biggest goat herd of the world, with about 8 millions of the animals and the biggest concentration of the goats is in Northwest region, with 94% of the country herd (IBGE, 1998). The goat meat is a product with large potential of expansion, considering the greatest internal and external markets, where in both cases it is possible to observe increase in the consume rate. This increase is associate with the improve in the slaughter conditions and broad availability of the young animals, then this animals needs to be better explored to attend the demand of goat meat with quality and quantity (SILVA SOBRINHO & GONZAGA NETO, 2000). The goat meat has a strong red color that is very characteristic. According to GONZALEZ et al. (1983); WOOD (1984); MOWLEM (1988); BARBIKER et al. (1990) the goat meat showed bigger ultimate pH than the other meats, exhibiting high water holding capacity and low cooking loss. This characteristics are advantages to meats and can be used in processed products such cured, smoked meat and sausages. Several searches showed that the goat meat has a low fat percentage, then there is a great opportunity to explorer this advantage in areas where the population needs to reduce the fat intake of the diet. The saturated fat percentage of the goat meat is very low in relation to cattle (850%), sheep (900%) and swine (1100%) (ADDRIZZO, 1990). Several chemical and physical treatments such extrusion and peletization are used in the ration processing with the objective of the improve the efficiency utilization of the diet by the way, the effect of this processing on the organoleptic characteristics of the goat meat are lack in the literature.

### Objectives

Thus the objective of the study was to evaluate the effects of the ration processing on pH and color of the goat meat in animals slaughtered with 30, 45 and 60 days of age.

### Methods

It were used 36 Saanen kids, feeding with total ration and the main ingredients were: corn hay (40.00%), ground corn (29.26%), soybean meal (21.82%), molasses (4.84%), soybean oil (0.91%) and minerals (3.17%).

The animals were assigned in a randomized complete design with a 3x3 factorial (three ages and three rations) with four replications and the treatments were: ground total ration (GTR) the control and peletted total ration (PTR) and extruded total ration (ETR). The means were analyzed using Tukey's test (5%) and to the correlation analyses, used the linear model with the equation  $Y = a + bx$ .

The bromatological composition (% dry matter) of the rations GTR, PTR and ETR was respectively 16.58; 16.93 and 16.47% crude protein (CP); 34.54; 27.78 and 32.03% neutral detergent fiber (NDF); 19.89; 20.33 and 18.39% neutral detergent acid (NDA) and 8.92; 9.13 and 8.57% fat.

Twelve kids (4 per treatment) were slaughtered with 30, 45 and 60 days of age and the live-weight at slaughter moment was approximately 5, 7 and 10 kg, respectively. The water and the ration of the animals were take of 12 and 24 hours before of the slaughter, respectively. Immediately after the slaughter, the animals were eviscerated and the carcass carried to the Laboratory to pH and color determination. Then, the carcass were chilled in refrigerator at 4°C during 24 hours, and the pH and color were determined again. After that, the carcass were frozen during eight months. Next, the samples were thawed in environmental temperature to determination of pH and color after frozen.

The pH was determined using a Jonhis digital pHmeter, model IpHPJ, directly on the *Semimembranosus* muscle and the color was determinated using a tristimulus analyser Minolta Chroma Meter-CR-300, where were evaluated the parameters L\* (lightness), a\* (redness) e b\* (yellowness) of the CIELAB System.

### Results and Discussion

The pH values to 0 and 24 hours after the slaughter and after frozen (8 months) of the *Semimembranosus* muscle of the Saanen kids leg, feeding with GTR, PTR and ETR are showed in the Table 1. Statistical analyses verified there was no significant difference between age and ration and the correlation between age and pH was low. Thus independent of animal age was observed that after the slaughter, the pH varied between 6.2 to 6.3 and was not significant among the rations. At once that 24 hours after the slaughter the pH stabilization was began, it was verified that the decrease was less intense between pH<sub>24hs</sub> and ultimate pH in relation to pH<sub>0hour</sub> and pH<sub>24hrs</sub>. It well know for the animal muscle be converted in meat it is necessary that occur biochemistry processes, such pH modifies, that in the live animal is approximately 7.4. When occur the *rigor mortis*, the muscular glycogen of the meat and the lactic acid production decrease the pH slowly to 5.6-5.7 in 6 to 8 hours after the bleeding (FORREST et al., 1975), this process is showed in the Table 1. This modifications provide to goat meat, tenderness and succulence with smell and flavor lightly acid (CAÑEQUE et al., 1989), therefore, the pH determination is an important attribute to the meat quality study.

JAIME (1991) evaluating the chilling effect in sheep carcass, verified value of the pH<sub>30</sub> = 6.81 and when the meat was slow chilling during 24 hours, the pH decrease to 5.82. In study with "mestiços" goats slaughtered with 175 days of age, MADRUGA (1999) verified that the pH on the slaughter moment was of 6.36 ± 0.28, similar that the values founds in this study. In relation to the color, studies showed that this parameter is the most important factor that the consumer evaluate in the purchase moment. To this characteristic it was verified that wasn't significant interaction between age and ration. The L\*, a\* and b\* values, didn't differ among treatments (Table 2). It was observed that after 24 hours, L\* values increased, then the meat becomes pale, probably due the chilling process. SAÑUDO et al. (1990) used a tristimulus analyzer Minolta to verify the color of the sheep meat, found L\* values between 46 to 48, a\* values between 16 to 18 and b\* values between 7 to 8 by the way, in this study with goat meat a\* and b\* values showed lower in relation to sheep meat.

PAGE (2001) observed that L\*, a\* and b\* values are inversely related with the pH, similar the observed in this study that verified meat with a much dark when the pH<sub>0 hours</sub> above 6.2 to study rations.

### Conclusions

It was concluded that the peletization and extrusion processes of the total ration and the age did not interfere on pH and meat color of Saanen kids slaughtered with 30, 45 and 60 days of age.

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Table 1. The pH values to 0 and 24 hours after slaughter and after frozen (ultimate) of the *Semimembranosus* muscle of the Saanen kids leg, feeded with ground total ration (GTR), peletted total ration (PTR) and extruded total ration (ETR).

pH	GTR	PTR	ETR	Linear Equation	CV %
0 hour	6.25 <sup>a</sup>	6.23 <sup>a</sup>	6.34 <sup>a</sup>	y = -0,0028x + 6,3478 r <sup>2</sup> = 0.0120	3.67
24 hour	5.84 <sup>a</sup>	5.76 <sup>a</sup>	5.82 <sup>a</sup>	y = -0,0088x + 5,9695 r <sup>2</sup> = 0.1242	2.95
Ultimate	5.58 <sup>a</sup>	5.52 <sup>a</sup>	5.62 <sup>a</sup>	y = -0,0120x + 5,8155 r <sup>2</sup> = 0.2582	2.94

<sup>a</sup> Means within a line with same letters no differ significantly (P>0,05).

Table 2. Color values obtained to 0 and 24 hours after the slaughter and after the frozen (ultimate) of the *Semimembranosus* muscle of the Saanen kids leg, feeded with ground total ration (GTR), peletted total ration (PTR) and extruded total ration (ETR).

Color	GTR			PTR			ETR			CV %		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
0 hour	45.15 <sup>a</sup>	10.03 <sup>a</sup>	1.83 <sup>a</sup>	44.24 <sup>a</sup>	9.50 <sup>a</sup>	2.22 <sup>a</sup>	44.10 <sup>a</sup>	9.56 <sup>a</sup>	1.51 <sup>a</sup>	3.70	11.06	25.38
24 hours	46.26 <sup>a</sup>	11.10 <sup>a</sup>	4.67 <sup>a</sup>	47.13 <sup>a</sup>	10.30 <sup>a</sup>	4.94 <sup>a</sup>	47.60 <sup>a</sup>	10.84 <sup>a</sup>	4.26 <sup>a</sup>	5.40	11.25	26.10
Ultimate	46.70 <sup>a</sup>	7.90 <sup>a</sup>	1.98 <sup>a</sup>	47.11 <sup>a</sup>	7.66 <sup>a</sup>	2.85 <sup>a</sup>	47.88 <sup>a</sup>	7.16 <sup>a</sup>	2.85 <sup>a</sup>	7.30	18.39	19.14

L\* (Lightness); a\* (redness); b\* (yellowness)

<sup>a</sup> Means within a line with different letters with similar parameters differ significantly by Tukey's test (5%).