P-04-16

Determination of aw and pH of charqui elaborated with beef matured, defrosted and salted with common salt (NaCl) (#486)

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Introduction

From very remote times, in the prehistoric civilizations, the necessity of the conservation of the foods was imposed to assure the supply to the population. In this sense, the salting and drying of the meat were two processes widely used for their conservation and that are still used today (Salvá, 2009, Mateo et al., 2010). This conservation technique was known in Asia, Africa, Europe and America, having been used by Mayas and Aztecs. There is also evidence of dried meat in Egypt from 4,000 to 5,000 years ago (Salvá, 2009; Alache, 2013).

In Quechua the word for charqui is ch'arki and its origin is ancestral. It is a product made with meat cut into strips or pieces of little thickness, usually without fat (lean), salted dry or in brine and dried in the sun (Salvá, 2009, Mateo et al., 2010, Navarro et al., 2011 Alache, 2013; Abrantes et al., 2014).

Charqui is a nutritious product, rich in proteins, low in fat and stable at room temperature (Mamani-Linares and Cayo, 2014, Nguyen and Nguyen, 2014, Liu et al., 2016).

In Chile, there is no specific regulation for a product such as charqui (Alache, 2013) and the domestic market for this product has a mostly informal offer, of an artisanal nature and of low sanitary and quality standards, with a low-scale production , which has a loyal demand in the niche of low quality consumers, leaving out a large sector of the population that does not consume charqui, because it is associated with an unhealthy product with low palatability (Navarro et al., 2011).

The objective was to elaborate and characterize charqui with matured, defrosted and salted beef with common salt, to determine the color and pH.

Methods

The test was carried out in the Biomaterials Physical Properties Laboratory of the Faculty of Agricultural Engineering, University of Concepción, Campus Chillán.

For this study we worked with three cuts of the posterior quarter: striploin, corresponding to the longissimus lumborum muscle (from the 10th rib to the lumbar vertebrae); eye of round, located on the back of the thigh, which corresponds to the semitendinosus muscle; and sirloin tip, corresponding to the quadriceps femoris muscle.

At the end of the charqui process, color and pH were evaluated in each cut. Evaluation of the color was done with the slices of charqui analyzed in a spectrophotometer color reflecting Hunter Lab® model Color QUEST. B illuminant was used at an angle of 45 ° on a 2.54 cm diameter viewfinder, which measures the color coordinates of the CIELab space, where, L * indicates brightness and ranges from 0 (black) to 100 (white), a * measures the intensity of red, from + a (red) to -a (green), and finally, b * measures the intensity of yellow, from + b (yellow) to -b (blue). The parameters L * a * b * and the reflectance spectrum are obtained from 400 to 700 nm in steps of 10 nm. Three measurements were made per day of maturation and for each commercial cut of fresh beef.

Evaluation of the pH was measured with a pH meter electrode type punch, brand HANNA INSTRUMENTS®, model HI 99163, which was previously calibrated with buffer. Three repetitions were made per day of maturation and for each commercial cut of fresh beef.

Statistical analysis, an experimental design of repeated samples was used considering time as a treatment factor for all commercial cuts of beef. The assumptions of normality and homogeneity were previously analyzed using the Shapiro Wilk and Bartlett's test respectively, where the data show a normal distribution. The analysis was carried out through descriptive statistics, analysis of variance and Kruskal-Wallis test, with the statistical program InfoStat Version 2019e.

Results

Table 1 pH of charqui with common salt with different days of maturation, made with the cuts striploin, eye of round, sirloin tip.

Treatment	Maturation days	Striploin	Eye of round	Sirloin tip
1	1	5.53^{abcd}	5.49^{abcd}	5.46^{a}
2	5	5.40^{ab}	5.58^{bcd}	5.58^{abc}
3	10	5.54^{bcd}	5.45^{abc}	5.55^{abcd}
4	15	5.52^{bcd}	5.50^{abcd}	5.94^{cd}
5	20	5.54^{bcd}	5.61^{cd}	5.57^{abcd}
6	25	5.59^{cd}	5.42^{a}	5.57^{abcd}
7	30	5.58^{cd}	5.44^{abc}	5.56^{abcd}
8	45	5.53^{abc}	5.43^{ab}	5.69^{bcd}
9	60	5.42^{ab}	5.44^{ab}	5.49^{ab}
10	75	5.43^{ab}	5.35^{a}	5.34^{ab}
11	90	5.20^{a}	5.43^{a}	5.51^{ab}

Notes

* Different letters are valid for the same column, medians with a common letter are not statistically different (p> 0.05) in the Kruskal Wallis test.

Table 2 a_w of charqui with common salt with different days of maturation, made with the cuts striploin, eye of round, sirloin tip.

Treatment	Maturation days	Striploin	Eye of round	Sirloin tip
1	1	0.69^{cd}	0.65^{abcd}	0.71^{bcd}
2	5	0.55^{a}	0.67^{abcd}	0.70^{abcd}
3	10	0.70^{d}	0.51^{ab}	0.65^{ab}
4	15	0.65^{abc}	0.64^{abcd}	0.72^{cd}
5	20	0.67^{abcd}	0.70^{d}	0.68^{abc}
6	25	0.66^{abc}	0.58^{abc}	0.71^{bcd}
7	30	0.68^{bcd}	0.72^{d}	0.69^{abcd}
8	45	0.67^{abcd}	0.68^{bcd}	0.72^{cd}
9	60	0.67^{abcd}	0.68^{bcd}	0.65^{ab}
10	75	0.68^{bcd}	0.63^{abc}	0.74^{d}
11	90	0.63^{ab}	0.68^{cd}	0.67^{abc}

*Different letters are valid for the same column, medians with a common letter are not statistically different (p> 0.05) in the Kruskal Wallis test.

Conclusion

The elaboration of charqui in controlled conditions of time and temperature, allow to optimize the resources. It should be noted the importance of pH and aw in the preservation of meat products. Sirloin tip obtained aw smaller than 0.51 and at pH striploin it was the lowest value 5.2.

Notes