CHARACTERIZATION OF DRY AGEING BAG *SERPENTINA* CHEVON: PROCESS YIELD AND CHEMICAL AND PHYSICAL PARAMETERS

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I. INTRODUCTION

The "*Cabrito do Alentejo*" (Alentejo's kid), a protected geographic indication meat product obtained from autochthonous *Serpentina* breed goats (30-120 days of age), is tender, juicy, low in fat, with a high proportion of muscle, light colour with little intense red and a pleasant flavour (1). However, meat from heavier and older animals, is not appreciated, being normally commercialised at very low prices when compared with younger animals, or used to process (2,3). A new dry ageing process using a highly water vapour-permeable bag was introduced to improve the traditional unpackaged dry ageing process with lower losses and similar upgraded sensory traits (4). However, if dry ageing of goat meat is not common (5), dry ageing in bag is even less. Thus, an exploratory approach to study the effects of the dry ageing in bag (46 days) in some meat parameters from older and cull goats from *Serpentina* breed, such as, pH, colour, water-holding capacity (WHC), water activity (a_w) and process yield, was defined.

II. MATERIALS AND METHODS

Five female goats from *Serpentina* breed at the end of productive life, with 8-12 years old, from the same farm, were slaughtered on the same day at a commercial slaughter plant according standard procedure. The average±standard deviation carcass weight was 28.4±4.4 kg. On day 2 *post mortem*, muscle *longissimus dorsi* (*M. longissimus thoracis et lumborum*) (LD) was cut out from both sides of each carcass and vacuum packaged. On day 3 *post mortem,* LD from the left side were packaged in bags with permeability of OTR at 23 ºC and 0% RH of 24 cm^3/m^2 /24 h; of CO_2 at 23 ºC and 0% RH of 78 cm^3/m^2 /24 h and MVTR at 38 ºC and 100% RH of 44 g/m^2 /24 h (LID540X, Cryovac®). The ageing process was carried out at 2±2 ºC with relative humidity of 60-90% for 46 days, in darkness, non-filtered air and protected from UV light. From the right side of LD, 200 g were removed for analysis. After ageing, samples were trimmed and pH was measured. Weight losses were calculated: ageing loss (%) = weight loss (WL) during ageing/weight before ageing x 100%; Trim loss (%) = WL during trimming/weight before trimming x 100%; total ageing and trimming loss (%) = (weight before ageing – weight after trimming)/ weight before ageing x 100%.To evaluate WHC, samples were weighted and heated in vacuum package in a 72 ºC water bath until core temperature of 70 ºC. The samples were then cooled in running cold tap water for 30 min, stored at 4 ºC overnight and weighted the next day. WHC was calculated as percentage of meat weight loss during cooking. Cooking loss (%) = (weight before cooking) – (sample weight after cooking)/weight before cooking x 100%. Total loss at ageing and cooking (%) = total ageing and trim loss (%) + cooking loss (%). Meat

colour was measured using a Konica Minolta CR-400 and CIE *L**, *a**, *b** colour scale. Was used the average of nine measurements on the meat surface. Chroma value was calculated as $C^* = \sqrt{(a^{*2} + b^{*2})}$ and hue angle as $°h = \frac{arct\frac{b^*}{a^*}}{6{,}2832} X360$, if $a^* > 0$ and $b^* > 0$.

The pH was measured on day 3 *post mortem* and on day 46 of ageing using a portable meter (Crison instruments). For each sample five measurements were taken at different points on the meat. Water activity (a_W) was performed using a thermo-hygrometer at 20 ± 1 ºC (HigroPalm Rotronic AG). The previously ground samples were placed in the sample holder of the equipment and the value corresponding to the a_W was then registered after the stabilization of the equipment reading. Results were compared to identify parameters that changed significantly during ageing process using the non-parametric Kruskal-Wallis test in R statistical software (version 4.2.2).

III. RESULTS AND DISCUSSION

Results shown that ageing process yield was of 72.61±15.2% (Table 1), which represent similar losses of some authors (5). All parameters were significantly different between aged and unaged meat, with the exception for WHC and chroma (Table 1). In fact, when compared between unaged and aged meat, pH, *L** and *a** increased substantially, but hue and *b** decreased.

Table 1 Effect of dry ageing bag (46 days) on weight loss, water holding capacity, colour and pH of chevon

Trait	Unaged Meat	Aged Meat	SE	*P-value*
Weight loss				
Ageing loss (%)	-	7.58±10.75	4.81	-
Trim loss (%)	-	21.98±9.29	4.15	-
Total ageing and trim loss (%)	-	27.39±15.2	6.80	-
Water holding capacity (%)	2.44[a]	2.07[a]	0.11	0.00
pH	5.69[a]	6.70[b]	0.05	6.2E-15
Colour: *L**	10.44[a]	34.75[b]	0.42	0.00
*a**	8.83[a]	15.06[b]	0.29	0.00
*b**	9.16[a]	5.08[b]	0.17	0.00
Chroma	26.20[a]	15.70[a]	1.29	1.7E-14
Hue	46.04[a]	18.60[b]	0.58	0.00

SE: Standard error
Different letters in a row correspond to significant differences at a significant level α equal to 0.05 (Kruskal-Wallis)

IV. CONCLUSION

Dry ageing in bag had a considerably influence on pH and colour parameters, which can compromise meat quality attributes. Further sensory and microbiological studies are necessary to validate these findings and to improve ageing methodology.

REFERENCES

1. APCRS (2022). Caderno de especificações do cabrito do alentejo IGP. Associação Portuguesa de Caprinicultores da Raça Serpentina. Évora, Portugal.
2. Teixeira, A.; Pereira, E. & Rodrigues, E. S. (2011). Goat meat quality. Effects of salting, air drying and ageing processes. Small Ruminant Research 98: 55-58.
3. Webb, E. C.; Casey, N. H. & Simela, L. (2005). Goat meat quality. Small Ruminant Research 60: 153-166.
4. Ahnstrom, M. L.; Seyfert, M.; Hunt, M. C. & Johnson, D. E. (2006). Dry aging of beef in a bag highly permeable to water vapour. Meat Science 73: 674-679.
5. Hastie, M.; Jacob, R.; Ha, M.; Hepworth, G.; Torrico, D.; Ashman, H. & Warner, R. (2021). Effect of carcase characteristics and sheep breeding values on the yield of dry- and wet-aged multipurpose merino cull ewe meat. Livestock Science 243: 1-9.