

INTRODUCTION

Serpa is a typical ripened Portuguese cheese granted with the Protected Designation of Origin (PDO) label (Regulation EEC 2081/92). It is produced within the Alentejo province (south of Portugal) from raw ewes' milk and using as rennet dried flowers of the plant *Cynara cardunculus* L.. The absence of any standardizing thermal process and starter microorganisms means that its quality and characteristics depends mainly on the endogenous flora which arises mainly from raw milk and cheese dairy environment (1- 4). Consequently, the properties of the resulting cheese can vary due to small differences in cheesemaking technology and the chemical and microbial composition of milk associated to the conditions of milk production, such as geographical area, animal breed, animal diet and season (2, 5). The Serpa cheese production benefits the rural economy, boosts farmer's income and maintains the population in less favored or remote areas. So, the aim of this work was to evaluate the physicochemical and sensory properties of thirty days ripened DOP Serpa cheeses produced in winter and spring by different dairies in the production area.

MATERIAL AND METHODS

The sample consisted of twelve units of thirty days ripened PDO cheeses from three dairies (A, C, G) with different locations in the geographical area of production. In each dairy, samples were collected in spring (SA, SC, SG) and winter (WA, WC, WG).

Physical assessment included the texture characterization performed with a texture analyser TAHDi (Stable Micro Systems, Godalming, UK), equipped with a 250 N load cell. The color was determined in the core and in the rind according to CIE color system (L^* , a^* , and b^* parameters) by a colorimeter Minolta CR 300.

The chemical characterization included the determination of pH, acidity, moisture, water activity, total nitrogen, soluble nitrogen, non-protein nitrogen, aminoacid nitrogen, and fat content through standard techniques.

Sensory evaluations were carried out by the official Serpa cheese panel tasters, housed in Department of Technologies and Applied Sciences of IPBeja and held in the tasting room with standard specifications (NP ISO 8586-1 and 2, 2001).

RESULTS AND DISCUSSION

PHYSICAL CHARACTERIZATION

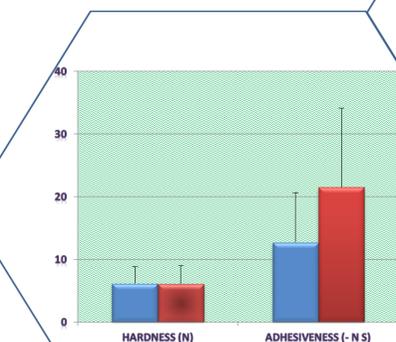


Figure 1 – Texture profile analysis (TPA) of cheeses produced in winter and spring in the different dairies.

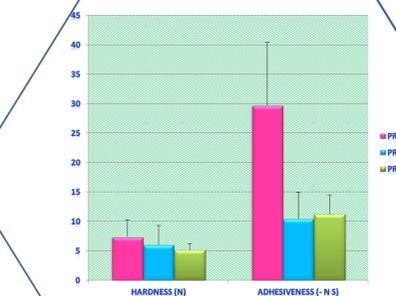


Figure 2 – Texture profile analysis (TPA) of cheeses from dairies A, C and G.

Texture profile

Hardness was similar among seasons and cheesemakers (Fig. 1, 2), however, differences in adhesiveness were found. Winter cheeses showed lower adhesiveness (Fig. 1). Similar trend have been observe by other authors in this type of cheese (6, 7) .

SENSORY EVALUATION

Sensory evaluation

The results showed in Fig. 9, 10, and 11 complies with the specifications for certification and are in accordance with other studies on sensory quality of Serpa cheese (5) even with respect to the preference of the spring cheese.

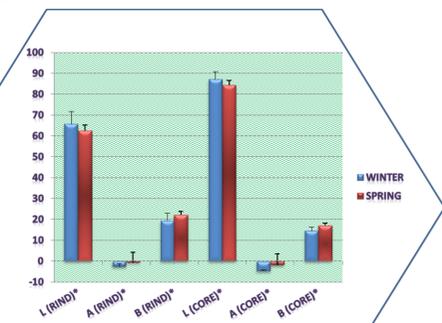


Figure 3 – Color parameters L^* , a^* , and b^* (rind and core) of cheeses produced in winter and spring in the different dairies.

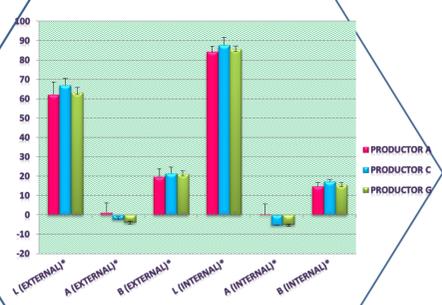


Figure 4 – Color parameters L^* , a^* , and b^* (rind and core) of cheeses from dairies A, C and G.

Color

In general there were significant differences between mean values between seasons and also producers (Fig. 3, 4). In spring there was a decrease in L^* and a^* values and an increase in b^* (Fig. 6). This trend is consistent with the higher values of spring cheese maturation factor (Fig. 8) as set out in (7).

CHEMICAL CHARACTERIZATION

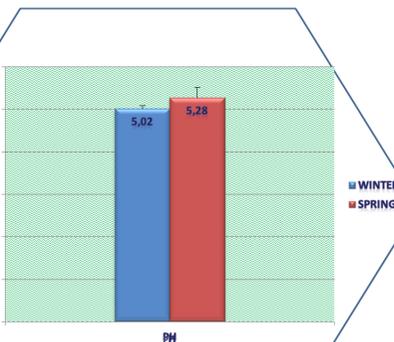


Figure 5 – pH of cheeses produced in winter and spring in the different dairies.

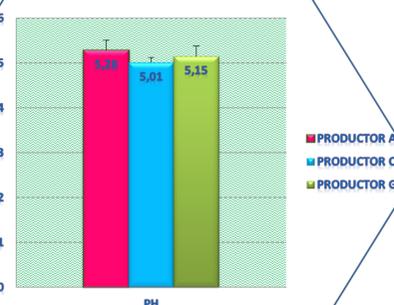


Figure 6 – pH of cheeses produced in dairies A, C and G.

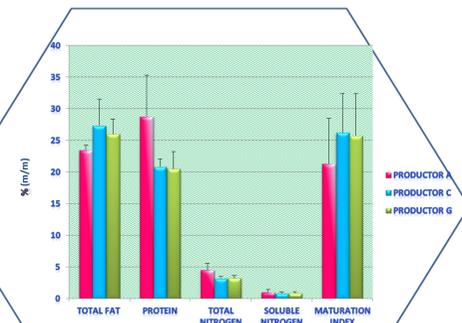


Figure 7 – Fat, protein, nitrogenous fractions and maturation factor of cheeses from dairies A, C and G.

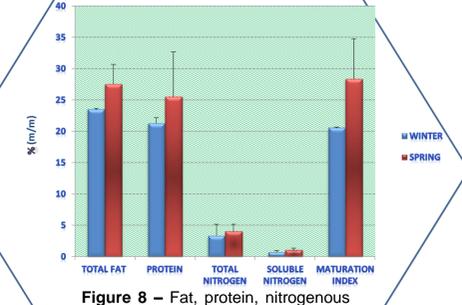


Figure 8 – Fat, protein, nitrogenous fractions and maturation factor of cheeses produced in winter and spring in the different dairies..

Chemical characterization

The chemical characterization showed values consistent with specifications and those obtained by other authors (2, 5, 6) (Fig. 5, 6, 7, and 8). The most significant differences between seasons and producers were in the pH (Fig. 5, 6), total fat, protein, nitrogenous fractions and maturation factor (Fig. 7, 8).

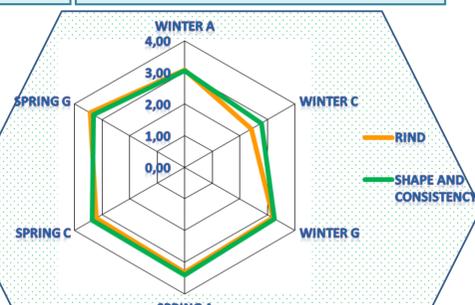


Figure 9 – Rind, shape and consistency of cheeses produced in winter (Winter A, C, G) and spring (Spring A, C, G) in the different dairies.

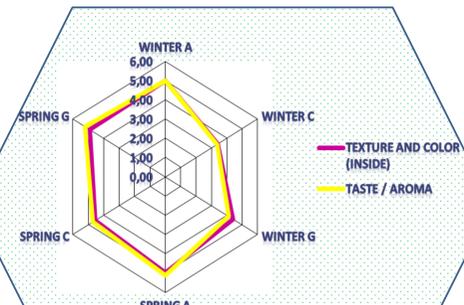


Figure 10 – Texture and color of core and taste/aroma of cheeses produced in winter (Winter A, C, G) and spring (Spring A, C, G) in the different dairies.

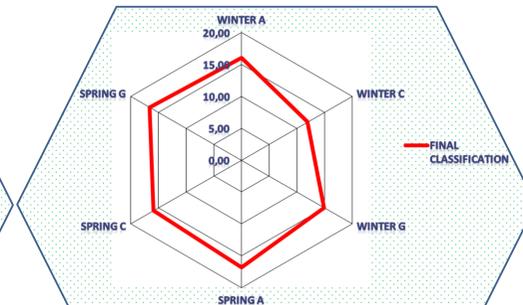


Figure 11 – Total/Final classification (sum of points obtained in assessing the rind, shape, consistency, texture, color and taste/aroma) of cheeses produced in winter and spring in the different dairies.

CONCLUSIONS AND PROSPECTS

Results showed statistical differences between seasons and cheesemakers in most of the parameters studied. We can concluded that the properties of this traditional cheese is highly influenced by several factors, so a more exhaustive control of the production system can help to get a homogeneous quality product.

The results, in general, are within the specified values for this type of cheese, whereby the selected samples may be used as source of indigenous microorganisms for future use in production improvement.

REFERENCES

- Reis PJM, Xavier Malcata F. Current state of Portuguese dairy products from ovine and caprine milks. *Small Ruminant Research*. 2011;101(1-3):122-33.
- Roseiro LB, Wilbey RA, Barbosa M. Serpa cheese: Technological, biochemical and microbiological characterisation of a PDO ewe's milk cheese coagulated with *Cynara cardunculus* L. *Lait*. 2003;83(6):469-81.
- Pereira CI, Graca JA, Ogando NS, Gomes AMP, Malcata FX. Influence of bacterial dynamics upon the final characteristics of model Portuguese traditional cheeses. *Food Microbiology*. 2010;27(3):339-46.
- Freitas C, Malcata FX. Microbiology and biochemistry of cheeses with Appellation d'Origine Protegee and manufactured in the Iberian Peninsula from ovine and caprine milks. *Journal of Dairy Science*. 2000;83(3):584-602.
- Canada JdSB. Caracterización sensorial y físico-química del queijo Serpa. PhD Thesis, Universidad de Extremadura, Cáceres, Spain. 2001-01-01.
- Alvarenga N, Canada J, Sousa I. Effect of freezing on the rheological, chemical and colour properties of Serpa cheese. *Journal of Dairy Research*. 2011;78(1):80-7.
- Alvarenga NBMGd. Estudos em textura de queijo Serpa Texto policopiado Nuno Bartolomeu Mendes Godinho de Alvarenga 2000.