

EFFECT OF THISTLE ECOTYPE IN THE PHYSICAL- CHEMICAL AND SENSORIAL PROPERTIES OF SERRA DA ESTRELA CHEESE



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Introduction

Cheese is a classical dairy product, which is strongly judged by its appearance, flavour and texture.

Processing parameters that could affect cheese structure play a dominant role upon the features exhibited by the final product.

Serra da Estrela cheese is one of the most traditional cheeses in Portugal.



Introduction

It is a product with Protected Denomination of Origin (PDO).

It has a great economic importance and unique sensorial characteristics.

Serra da Estrela cheese is manufactured from raw ewes' milk and curdled with thistle flowers.



Aim of the study

Evaluate the physical and chemical characteristics of Serra da Estrela cheese and compare these results with those of the sensory analysis, using six different thistle ecotypes.



Material and methods



Sample preparation

Cheeses were manufactured in a certified dairy, situated in Penalva do Castelo, which is within the geographical area of the Protected Designation of Origin.

The general cheese manufacturing methodology was the same for all the cheeses produced.

	Production conditions
Sheep bread	White Bordaleira
Quantity of thistle flower (g)/ 1L milk	0.15
Quantity of salt (g)/1L milk	15
Ripening moisture	1 st step- 7/8°C, 15/20 days, 90/95% Moisture 2 nd step- 10/12°C, 20/25 days, 80/85% Moisture

Six thistle flower ecotypes were tested, coded by 1, 2, 3, 4, 5 and 6.

Chemical analysis of sheep milk

- moisture (%)
- protein (%)
- fat (%)
- ash (%)
- chlorides (%)
- pH



Texture evaluation

Texture profile analysis (TPA)

texturometer TA.XT.Plus, Stable Micro Systems

Probe P/2 (2 mm diameter cylinder)

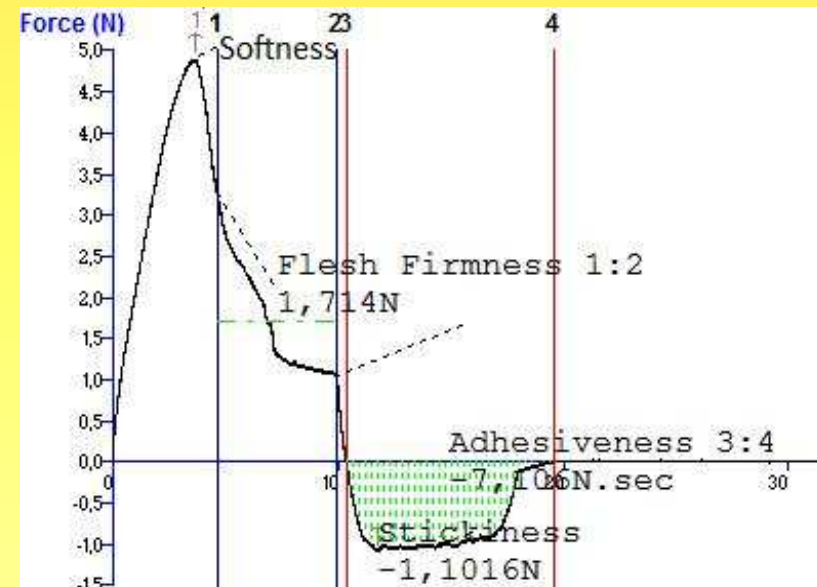
Textural properties:

Adhesiveness

Stickiness

Crust firmness

Inner firmness



Sensorial evaluation of cheeses

It was performed by 9 trained panelists, with ages between 25 and 56 years.

Sensory attributes (Portuguese Standard NP 1922)

- rind cheese aspects
- cheese past
- flavour intensity, taste and aroma
- bitter,
- remaining presence
- colour
- global appreciation.



A scale of seven unit points was applied: 1 for less and 7 higher intensity to all attributes except colour (range was blank (1) to yellow (7)).

Results and discussion



Chemical properties

Property	Eco1	Eco2	Eco3	Eco4	Eco5	Eco6
Moisture	48.25	40.15	44.39	47.77	42.96	44.46
(%)	(3.94)	(0.90)	(1.28)	(1.40)	(3.48)	(1.21)
Protein	14.69	16.48	19.35	19.88	17.46	16.95
(%)	(0.99)	(0.53)	(0.74)	(0.32)	(0.47)	(0.54)
Fat	45.00	45.00	40.00	35.00	40.50	44.33
(%)	(0.00)	(1.00)	(0.00)	(1.00)	(0.50)	(0.58)
Ash	4.41	4.39	4.26	4.13	3.88	4.95
(%)	(0.05)	(0.01)	(0.14)	(0.03)	(0.04)	(0.02)
Chlorides	2.99	2.01	1.88	1.34	1.23	2.15
(%)	(0.35)	(0.09)	(0.07)	(0.07)	(0.11)	(0.30)
pH	4.82	5.23	5.24	5.43	5.11	4.91

The results show the mean value \pm standard deviation (in parenthesis)

- Generally, the thistle ecotype influenced the chemical composition, mainly in the protein, fat and chloride contents, with a great variability.
- In spite of these, the encountered values are similar to those reported in literature for Serra da Estrela cheese.
- Moreover, this type of cheese is quite rich in fat and protein.

Colour characteristics

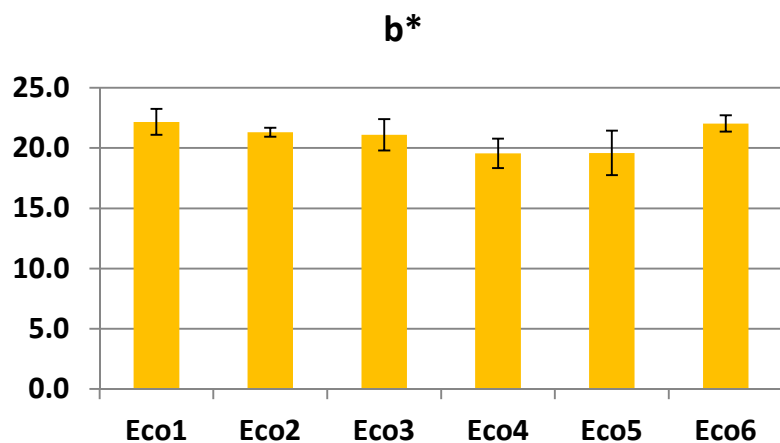
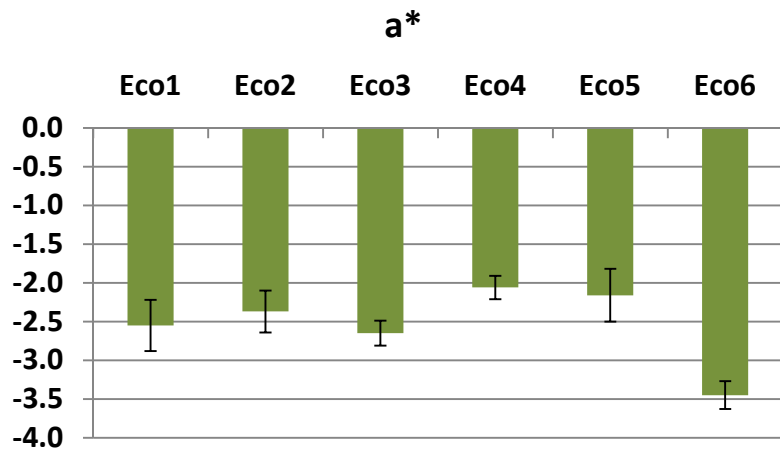
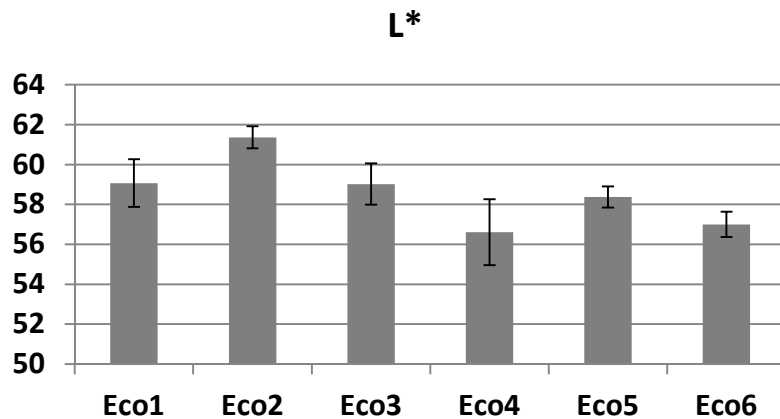
The cheese produced with the thistle ecotype 2 presented the highest L^* whereas the darkest was ecotype 4.

The values of greenness (a^*) are very close to zero, thus indicating just a slight presence of the greenish color.

The ecotype 6 showed the more intense green coloration .

As to yellowness (b^*), the values are positive and high, corresponding to an intense yellow coloration.

It was observed that ecotype 4 had the lowest value of b^* , which are also related with the lowest fat content.

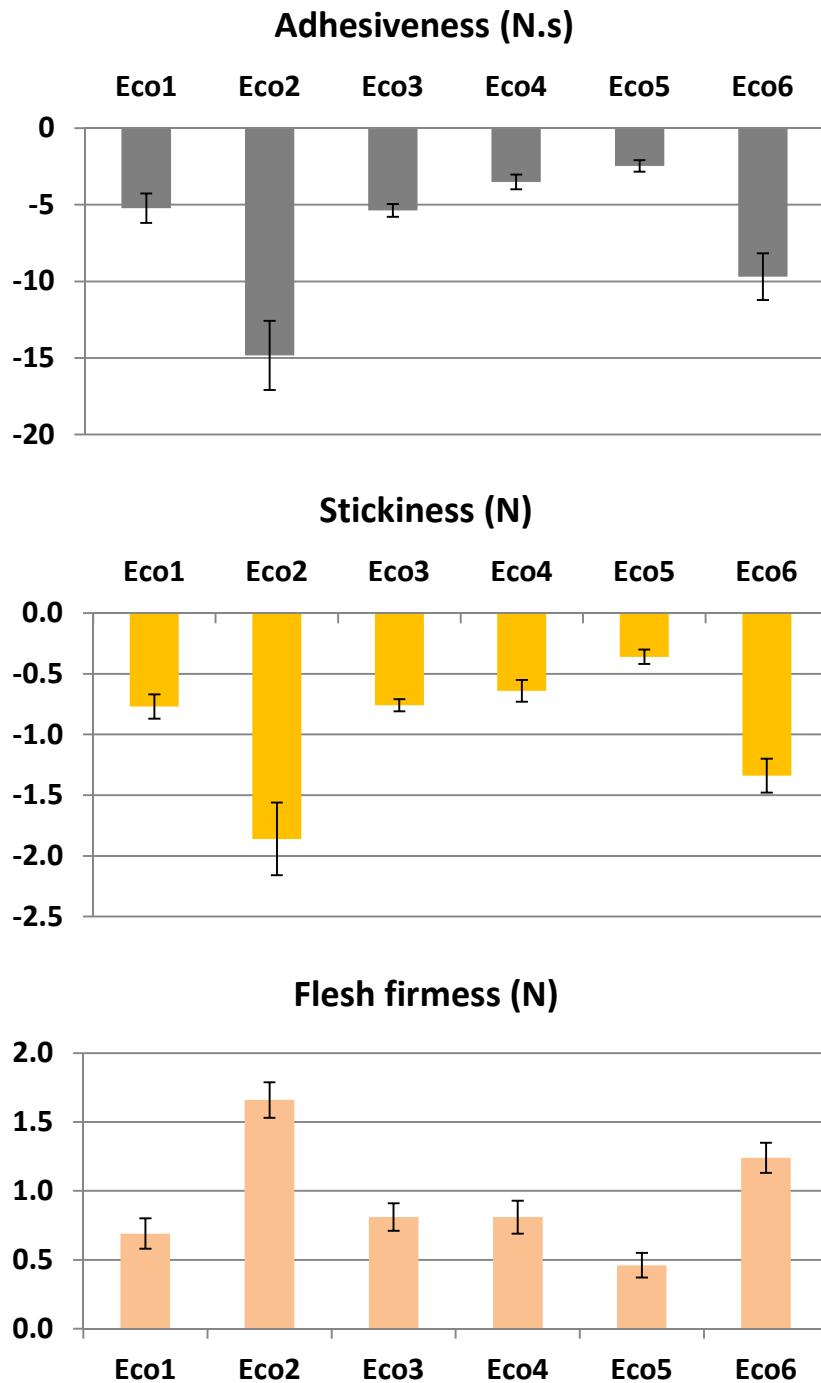


Texture properties

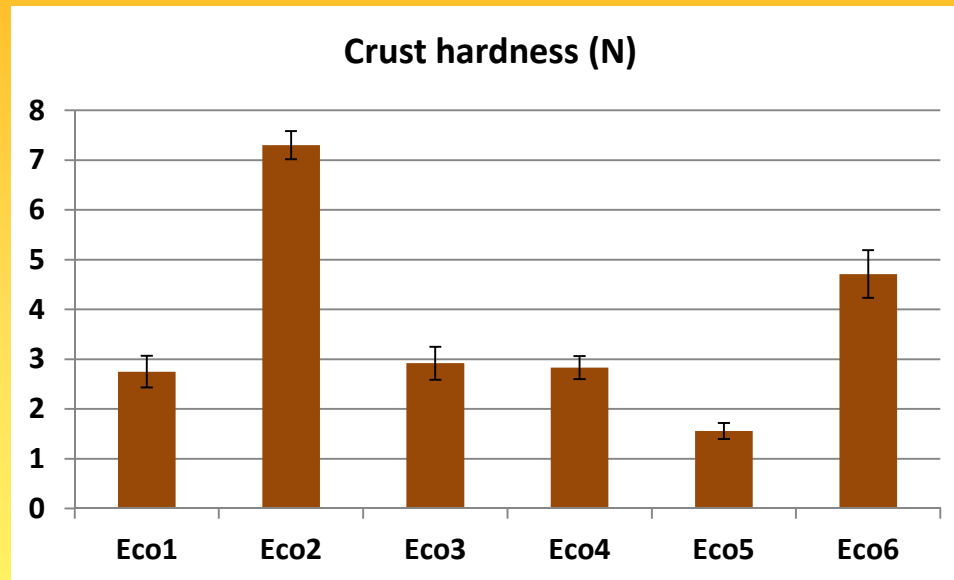
The cheese made with ecotype 2 had the highest crust hardness and also flesh firmness, followed by ecotype 6.

Thus, the harder cheese corresponded to that with the highest pH.

The textural properties related to the creaminess of the paste, adhesiveness and stickiness (these two last in terms of absolute value) were more intense also in sample ecotype 2 followed by ecotype 6, with ecotype 5 showing the lowest values. The creaminess is related to the fat content.

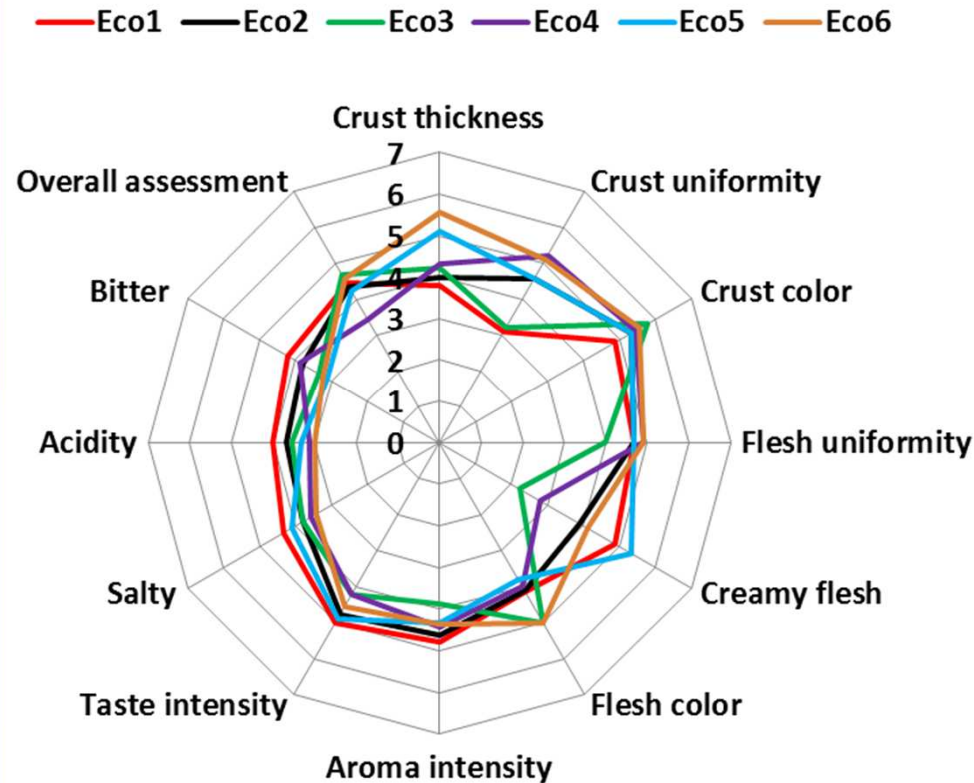


Texture properties



It was observed that sample ecotype 2 had the lowest moisture content and in fact was the hardest in the crust.

The sample of cheese made with thistle from ecotype 5 showed the lowest value for crust hardness.



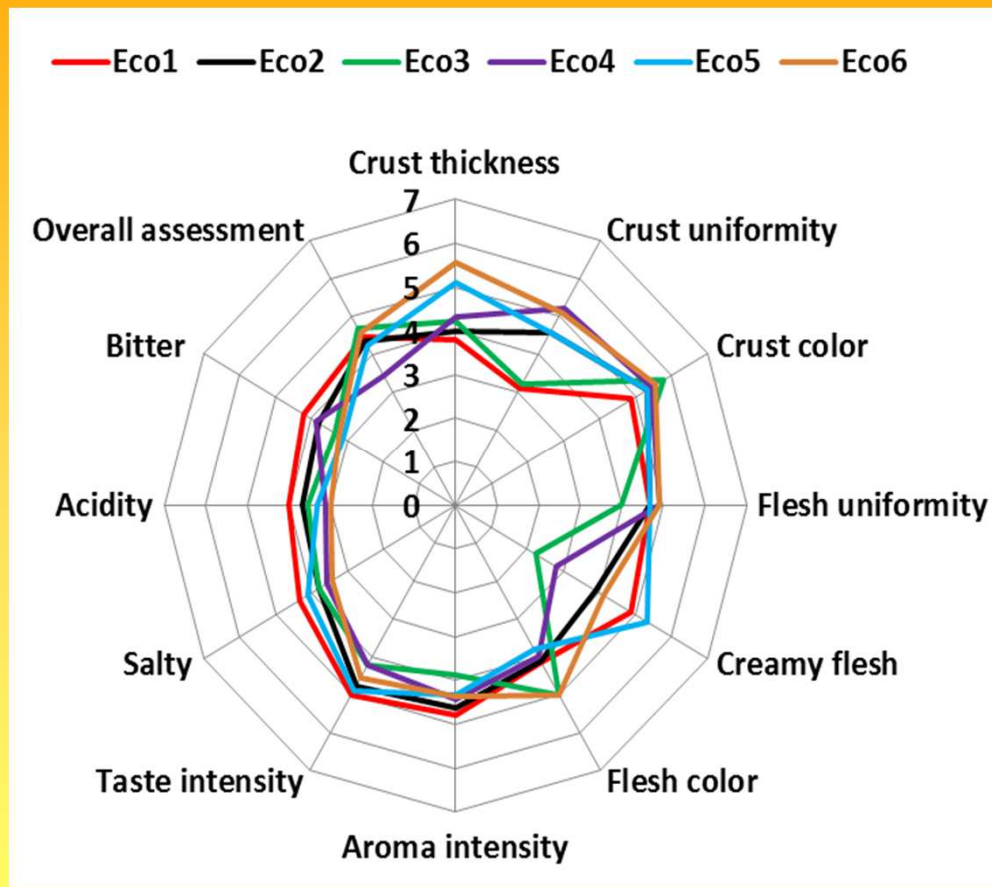
Sensorial profile

Cheese from ecotype 4 had the lowest overall assessment. As previously seen, this sample showed the highest hardness (crust and flesh) and highest creaminess.

The sample with better overall acceptability was ecotype 3.

Cheeses of ecotypes 5 and 6 had higher crust thickness, which are not in agreement with the results obtained by instrumental texture analysis.

Samples from ecotype 1 and 3 had very low scores in relation to crust uniformity.



Sensorial profile

The creaminess of the flesh was the property evaluated that allowed obtaining more dissimilar results among all samples at study. Samples ecotype 1 and 5 were considered very creamy, whereas samples ecotype 3 and 4 were evaluated as less creamy.

These cheeses obtained from raw milk develop a more intense flavor and softer texture, which can be explained by the intensity and extent of proteolysis happening in these cheeses

Conclusions

- The results obtained allowed verifying that the thistle ecotype, greatly influenced the cheese properties.
- There was a great variability in the chemical composition; the texture also diverged importantly among samples and color also revealed noticeable differences.
- The sensorial analysis allowed identifying clearly some differences, particularly in terms of creaminess, crust uniformity and crust thickness.

Conclusions

The texture and the sensorial analysis were quite different. This could be understood as a consequence of the different thistle flower ecotypes used, which in this study could be related with their biochemical characteristics.

It is important to further continue the search, in order to acquire a strong knowledge of the properties assigned by the different thistle flower ecotypes in cheese properties, so as to produce a specific cheese attending to different consumer targets.

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