Sensory Evaluation of Chicken Breast Treated with Oregano Essential Oil

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Abstract

The aim of the present study was sensory evaluation of samples of chicken breast meat treated with oregano essential oil. The samples of chicken breast was divided into three groups and treated as follows: control group was packaging in air without treated, next group was with vacuum packaging without treated and last group was with vacuum packaging and treated oregano essential oil (0.2% v/w). Sensory properties of fresh chicken breast meat were monitored over a 16 days period. All fresh chickens' breast meat samples were stored at 4°C. From sensory properties were evaluated taste, smell, juiciness and tenderness by 5-point scale test. The results were statistically processed using program Statgraphics. Statistically differences ($P \leq 0.05$) were found on smell between control group with air packaging and group vacuum packaging and group with oregano essential oil treatment. Silimilar results statistically differences were reported on taste, juiciness and tenterness.

Keywords: chicken breast meat, oregano essential oil, sensory analysis

1. Introduction

Poultry meat is a very popular food commodity around the world due to its low cost of production, low fat content, high nutritional value and distinct flavor and its consumption has increased in recent decades in many countries [1-5]. Fresh poultry meat belongs among a perishable food. The main interest of meat industry is prolonging the shelf-life of the meat perishable food, thus also poultry meat and products. One of the possibilities to achieve this goal is application a variety of natural preservatives in order to maintain a minimum of processing and also provide protection against spoilage and pathogenic microorganisms [6]. Such natural preservatives include also extracts of herbs and spices that are growing application in the food industry [7]. Spices are rich in phenolic compounds such as flavonoids and phenolic acids, which exhibit a wide range of biological effects, including antioxidant and anti-microbial [8, 9]. Essential oils (EOs) well known inhibitors of microorganisms, are aromatic oily liquids obtained from plant material (flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and roots), which can be obtained by expression, fermentation, enfleurage, extraction and method of steam distillation [10]. One of the most commonly used spices in the food industry is oregano (*Origanum vulgare*), well known for its antioxidative and antimicrobial properties [7, 10]. The main components of oregano essential oil are carvacrol (trace-80%), thymol (trace-64%), γ-terpinene (2-52%), p-cymene (trace-52%) [10]. The two phenols, carvacrol and thymol, the major components of oregano essential oil are mainly responsible for its antimicrobial activity [11- 13]. Effect of oregano essential oil was tested in foods

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such as meat [14], salads [15], but are limited studies that monitor antimicrobial effect of oregano oil on fresh food [16]. However, the practical application of several essential oils in foods is limited due to the strong flavor they impart to foods and also to their interaction with some food ingredients [10]. For these reasons the preservative effect of essential oils may be achieved by using lower concentrations of essential oils in combination with other preservation technologies such as low temperature [17], low dose irradiation [18, 19], high hydrostatic pressure [20] and MAP [21].

Direct integration of essential oils in foods may result in reduced microbial population, but may also be affected sensory characteristics of the food. Sensory analysis is based on the fact that the human senses are stimulated by chemical or physical stimuli that one is able to discern their perceptions [22].

The aim of the present study was sensory evaluation of samples of chicken breast meat treated with oregano essential oil.

2. Materials and methods

Material

Samples of fresh chicken breast meat were provided by poultry farm (Hydináreň Zámostie, Slovakia) from Ross 308 broiler (age 42 days). Meat was processed within 2 h after slaughter. The samples chicken breast weighting ca. 250 g were divided into three groups and treated as follow: control group was packaging in air without treated, next group was with vacuum packaging (VP) without treated and last group was with vacuum packaging and treated oregano essential oil (0.2% v/w). All fresh chickens' breast meat samples were subsequently kept at 4°C for 16 days.

The oregano oil solution was prepared as 0.2% water solution of pure oregano oil (Calendula, Slovakia). Each breast fillet was individually dipped into the oregano solution for 1.0 min. Immediately after dipping, each sample was packaged using a vacuum packaging machine type VB-6 (RM Gastro, Czech republic).

Sensory evaluation

Chicken meat samples were prepared baking in a wave at 180°C for 60 min. A panel of seven judges experienced in chicken evaluation was used for sensory analysis. Panelists were asked to evaluate taste, smell, juiciness and tenderness of samples. Acceptability of taste, smell, juiciness and tenderness was estimated using an acceptability scale ranging from 5 to 0. Sensory properties of fresh chicken breast meat were monitored over a 16 days period.

Statistical analysis

The results were statistically processed using program Statgraphics Plus version 5.1 (AV Trading, Umex, Dresden, Germany), where we have calculated the basic variation-statistical values (arithmetic mean, standard deviation) and to determine the evidential differences between groups, we used multiple range tests for points by parameters, method Tukey HSD (95.0%).

3. Results and discussion

The results of sensory evaluation (taste, smell, juiciness and tenderness) of baking, untreated and packed in air (control), untreated with vacuum packaging and treated with oregano oil and vacuum packaging chicken breast meat are presented in Table 1-3.

Table 1. Control samples

	smell	taste	juiciness	tenderness
D1	4.2	4.1	3.4	3.7
D4	4.2	4.5	3.9	4.0
D8	3.6	3.4	3.6	3.4
D12	3.0	3.2	3.4	3.1
D16	-	-	-	-
S_x	0.50	0.52	0.20	0.36

D1-D16 day of evaluation; S_x–standard deviation

Table 2. Vacuum packaging samples

	smell	taste	juiciness	tenderness
D1	4.0	3.6	3.4	3.7
D4	4.3	4.2	4.0	3.8
D8	4.6	4.4	4.3	4.1
D12	3.8	3,8	4.1	4.0
D16	3.8	3.6	4.1	3.8
S_x	0.31	0.32	0.42	0.35

D1-D16 day of evaluation; S_x–standard deviation

Table 3. Oregano oil samples and VP

	smell	taste	juiciness	tenderness
D1	3.4	3.5	4.3	3.8
D4	4.1	3.7	4.0	4.1
D8	4.1	3.8	3.8	4.0
D12	3.6	3.7	3.6	3.7
D16	3.0	3.1	3.3	3.0
S_x	0.42	0.25	0.34	0.39

D1-D16 day of evaluation; S_x–standard deviation

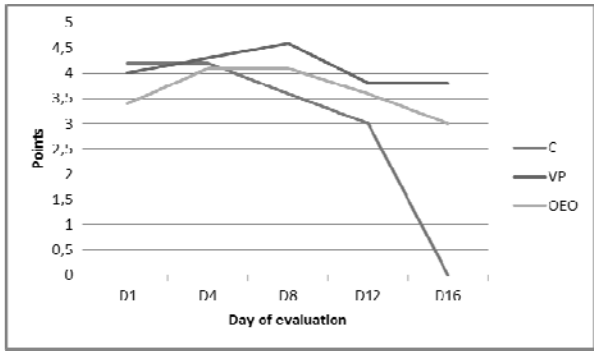

Figure 1. Perception of smell in tested groups C–control group; VP–vacuum packaging group; OEO–oregano essential oil group with vacuum packaging group

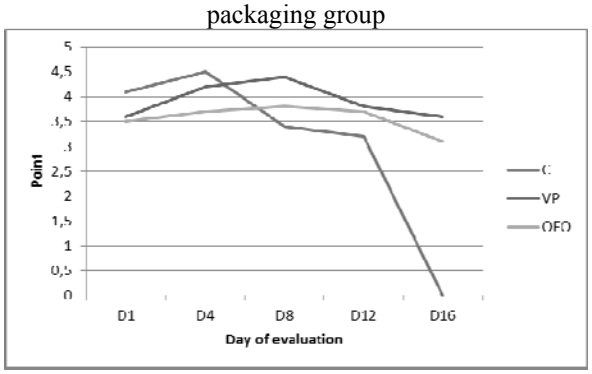

Figure 2. Perception of taste in tested groups C–control group; VP–vacuum packaging group; OEO–oregano essential oil group with vacuum packaging group

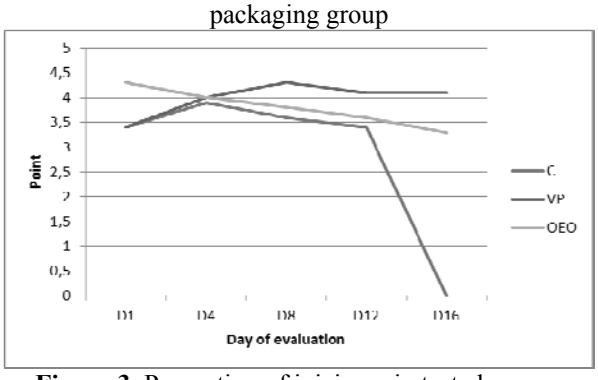

Figure 3. Perception of juiciness in tested groups C–control group; VP–vacuum packaging group; OEO–oregano essential oil group with vacuum packaging group

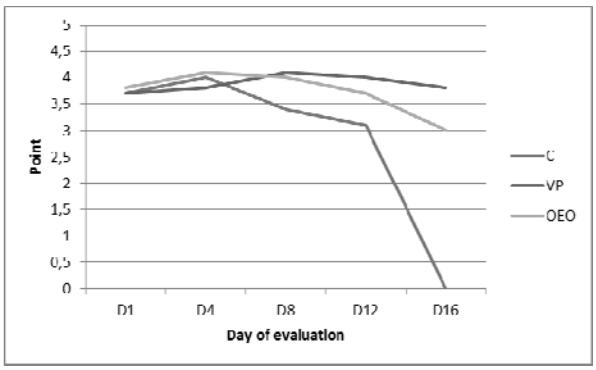

Figure 4. Perception of tenderness in tested groups C–control group; VP–vacuum packaging group; OEO–oregano essential oil group with vacuum packaging group

By organoleptic evaluation of chicken breast we found the highest score in date D1 and D4 in the control group without treatment and lowest in the vacuum packaging group and oregano oil group, respectively. In terms of D8, D12 and D16 we found the highest score in the vacuum packaging group, and lowest in the vacuum packaging, vacuum packaging and oregano oil group, respectively. Perception of taste, aroma, juiciness and tenderness for each test group during measurement is shown in figures 1-3. The lower the score attributed to the group oregano oil may be due to the subjective assessment oregano taste, which may not be acceptable for any consumer. But less acceptable flavour could be compensated for antimicrobial activity, which is characterized oregano essential oil. Similar results of oregano odour perception found [3] who used oregano oil at a concentration of 1% of cooked chicken breast meat samples packaged under MAP.

Statistically differences ($P \leq 0.05$) were found on smell between control group with air packaging and group vacuum packaging (-1.10*) and between control group with air packaging and group with oregano essential oil treatment (0.64*). For taste were found statistically differences ($P \leq 0.05$) between control group with air packaging and group vacuum packaging (-0.88*) and between control group with air packaging and group with oregano essential oil treatment (-0.52*). For juiciness were found statistically differences ($P \leq 0.05$) between control group with air packaging and group vacuum packaging (-1.22*) and between control group with air packaging and group with oregano essential oil treatment (-0.94*). Finally, for tenderness were found statistically differences ($P \leq 0.05$) between

control group with air packaging and group vacuum packaging (-1.00*) and between control group with air packaging and group with oregano essential oil treatment (-0.90*).
Many authors state that sensory analysis allow manufacturers to identify, understand and respond effectively to consumer preferences [23-27] and also to identify sensory characteristics and consumer preferences help producer in increasing competition for other producers [28-32].

4. Conclusions

This study has revealed, that using essential oil can influent sensory properties as smell, taste, juiciness and tenderness of meat. The smell, taste, juiciness and tenderness were the best assessed in the case vacuum packaging at the third evaluation and sensory properties without juiciness first day were the best evaluated for group with oregano essential oil treatment at the eight day also. We can state that the best sensory quality achieved tested group at the third evaluation.

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