EXPLORING THE ROLE OF NATURAL ANTIOXIDANTS IN THE DEVELOPMENT OF DIETARY GOAT MEAT PASTES

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I. INTRODUCTION

Kazakhstan dominates the export market for mutton and goat meat, accounting for 91.9% of total exports outside the EAEU. Major markets include the UAE ($3.4 million) and Uzbekistan ($1.6 million). In 2020, significant shipments were also made to Iran ($112,000) [1]. Notably, 70% of goat products are exported as live animals, creating a conflict of interest between farmers and processing enterprises. To address this issue, goat meat paste with antioxidant-rich purslane was developed and investigated.

II. MATERIALS AND METHODS

The object of research was goat meat paste with the addition of purslane and honey. In order to determine the moisture retention capacity, the Grau-Hamm pressing method was used. This method is based on measuring the area of the adsorption moisture spot corresponding to 8.4 mg of water per square centimeter. In order to determine the effect of the natural antioxidant purslane on meat paste, we determined the pH and color stability of the finished product. Determination of the color stability of the finished product. The color characteristics of the samples were determined using a Konica Minolta CM-2300d spectrophotometer calibrated using standard black-and-white calibration plates. The color values were expressed as L-lightness, a-redness and b-yellowness. To determine the color resistance to light, the color stability assessment criterion (Y) was used. Color stability was calculated using the following formula: $Y = \left(1 - \left(\frac{|L_1 - L_2|}{3 \times L_1} + \frac{|a_1 - a_2|}{3 \times a_1} + \frac{|b_1 - b_2|}{3 \times b_1}\right)\right) \times 100,\%$. Where L1, L2 is the value of the light index before and after exposure to light; a1, a2 – the value of the redness index before and after exposure to light; b1, b2 – the value of the yellowness index before and after exposure to light. When determining the color resistance to light, the sample was placed under an artificial light source (an incandescent fluorescent lamp with a power of at least 40 watts). 1 hour after the start of the experiment, the change in color characteristics was instrumentally determined.

III. RESULTS AND DISCUSSION

Our study investigated two types of goat meat paste samples: a control sample without purslane and an experimental sample with purslane powder (1% by weight of minced meat) and honey. The physico-chemical properties of these samples are presented in Table 1.

Table 1 – Physico-chemical analysis of goat meat paste.

Indicators	Control sample	Experimental sample
Mass fraction of moisture,%	61,7	64,8
Mass fraction of fat,%	14,1	10,9
Mass fraction of protein, %	14,8	13,3
Mass fraction of carbohydrates,%	1,2	4,0

The experimental sample with purslane and honey shows a higher moisture content (64.86%) compared to the control (61.7%), attributed to glucose and fructose enhancing moisture retention. The experimental sample also has a lower fat content (10.98% vs. 14.1%) and higher carbohydrate content (4.01% vs. 1.28%) due to the addition of honey and purslane. Moisture binding capacity (MBC) is critical in meat paste production, as it ensures the product's juiciness, tenderness, and pleasant

texture. In this regard, the moisture binding capacity of the control and experimental samples was investigated (Figure 1). Measuring the acidity pH in meat paste helps to control the production processes, ensure the safety and quality of the product, as well as optimize its storage and shelf life (Figure 2).

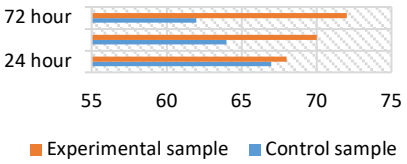

Figure 1. Moisture binding capacity of meat pastes,%

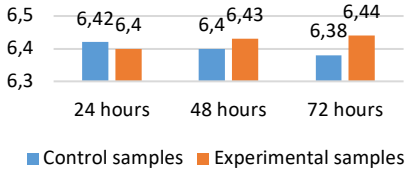

Figure 2. pH acidity of meat pastes

The results (figure 1) show that the addition of vegetable raw materials and honey increases the moisture binding capacity of the finished product. It should also be noted that goat meat has a high potential for moisture binding ability [2]. The results of the pH study (figure 2) showed that the introduction of vegetable raw materials purslane in order to impart antioxidant properties is confirmed by moderate pH values in the experimental sample. When studying the stability before and after exposure to light on the meat paste parameters, the following values were obtained for the main color characteristics: L-lightness, a-redness and b-yellowness.

Table 2 – Color characteristics of goat meat paste.

Samples	Color characteristics before exposure to light			Color characteristics after exposure to light			Color stability, %
	L-lightness	a-redness	b-yellowness	L-lightness	a-redness	b-yellowness	
Experimental sample	70,3±0,3	20,0±0,3	10,9±0,3	69,1±0,3	20,1±0,3	12,5±0,4	93,9±1,7
Control sample	62,9±0,3	17,3±0,4	12,1±0,3	59,6±0,7	17,6±0,4	14,3±0,1	91,7±1,1

The experimental sample with purslane and honey showed superior color stability at 93.9% compared to the control sample's 91.7%. It retained lightness better (98.4% vs. 94.7%) and had a smaller increase in yellowness (12.5 vs. 14.3). Therefore, the experimental sample is the better product due to its enhanced resistance to color changes, maintaining a more appealing and stable appearance.

IV. CONCLUSION

The experimental goat meat paste with purslane and honey demonstrated superior overall quality compared to the control sample. It maintained higher color stability (93.9% vs. 91.7%), better moisture binding capacity at both 24 hours (70% vs. 65%) and 72 hours (72% vs. 60%), and stable pH levels across 24, 48, and 72 hours (6.40, 6.43, and 6.44 respectively) compared to the control sample (6.42, 6.40, and 6.38). The enhanced moisture retention and pH stability indicate that the experimental sample is more effective at maintaining juiciness, texture, and overall product stability. Therefore, the inclusion of purslane and honey significantly improves the quality and shelf life of goat meat paste.

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