

## P-03-20

**Hydronium ions effect on *Corchorusolitorius* mucilage used in beef preservation (#466)****Abdulatef M. Ahhmed<sup>1</sup>**, Hasan Yetim<sup>2</sup>, Ryoichi Sakata<sup>3</sup><sup>1</sup> Yildiz Technical University, Chemical and Metallurgical Engineering Faculty, Food Engineering Department, Istanbul, Turkey; <sup>2</sup> Istanbul Sebahattin Zaim University, Food Engineering Department, Faculty of Engineering and Natural Science, Istanbul, Turkey; <sup>3</sup> Azabu University, Laboratory of Food Science, School of Veterinary Medicine, Kanagawa, Japan**Introduction**

Almost always, consumers during the course of consumption easily recognize eating quality alterations of beef (flavor, tenderness, and juiciness) which are caused by changes in pH values. Therefore, the aim of this research was to evaluate the quality and fresh stability of beef steaks stored at low temperatures at 4°C/7days and -18°C/35days using *corchorus olitorius* mucilage (COM) as a lamination material. Further, to determine the chemical interactions between meat components and COM extracted in three different hydronium ionic state buffers. Technically, the purpose of this work was to determine if COM can be used as a natural coating material that preserves steaks that sounds healthy and eco-friendly. The *corchorus olitorius* which is commonly known all over the world as Mulukhiya provides a viscous liquid if sat in water for a certain time. Since COM consists of soluble and insoluble fibers, it was extracted in different hydronium ion buffers. Meat, in particular, is a perishable food item that requires careful processing, smart coating, and lamination materials. It was quite interesting to determine whether COM would possibly be used as coating materials to maintain and preserve the freshness of beef steaks under vacuum packaging and stored at low temperature.

**Methods**

Separately, each 3g of Palestinian *Corchorus olitorius* dried leaves were added to 1L of D.H<sub>2</sub>O sat at room temperature with a gentle stirring process for 24h but adjusted at different hydronium ionic states as acidic (pH: 4.5), neutral (7.0) and basic (9.5). The homogenate then sieved and the product collected as *Corchorus olitorius* mucilage (COM). The beef steaks of Turkish cattle were gently coated with COM (9w/1v), respectively. The untreated and treated steaks were placed in polyethylene bags and vacuum packaged. Steaks without COM were placed in low-density polyethylene sheet (LDPE). The 3 sets were stored at 4/7days and at -18°C/35days as sub-groups. The physico-chemical properties like drip loss (DL), water soluble and myofibrillar proteins, color values and metmyoglobin (MetMb) % were evaluated. Further chemical analyses like molecular weights of myofibrillar proteins (SDS-PAGE) and antioxidant and antihypertensive activities of hydrolysates were also determined.

**Results**

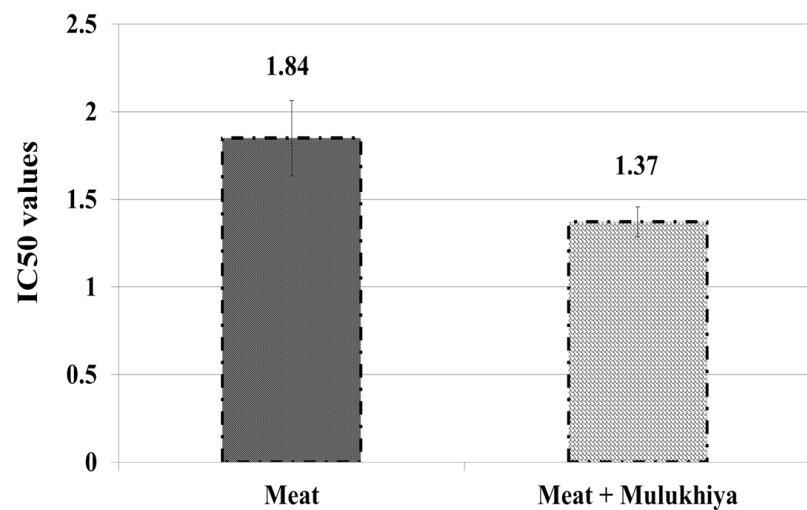
DL % in samples stored at 4°C/7days showed that the COM-coated samples and vacuumed in polyethylene bags (PE) had incredibly lower values than those of vacuumed samples without COM and also lower than those LDPE-wrapped samples. DP % in the samples stored at -18°C/35days illustrated different results, however, the COM-coated samples showed the lowest DP

value among all, particularly the sample coated with COM that extracted in an acidic state. The low hydronium ionic state is the best condition for extracting COM as it retained much meat moisture than those samples including the ones that had no COM treatment. Baseline samples showed the lowest protein concentration (PC) values among all, however, the highest PC values observed in COM-coated samples in a neutral state and it was second high in samples at acidic state. Protein concentration in COM-coated steaks stored at 4°C was improved. Color data in samples stored at refrigeration temperature had no remarkable change but lightness values in all chilled samples were the lowest. Yet, the best samples maintained the color axes were the COM-coated samples. *Metmyoglobin* (MetMb) % of samples kept at 4°C/7days showed divergent values, COM-coated samples of the neutral state showed the highest values, which may refer to the free O<sub>2</sub> in the buffer. The most proper MetMb % was exhibited by COM-coated samples at a neutral state. SDS-PAGE patterns illustrated that COM treatment had no negative effect on sarcoplasmic and myofibrillar proteins. Baseline samples expressed a lower antioxidation activity than in Mulukhiya treated samples. COM-coated samples had increased the antioxidant activity by 28% higher the capacity found in baseline meat and that leads to suggesting that Mulukhiya addition resulted in an improvement in the nutritional properties of steaks. Fresh and treated beef steaks showed remarkable antihypertensive activities as IC<sub>50</sub> of baseline and COM-coated samples were 1.84 and 1.37mg/ml, respectively (Fig. 1). Mulukhiyah contributed to antihypertensive activities of beef steaks, which in turn improves the nutritional properties and functionality of meat proteins.

**Conclusion**

Mulukhiyah mucilageshows to protect water holding capacity, protein content, and color but not much of the MetMb % of beef steaks. COM can preserve the freshness of beef stored at refrigeration chilling temperatures and also prevent its quality deterioration. Antioxidant and antihypertensive activities in samples treated with COM were remarkably enhanced. Mulukhiyah mucilage is an excellent carrier of phytochemical and polyphenols that can be utilized as a potential bioactive film as if used with vacuum packaging which improves the antioxidation and antihypertensive properties of meat. However, hydronium ionic state of the buffer used to extract Mulukhiya mucilage has to be taken into account since the data suggests that the acidic states displayed the best results.

**Notes**



**Figure 1. Antihypertensive activity of fresh beef and beef treated with Mulukhiya, the data express**

Antihypertensive activity of fresh beef and beef treated with Mulukhiya, the data expressed in IC50 values (mg/ml).

## Notes