



## Use of Methylcellulose as a Replacer of Meat in Beef Patties

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### Objectives

Advances in processing technology of methylcellulose have made it an alternative binder/extender for comminuted meat products. Until recently, methylcellulose has been widely used in food products as an emulsifier, thickener and gelling agent. It is manufactured by a substituting reaction whereby hydroxyl residues (-OH functional groups) are replaced with methoxide (-OCH<sub>3</sub>) groups. Various types of methylcellulose are made depending on the number of hydroxyl groups substituted on linked glucose molecules. Methylcellulose is USDA/FSIS approved ingredient and listed on Directive 7120.1 for various comminuted meat and poultry products where binders are permitted up to 3.5% of product formulation. The objective of this study was to evaluate cooked yields, texture profile analysis and freeze-thaw purge of beef patties using methylcellulose (MC) and carboxymethyl cellulose (CMC) to replace a portion of the meat block.

### Materials and Methods

Experimental design: Control, TRT 2: 1% MC + CMC blend, TRT 3: 0.75% MC + CMC blend, TRT 4: 0.5% MC + CMC blend. Beef patties were formulated using beef 85s (15% fat), beef 50s (50% fat), water, textured soy protein concentrate, soy protein concentrate powder, salt, flavoring, methylcellulose and carboxymethyl cellulose. Beef 85s and beef 50s was ground through a 6.35 mm plate. The textured soy protein concentrate was hydrated with all of the formulation water for 10 min and for the test treatments, the MC and CMC was dry blended with the soy protein concentrate powder, salt and flavorings. The ground beef 85s and 50s trim was added to the mixer (Leland 100DA70, Fort Worth, TX) and while mixing, the hydrated textured soy protein concentrate and dry ingredient blend were added and mixed for 5 min. The

meat mixture was reground through a 9.53 mm plate. Patties were formed using a Hollymatic 200 equipped with a round knock-out plate (Countryside, IL) targeting 113.5 g patties. Beef patties were cooked in an Alto-Shaam convection oven using a combination setting of steam and dry heat at 176.7C and cooked to an internal temperature of 73.9C. Cooked patties were immediately individually quick frozen. Beef patties were evaluated for cooked yield after the product was cooled following USDA stabilization guidelines, texture profile analysis using a Texture Analyzer equipped with a 1-cm diameter stainless steel probe and freeze-thaw purge measured after 7 d by difference in weight of the patties after one freeze-thaw cycle frozen at -23.3C. The study was replicated 3 times and statistical analysis was performed using ANOVA ( $P < 0.05$ ) with StatView for Windows.

### Results

Cooked yields were significantly ( $P < 0.05$ ) higher for TRT 2, TRT 3, and TRT 4 compared to control. The hardness values for TRT 2 were significantly ( $P < 0.05$ ) higher while gumminess and chewiness values were not significantly ( $P < 0.05$ ) different compared to control. Hardness, gumminess and chewiness values for TRT 3 and TRT 4 were significantly ( $P < 0.05$ ) lower compared to control. After one freeze-thaw cycle, purge was significantly ( $P < 0.05$ ) lower for all treatments compared to control. All treatments achieved higher yielded blend cost savings compared to control.

### Conclusion

Methylcellulose is a functional, non-allergenic ingredient that can be utilized as a binder/extender in comminuted meat and poultry products. It is a sustainable ingredient source that offers unique functional attributes for meat products.