Introduction

Edible films and coatings from renewable biopolymers can extend food shelf life by functioning as solute, gas, and vapor barriers. There is interest in the development of edible packaging due to food processors’ needs for novel storage techniques, environmental concerns over disposal of non-renewable food packaging materials, and opportunities for creating new market outlets for film-forming ingredients derived from under-utilized agricultural commodities. Several lipid (e.g., waxes, long-chain fatty acids, and acetylated glycerides), polysaccharide (e.g., starch and its derivatives, cellulose ethers, alginate, carrageenan, pectin, pullulan, and gellan gum), and protein (e.g., collagen, gelatin, whey protein, casein, wheat gluten, corn zein, soy protein, and egg albumen) biopolymers have been investigated as edible film-forming ingredients.

Potential Benefits from Use of Edible Coatings on Meats

Potential benefits to the meat industry from using edible coatings include:

1) Application of edible coatings prior to vacuum-packaging of meat may prevent moisture loss, thereby maintaining saleable weight and alleviating texture, flavor, and color changes;
2) Edible coatings on meat cuts may hold in juices, prevent dripping, enhance product presentation, and eliminate the need for placing absorbent pads at the bottom of plastic retail trays;
3) Lipid and myoglobin oxidation in meats may be reduced by using edible coatings of low oxygen permeability;
4) Edible coating solutions which have been heated just prior to application may reduce the loads of spoilage and pathogenic microorganisms and partially inactivate proteolytic enzymes at the surface of coated meat cuts;
5) Volatile flavor loss from and foreign odor pick-up by meat may be restricted with edible coatings;
6) Seasonings and/or browning agents may be imbedded into coatings and applied to meat products prior to cooking;
7) Used as active packagings, edible coatings carrying antioxidants (e.g., tocopherols) and/or antimicrobials (e.g., organic acids) may be used for direct treatment of meat surfaces, thereby delaying meat rancidity and discoloration and reducing microbial loads;
8) Oil uptake by meat products during deep-fat frying may be reduced through application of coatings prior to battering and breading;
9) Coatings may reduce meat charring and stickiness to the cooking surface during broiling/grilling.

Examples of Commercialized Edible Meat Coatings

Edible meat casings from regenerated collagen have been used for over 60 years. In the 1950s, application of strippable wax coatings on frozen meats was common. Extruded hydroxypropylated high amylose starch films (trade name Ediflex) intended for frozen meats were commercially available in the 1960s. Meat coatings based on acetylated monoglycerides (trade name Dermatex) and alginate (trade name Flavor-Tex) were marketed in the 1970s and 1980s. Edible films from collagen (trade name Coffi) and carrageenan (trade name Soafil) were marketed in the late 1980s. Spice-laden edible films from pullulan are currently marketed in Japan for application on meats and other food products.

Commercialization Challenges

Besides collagen casings, edible packaging has found limited applications in the meat industry. Challenges to wide commercialization of edible packaging that need to be addressed include:

1) The high cost (>2.00/kg) of film-forming biopolymers (with the exemption of starch and certain starch derivatives) compared to synthetic packaging materials;
2) The need for effective, economical, and microbiologically safe methods for applying edible coatings on meat products on an industrial scale;
3) The poor barrier properties of most polysaccharide- and 
protein-based edible films at high relative humidity envi-
ronments;
4) The possibility for adverse organoleptic effects introduced 
by edible coatings; and
5) The dietary allergies and intolerances associated with vari-
ous protein film-formers.

References

Reviews
Gennadios, A., Hanna, M.A. & Kurth, L.B. 1997. Application of edible coat-
ings on meats, poultry and seafoods: a review. Lebensmittel - Wissenschaft
und Technologie, 30:337-350.
Gontard, N. & Guilbert, S. 1994. Biopackaging: technology and properties 
of edible and/or biodegradable material of agricultural origin. In: Food 
Academic & Professional, London.
polymer films: challenges and opportunities. Food Technology, 51(2):61-
74.
and Films to Improve Food Quality. Technomic Publishing Company, 
Lancaster, PA.

Research Articles
packaging materials for cooked turkey. Journal of Food Science, 61:415-
417, 421.
Padgett, T., Han, J.Y. & Dawson, P.L. 1998. Incorporation of food-grade anti-
microbial compounds into biodegradable packaging films. Journal of Food 
Siragusa, G.R. & Dickson, J.S. 1992. Inhibition of Listeria monocytogenes on 
beef tissue by application of organic acids immobilized in a calcium algi-

Trade Articles
Hegenbart, S. 1996. The changing face of shelf life. Food Product Design, 

U.S. Patents
for making and use therefor. U.S. patent 5,736,178.
Process for producing edible proteinaceous film. U.S. patent 5,569,482.
patent 5,540,944.