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RECENT ADVANCES IN PACKAGING OF MEAT

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Introduction

Packaging can be defined as the wrapping material around a consumer item that serves to contain, identify, describe, protect, display, promote, and otherwise make the product marketable and keep it clean.The basic purpose of packaging is to protect meat and meat products from undesirable impact on quality including microbiological and physio-chemical alterations and protects products against deteriorative effects, which may include discoloration, off-flavour and off-odour development, nutrient loss, texture changes, pathogenicity and other measurable factor.

There are many packaging options for Raw, Chilled and Processed meats The choice of packaging and use depends on no of factors like characteristics desired for storage and display and the expectations of purchasers, cost, volume of meat to be handled and purchaser expectation.

Innovative measures or advanced packaging methods in meat industry include active packaging, intelligent packaging, antioxidant packaging, antimicrobial packaging, modified atmospheric packaging (MAP) and nanotechnology are used in packaging of meat. These packaging methods are environment benign and ecofriendly, they extends meat shelf life, supervise safety and quality,Interact with meat and establish a communication with consumers

Active packaging (AP):

AP is the incorporation of specific compounds into packaging systems that interact with the contents or environment to maintain or extend product quality and shelf life, Active packaging is a technique in which the product, package and package environment interact to create a conducive environment for the food Protection and shelf life extension of the product The most common active packaging modes are for antioxidant or antimicrobial purposes

a) Antioxidant packaging:

Lipid oxidation is the most important cause of food spoilage, after microbial growth. The addition of direct antioxidants s to food surface face the limitation that, once the active compounds are consumed in the reaction, food quality degrades at a higher speed,protection

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ceases, and Besides, it also change food quality parameters, such as color or taste, Thus, the addition of antioxidant agents to packaging formulation became a good alternative

The two methodologies for producing antioxidant packaging are

- Devices like pads, sachets, or labels that contain the antioxidant
- Incorporation of the antioxidant into the packaging material.

A benefit of antioxidants in packaging materials compared to direct antioxidant addition to food is the release of the active compound at controlled rates.

b) Antimicrobial Packaging:

The growth of microragnisms increases food-borne diseases risk and accelerates smell, color and texture changes of foods, resulting in a diminished shelf-life. The growing trend is to apply natural antimicrobial compounds into the packaging and delay the microbial growth

Antimicrobial active packaging can take several forms, including:

- Addition of pads or sachets containing antimicrobial agents into packages.
- Incorporation of antimicrobial agents directly into polymers.
- Coating or adsorbing antimicrobials onto polymer surfaces.
- Immobilization of antimicrobials to polymers by covalent or ionic linkages.
- Use of polymers that are inherently antimicrobial.

c) Oxygen scavengers:

Oxygen in packages compromises the shelf life of meat and eventually causes quality deterioration due to oxidative processes, so removal of O2 from vacuum or MAP packaging is highly desired.

Oxygen scavengers are used to reduce O2 residuals to as low a level as possible since even 0.05% residual O2 may induce oxidation

Commonly used Oxygen scavengers are:

- Iron or Ferrous oxide fine powders,
- Ascorbic acid,
- Sulphites,
- Catechol,
- Ligands, and enzymes like Glucose oxidase may also be used dation of pigments and lipid

Modified Atmosphere Packaging (MAP):

MAP technology involves the alteration of the gas atmosphere inside a food package to preserve the food quality and extend its shelf-life So, it can consider as an active packaging. High O2 concentrations favor oxidative processes,which can modify food quality,so, MAP can prolong shelf-life, reduce microbial growth usually contain mixtures of two or three gases:

- O_2 (to enhance color stability)
- CO_2 (to inhibit microbiological growth)
- N_2 (to maintain pack shape

Intelligent packaging:

Intelligent packaging represents sensors or indicators that then signal a needed change or actually initiate a needed change in the package environment or package.

Intelligent packaging can sense, monitor, record, trace, and provide information about the quality of food.It can be used with decisions making concerning shelf-life, safety, and quality. They can disclose the conditions of the packaged product, but cannot interact with the food

Intelligent packaging systems can be classified into three main categories:

- Indicators,
- Sensors
- Data carriers

Indicators: They supply immediate information (visual, qualitative, or semi-quantitative) about food through a color (or color intensity) change or by dye diffusion. Indicators are supposed change in the environment of product (for example, temperature, pH) through visual changes, such as time-temperature indicators (TTI), oxygen indicators, comfort indicators and freshness indicators.

Sensors: They are devices used to detect, locate, by sending a detection signal or measurement of a physical or chemical property captured by the device. They can detect small molecules of pollutants, pathogens, allergens, or adulterants in food matrixes Sensors are more complex than indicators since they are formed by a receptor that transform the chemical or physical signal into energy, and a transducer that turns that energy into an analytic signal .Commonly, they are gas sensors or biosensors

Data carriers: They are new devices control the flow of products and provide information , particularly appropriate for big productions such as supply chains. Compared with indicators and sensors, they do not provide quantitative or qualitative information. They are used for identification, traceability, automation,anti-theft prevention or forgery protection.The most important devices in the packaging industry are bar codes and QR code radiofrequency identification (RFID) labels,

Nano technology: Nanotechnology is an interdisciplinary area involving the utilization of materials with one or more dimensions that are less than 100 nm and stronger, more heat resistant and high barrier materials, which would be useful in the abrasion encountered for meat packages and in packages used for heating of meat products.Biocomposite films based on cellulose nano fibres and alginate are more commonly used for packaging of meat and other foods.

More recent focus has been on the:

Biodegradation

Recycling ability of materials with improved functional features for enhanced shelf life and convenience

Edible films and coatings shows consumer concerns for more natural foods and environmental protection.

Biopolymers are usually based upon hydrocolloids such as polysaccharides like cellulose, starch, alginates, chitosan, gums, pectin or proteins from animal or plant sources to modify barriers to moisture and gases and to form films with the desired mechanical and functional properties (Buonocore and Iannace, 2013).

Pullulan-alginate based films were highly water soluble, heat-sealable, and oxygen impermeable.

CONCLUSSON

With the increased demand for meat and processed meat products the need for meat packaging to fulfill multiple functions has resulted in a variety of materials and systems that are available and each can be tailored to specific needs and applications.