Raw meat shelf life increasing by antimicrobial edible coating.

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State of art

The safety of meat is one of the common objective of food technologies. Every years the number of consumer, that pretend good quality and safety of meat, grow. To reach this goal, food technologies should focus to increase quality of animal feeding and better packaging of meat. Packaging must guarantee safety and an increase of shelf life of the product. Currently packaging technologies work to create active packaging with antimicrobial and antioxidant effect. On the other hand, Food sciences work to create alternative and biodegradable (or edible) film to reduce environment pollution. In this work, it will be presented how an edible-Biodegradable coating with antimicrobial activity will be able to reach these goals. (Sofos, 2008)

Objective

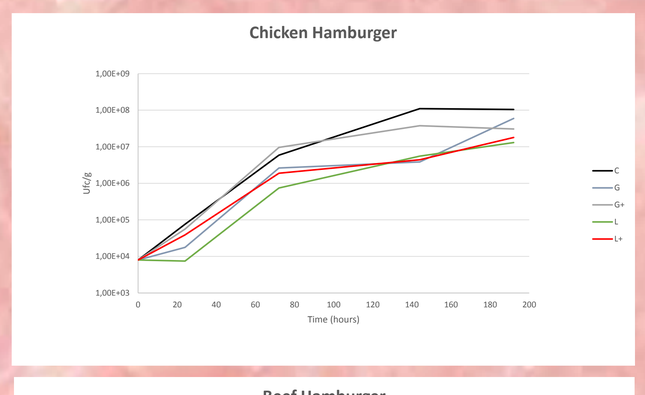
The aim of this work is to show how the integration of antimicrobial and edible pectin films could increase the shelf life of different kinds of meats [1]. Chicken and beef, raw meat, are the two types of meat considered; in two different forms: hamburger and sliced meat [2]. The biodegradable films used in this study are made of Low methoxyl pectin (CF 010 D, Herbstreith&fox) from food waste.

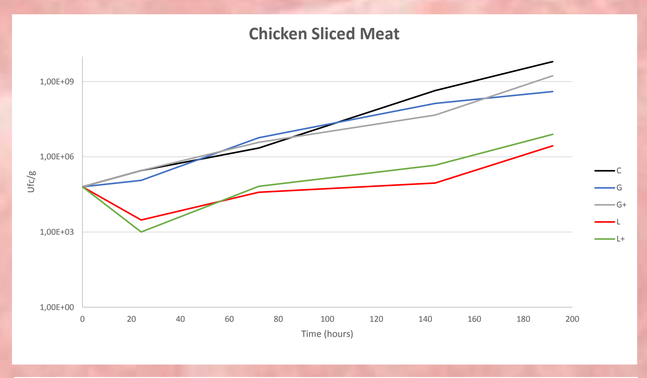
Matherials & Methods

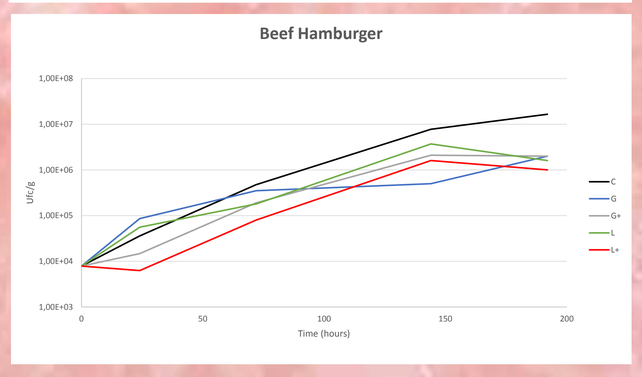
To obtain this edible film are used low methoxyl (LM) pectin with an esterification degree of 30-36% and amidation degree of 14-20%, glycerol are added as plasticizer [3]. The antimicrobial activity are improved with LAE (Ethyl-N-lauryl-L-arginine), 1,6 mg/ml [4]. The activity of LAE is effective by contact and diffusion from the film and can reduce microbial growth. To reticulate the film Calcium D-Pantothenate are added by spraying techniques. All the meats samples are wrapped in the antimicrobial coating, put inside a Styrofoam tray, closed with polyethylene film and stored at 4°C. The test consists to check the microbial growth during the storage periods with classic microbiological protocol. The sample (10 grams) is mixed with 90 ml of sterile physiological water inside a stomacher, the solution formed after serial dilution is inoculated inside Plate count agar media. After 24 hours of incubation at 30°C, the bacterial colonies are counted to determine the Ufc/g. To establish the safeness of raw meat for human health and the time of shelf-life [5].

Fig. 1. Hamburger of beef raw meat wrapped with antimicrobial coating.

Results & Discussion







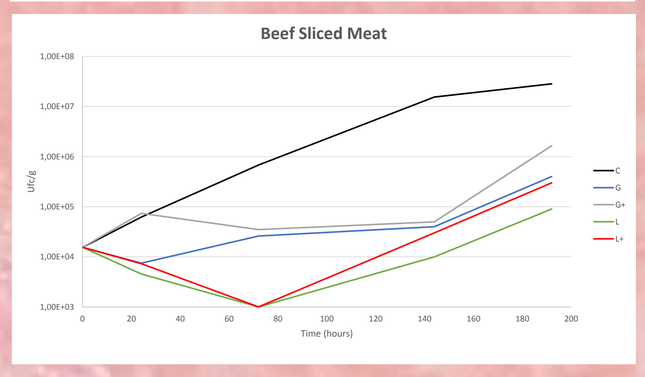


Fig. 2. Progress of mesophilic aerobic microbial charge of four type of sample. **(C)** Control, **(G)** Glycerol film, **(G+)** Reticulated glycerol film, **(L)** LAE film, **(L+)** Reticulated LAE film.

In the Figure 2, it is possible to observe the microbial growth of the different sample:
(C) no film applied, (G) film with glycerol, (G+) reticulated film and glycerol, (L) film with LAE, (L+) reticulated film and LAE.

Minced Chicken meat:
The mesophilic aerobic charge of control (C), grows faster than the samples G, L + and L. The last one is the best formulation. G + has a similar pattern as C.

Sliced Chicken meat:
The mesophilic aerobic charge of the control(C) is similar to the samples G and G +.The samples L and L + after an initial decrease of the charge, we have a microbial growth that differs by 2 orders of magnitude.

Minced beef meat:
The mesophilic aerobic charge Of (C), (G) and (L) are similar. After 50 hours, G and L slow down while the control continues to grow faster. The samples (L+) and (G +) have constant microbial growth lower by almost an order of magnitude.

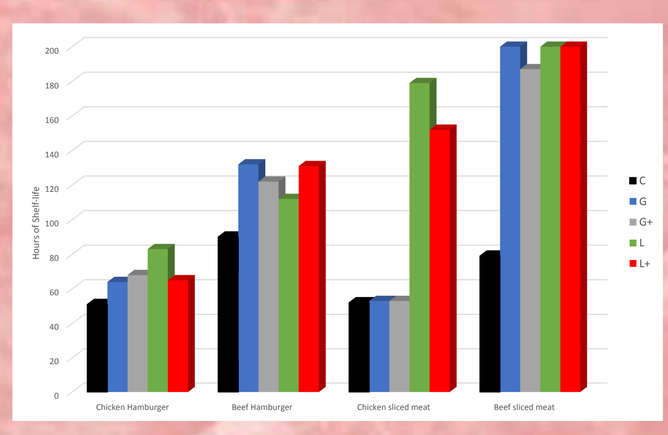


Fig. 3. Comparison of shelf life expressed in hour of all kind of samples wrapped inside the four different types of Pectin packaging. **(C)** Control, **(G)** Glycerol film, **(G+)** Reticulated glycerol film, **(L)** LAE film, **(L+)** Reticulated LAE film.

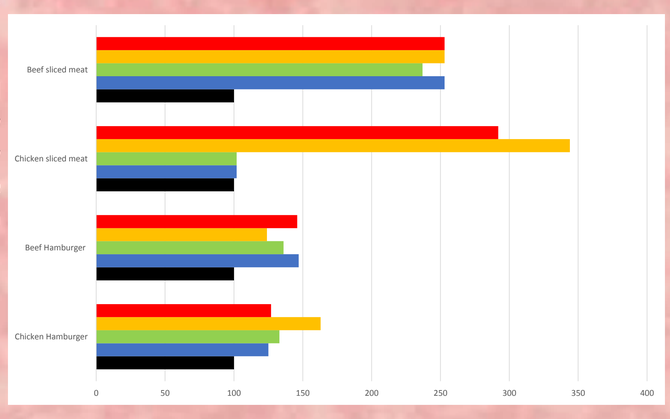


Fig. 4. Increase of Shelf life expressed in percentage of fig. 3.

Slice beef meat:
The mesophilic aerobic charge of control(C) grows much faster than all the other samples.G and G + stabilize the charge up to the 150 hours, after it begins to grow. The samples L and L + decrease the charge until 70 hours, after the growth starts again. The mesofilic aerobial charge stays lower than all the other samples, it is clear that the best formulation is L.
In figure 3, it is possible to observe the shelf-life expressed in hours of the various types of meat packed with different samples. The best performances:Chicken burger with 83 hours (Sample L); Hamburger with 131 hours (sample L +);Slice chicken with 179 hours (sample L). Slice beef with over 200 hours (samples G, L, L +). In figure 4, it is possible to observe the same data expressed as a percentage of shelf life compared to the control. In the minced chicken the maximum increase is 163%, in that of beef is 146%, in the slice of chicken is 344% while the slice of beef is more than 253%.

Conclusion

Antimicrobial pectin packaging that works mainly by contact express maximum antimicrobial potential against sliced meat. The motivation is a better contact between film and microbial charge that are present only in the surface of foodstuff. In the case of the slice of beef, it can be noted that the film without antimicrobial stabilizes the mesophilic aerobic charge and slows their growth.
The LAE is an antimicrobial "Engage", which means activation and disappear (downward trend), then the microbial remained starts to grow (upward trend).

References

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