

2017 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™



Application of Food-Grade Ingredients Infused Nets to Control Mite Infestation on Dry Cured Ham

X. Zhang^{1*}, M. D. Byron¹, J. Goddard², T. W. Phillips³, Y. L. Campbell¹, J. Hendrix¹, S. Abbar³, and W. Schilling¹

¹Food Science, Nutrition, and Health Promotion, Mississippi State University, Mississippi State, MS, USA;

²Biochemistry, Molecular Biology, Entomology, and Plant Pathology, Mississippi State University, Mississippi State, MS, USA;

³Entomology, Kansas State University, Manhattan, KS, USA

Keywords: mite reproduction, propylene glycol, lard, dry cured ham

Meat and Muscle Biology 1(3):89

doi:10.221751/rmc2017.084

Objectives

Tyrophagus putrescentiae (Schrank; Sarcoptiformes: Acaridae), the most common arthropod pest of dry-cured ham, is controlled in the U.S. dry cured ham industry with methyl bromide (MB) fumigation. However, MB fumigation will be phased out of use since it is an ozone depleting substance. The objective of this research was to evaluate ham nets that were infused with food-grade ingredients for their efficacy at controlling mite infestations on dry cured ham.

Materials and Methods

Ham nets were infused with low or medium concentrations of patent pending formulations of food-grade propylene glycol (PG) and lard, and/or gums. The gums that were used include xanthan gum (XG) and the combination of carrageenan (CG) and propylene glycol alginate (PGA). Three sets of experiments were conducted. The netting formulations in the first set included 100% lard, lard + low PG, and lard + medium PG; the second set included XG + low/medium lard + low/medium PG; and the third set included CG + PGA + low/medium lard + low/medium PG. Control hams cubes were not covered with nets, while net control ham cubes were wrapped with untreated nets. Dry cured ham cubes ($2.5 \times 2.5 \times 2.5 \text{ cm}^3$) were covered in untreated or treated nets and placed in ventilated glass jars. Each cube was inoculated with 20 large adult mites and incubated in a dark cabinet that was controlled at room temperature (20 to 25°C) and relative humidity of $80 \pm 5\%$. To evaluate the long-term effectiveness of treated nets at controlling mite infestations, 2 batches of samples were prepared and each batch was inoculated with adult mites on the first day of storage and at 4 wk of storage, respectively. After 2 wk of incubation, the total number of moving mites were counted

under a microscope. Randomized complete block designs with 2 replications ($n = 10$) were utilized for each set of experiments, and Tukey's Honestly Significant Difference Test ($P < 0.05$) was used to separate treatment means.

Results

Fewer *T. putrescentiae* ($P < 0.05$) were on ham cubes with treated nets that contained PG when compared to the number of mites on ham cubes with untreated nets over 6 wk of storage. In comparison to the net control (123 to 163 mites on average), lard and low- or medium-PG infused net treatments had only 19 to 44 mites. However, lard infused nets without PG did not decrease the mite population ($P > 0.05$). XG + lard + PG infused nets had fewer mites (2 to 39 mites; $P < 0.05$) when compared to the net control (77 to 146 mites). Similarly, CG + PGA + lard + PG infused nets also had fewer mites (0 to 22 mites; $P < 0.05$) than the net control (88 to 123 mites), and medium PG treatments had only a few mites present.

Nets slowed the growth and reproduction of *T. putrescentiae* since net controls had fewer mites ($P < 0.05$) than controls without nets (133 to 437 mites). Molds were not present on ham cubes that were treated with PG-containing nets over 6 wk of storage, with the exception of XG + low lard + low PG and CG + PGA + low lard + low PG treatments that were inoculated at 4 wk of storage.

Conclusion

Lard and XG, or CG + PGA treated nets containing the medium concentration of PG effectively inhibited mite reproduction and mold growth on dry cured ham and could potentially be used in an integrated pest management program to control mites on dry cured ham.