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Impact of Relative Humidity and Net Treatments on Tyrophagus Putrescentiae (Schrank) Infestations and Mold Growth on Dry Cured Ham

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Objectives

Dry cured hams are susceptible to mite infestations which are currently controlled in the U.S. dry cured ham industry via fumigation with methyl bromide. Since methyl bromide is an ozone depleting substance, food grade ingredient infused nets have been researched as an alternative to control mite infestations on dry cured hams. Mite infestations and mold growth vary on dry cured ham in untreated and treated nets due to environmental changes in relative humidity (RH) and temperature. Therefore, the objective of this research was to evaluate the effect of RH and infused nets on mite infestations and mold growth on dry cured hams.

Materials and Methods

Patent pending food grade coating formulations consisting of 1) xanthan gum (XG) and propylene glycol (PG) and 2) carrageenan (CG), propylene glycol alginate (PGA), and PG were infused into ham nets. Dry cured ham cubes (2.5 cm^3) and slices (2.5 cm × 9.0 cm × 15.5 cm) were wrapped with untreated (control) and 2 types of infused (treated) nets (XG + PG and CG + PGA + PG) and stored in ventilated glass jars. Three cubes and slices from each treatment were inoculated with 20 and 50 adult mites respectively, and stored in an environmental chamber for 14 d at 24°C and 65 ± 2, 75 ± 2, and 85 ± 2% RH. Mite infestation was determined by counting the mobile mites on ham cubes, slices, and nets using a microscope. Nine trained panelists rated the moldiness of ham slice surfaces on a 0 to 100% scale. A 3 × 3 factorial structure within a completely randomized design was used to determine the impact of RH and net treatment on mite infestations and mold growth. The least square means method was applied to separate treatment means.

Results

At 65 and 75% RH, samples with treated nets had fewer ($P < 0.05$) mites than the control, but there were no differences ($P > 0.05$) between treated and control nets at 85% RH. On average, across net treatments, there were fewer mites ($P < 0.05$) at 75 and 85% RH in comparison to 65% RH. In addition, when averaged over RH, samples in XG and CG coated nets had fewer ($P < 0.05$) mites on ham slices compared to samples in untreated nets. Though there was no difference between XG and CG ($P > 0.05$) with respect to the number of mites on ham slices, the CG treatments were effective at controlling mites at all RHs. In contrast, the XG treatment did not control mites at 65% RH. There was a strong correlation ($r = 0.98$) between percentage of the ham slices covered with mold and number of mites present. Mold growth was greater ($P < 0.05$) at 65% RH in comparison to 75 and 85%, and XG and CG treatments had less mold growth than the control treatments, with the CG treatment completely inhibiting the presence of visual mold.

Conclusion

Treated nets inhibited mite infestations and mold growth on ham cubes at 65 and 75% RH and on ham slices at 65% RH. Results indicate that 75 and 85% RH would be more desirable in the ham industry if hams were aged at 24°C. Further testing will be performed to observe the impact of temperature on mite infestations and mold growth on ham cubes and slices at various RHs to optimize aging conditions that can used to help control mite infestations.

