Mold infection of imported smoked herring

M. Refai, E. Elmossallami and A. Elot

Mold infection of meat and fish occurs very often. In the surface layers of meat, fungi cause such changes that meat becomes unfit for consumption. Stoll (1956) found that the most common types of molds in food industry are Aspergillus flavus, Penicillium glaucum, and Mucor mucro. Similar results were obtained by Martin (1959). Malschow (1965) stated that Penicillium is the most common type met with more occasionally Mucor, Cladosporium, Thamnidium, Trichoderma, Rhinospor, Alternaria, Aspergillus, Boreyrii, Verticillium and Monilia.

During the year 1966, the smoked herring imported amounted to 6,845,002 kg. There has been considerable losses of such herring due to mold infection. The work included in this paper is a trial to isolate and identify these molds.

6,420 kg smoked herring packed in 642 wooden boxes were imported and stored in refrigerators. Each box had 2—3 holes on each side. The size of the box was 40 × 60 × 15 cm. On inspecting such boxes a musty odour was noticed. Beside that black and white fungal spots 6—9 mm in diam. were found on the surface of the herring, wrapping paper and sides of the boxes. The uppermost layers were heavily infected with the fungi. The proportion of the white spots to the black one was 1:3.

Herrings that presented surface growth of molds were not allowed for further transportation or refrigeration but only for rapid consumption, provided that the infection was limited to a small part of the fish.

Figure 1: Smoked herrings with fungal spots
Representative samples were taken in sterile containers, as well as swabs from the boxes and wrapping papers. Direct microscopical examination of smears made from the white and the black spots in 15% Na OH solution revealed the presence of Aspergillus and Penicillium species. Both types were cultured on Sabouraud's agar at room temperature.

The microculture of the Aspergillus strain presents black and globose heads which is characteristic of Aspergillus niger group. As the sterigmata are in 2 series and the primary one is about 10 micron length, the fungus is grouped in the Aspergillus niger series (type Awamori). The identification of the Penicillium strain was difficult as we lack the "Manual of Penicillia" (Raper and Thom). We worked according to the general key.
to the series and sections of Penicillium summarised by Cooke (1963) from the book of Raper and Thom. The colony is green, with floccose somewhat tufted surface. No perithecia or sclerotia, penicilli branched and mostly symmetrical. The strain could be grouped in the Penicillium funiculosum series.

The problem of fungal contamination of smoked herring is important. The factors enhancing the growth of molds are temperature and humidity. Wright (1953) stated that through carelessness, the temperature may be allowed to rise, enabling the common molds to grow. This happens often during transportation. High humidity and bad ventilation help molding (Malachow 1965).

From the results obtained, it was noticed that Aspergillus niger and Penicillium funiculosum were heavily contaminating the herring. This agrees with the finding of Leche (1957) who stated that Penicillium types are mostly met with in smoked fish. He
attributed such contamination to rapid packing and transport. Butjagin (1905) found that the growth of Aspergillus niger and Penicillium glaucum cause a loss in dry matters and nitrogen and increase in the amount of water soluble nitrogenous matters. During the growth of these molds a gradually increasing amounts of volatile acids was produced. It was noticed that Penicillium destroys the constituents of meat more quickly than the Aspergillus. Beside that the ammonia produced by some molds makes favourable condition for the development of putrefactive microorganisms.

The authors recommended the followings for such mold affections:

1. Herring that presented surface growth of molds were carefully cleaned, and not allowed for transportation or refrigeration but allowed only for rapid consumption.
2. Removing molds and cleaning the herring must be done outside the keeping chambers to avoid contamination of new batches of fish with mold spores.
3. To eliminate molds, it was recommended to treat the herring with 20—25 % salt solution or 3 % vinegar solution, with subsequent drying in air. Smearing the surface of the fish with oil of good quality was performed in light infection which was limited to a small part of the fish. In advanced cases, the fish was considered unfit for consumption should be condemned.

Summary

Representative samples were taken from 6 420 kg imported smoked herring. The examination revealed fungal infection by Aspergillus niger type Awamori and Penicillium funiculosum. Measures recommended in such cases were mentioned.

Zusammenfassung


References


Address: Dr. med. vet. MOHAMED REFAI, Vet. med. Faculty, Cairo University, El Gizeh, U. A. R.

mykosen 11, Heft 1 (1968)