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# Microbiology of Mass Feeding Systems: An Introduction<sup>1</sup>

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The feeding systems selected for review in this seminar,—hospitals, military systems, universities, and airlines and cruise ships share many attributes with each other and with other similar systems.

These systems which are designated in-house feeding systems are complete in that the food, while it may be purchased preportioned, or even partially processed is prepared and served in-house and constitutes a main source of food supply for a large number of customers. The populations serviced are quite distinct and the systems are often of high complexity as reflected by the large assortment of menu items prepared. They are responsible for serving the three main meals and, for certain systems, numerous between meal servings are also involved. The physical plant for food processing and distribution is usually an integral part of the facility. It is obvious that additional in-house feeding systems could have been included in this seminar but as seen in the presentations those selected represent the major problems encountered in in-house feeding systems while at the same time certain problems will characterize a particular system.

In hospitals, food is prepared for a larger number of customers having a high susceptibility to infection. In contrast the military serves a generally resistant population but these meals often have to be prepared in submarines, in airplanes, or under field conditions. Airlines depend almost completely on centrally processed prepackaged meals but cruise ships are frequently obligated to serve very extensive menus with limited food preparation facilities.

These systems, while regulated by governmental agencies, in practice are monitored by techniques varying from the sophisticated to the most rudimentary, often but not always reflecting the risk involved to the

consumer.

Modern food preparation techniques, to decrease labor costs have utilized more sophisticated labor saving production and distribution technology. These modifications incorporate a greater use of precooked, chilled, frozen items or items transported at elevated temperatures. In addition packaging, transportation, and reconstitution techniques are also undergoing changes in response to economic requirements. Whether or not these changes alter safety remains to be ascertained.

None of the papers at this seminar refer to such terms such as "Good Manufacturing Practices" (GMP) or to "Hazard Analysis—Critical Control Points" (HACCP). These terms are commonly employed in quality assurance programs by the FDA and by industry for more effective monitoring of industrial production facilities. While qualified personnel monitoring in-house feeding systems do in effect attempt to perform a hazard analysis, effectiveness is often negated by a failure to formalize the approach by not issuing written procedures supported by effective training and supervision. One difficulty of applying the HACCP—which is really a preventative approach for industry, to these feeding systems is that the facilities involved were not designed for industrial processing. In industrial facilities each product processing line is a distinct entity producing a single item. In the in-house feeding facilities many items are being produced simultaneously using common equipment. For example, the effective segregation of raw foods from contact with processed foods is a frequent problem in the limited cooking areas of the in-house feeding system.

The purpose of this seminar is therefore to find out to what extent these representative feeding systems are: (a) affected by microbiological problems, (b) developing procedures to monitor feeding systems, (c) deriving benefits from GMP and to what extent a breakdown in GMP must occur in order to result in outbreaks of food poisoning or infections, (d) conducting end product analysis and employing microbiological standards, (e) maximizing safety in relation to cost, and (f) determining the relative contribution of food hygiene and environmental sanitation to producing a safe product.

<sup>1</sup>A Seminar on Microbiology of Mass Feeding Systems was convened by Gerald Silverman at the 75th Annual Meeting of the American Society for Microbiology, New York, N.Y., April 27-May 2, 1975. Papers presented at the Seminar include: "Microbiology and Hospital Feeding Systems" by Ruth B. Kundsln and Hollis A. Bodman, "Assurance of Microbiological Safety in a University Feeding Safety" by M. Solberg et al.; "Microbiological Aspects of Certain Military Feeding Systems" by Durwood B. Rowley; and "Food-and Waterborne Disease Outbreaks on Passenger Cruise Vessels and Aircraft" by Michael H. Merson et al. These papers will appear in the Journal of Milk and Food Technology.