

Shelf-life of beef extended as NRC scientists Garnish with CO₂

Per capita consumption of red meats has reached an all-time high in Canada. Despite rising prices, Canadians consume more beef than any other meat – an average of 87 pounds each, compared with 54 pounds of pork, followed by veal, mutton and lamb, offal, and finally, canned meats.

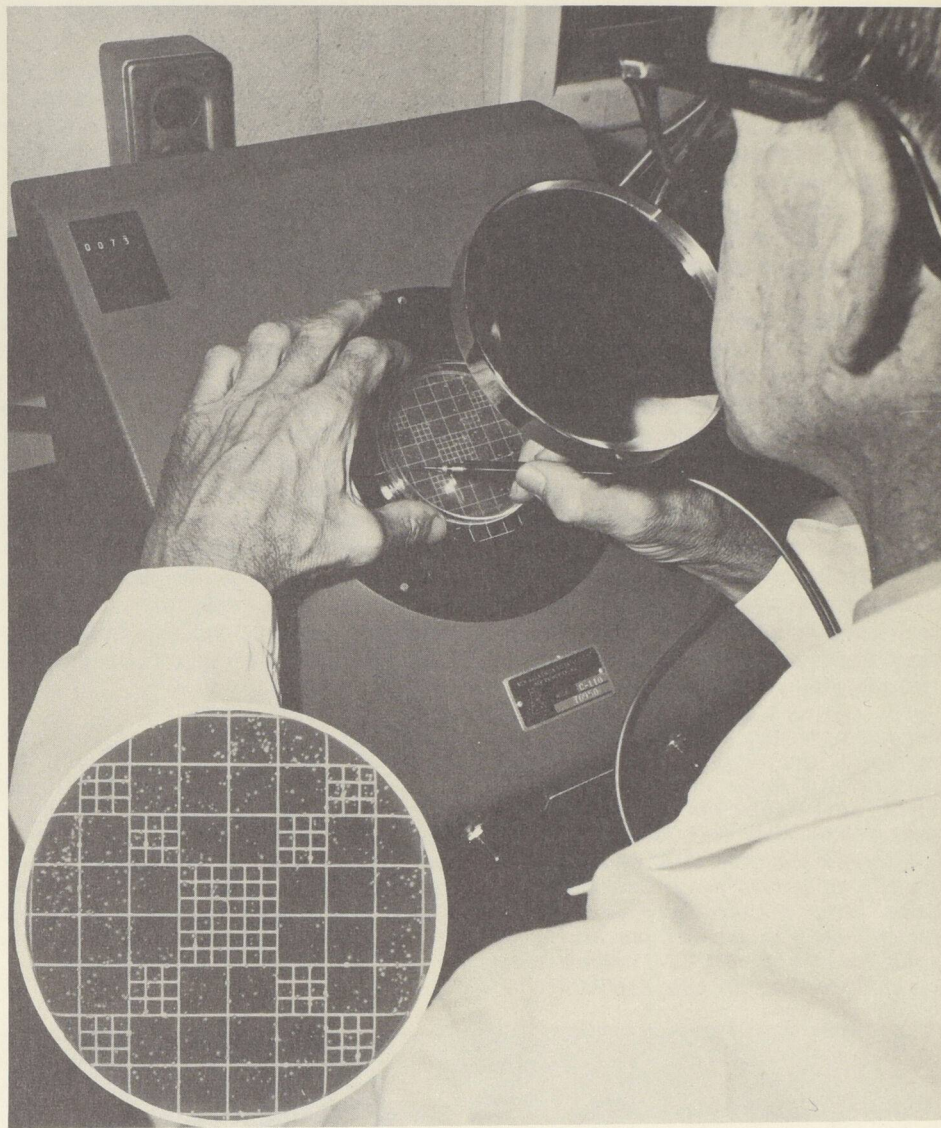
Beef production has increased steadily, with the number of animals slaughtered rising from 1,961,000 in 1951 to 3,446,000 in 1968. As production increases to meet consumer demands, new and better methods are continually being sought for storing, transporting, and preserving meat. For years, the National Research Council of Canada has worked in close co-operation with Canadian railways and packing plants to ensure that the consumer gets a top-quality product.

Recently, the Canadian Pacific Railway sought the assistance of the Council in solving a problem causing the formation of slime on some carcasses of fresh beef during the four- to six-day transportation period from Western Canada to markets in Eastern Canada.

Slime is caused by certain kinds of bacteria which are normally present on the surface of fresh beef and grow rapidly even at the freezing point of water. These cold-resistant, or psychro-tolerant bacteria, do not constitute a health hazard, but in large numbers they produce slime and cause an objectionable odor, as well as a change in the color of the meat.

A high relative humidity is required in refrigerated railway box cars to minimize weight loss and drying. However, high humidity encourages the growth of these micro-organisms, creating slime formation during transportation.

Two NRC scientists, C. P. Lentz, Head of the Food Technology Section of NRC's Division of Biology, and his associate, Dr. D. S. Clark, initiated a detailed study of the problem by first conducting field tests to determine the level of bacterial contamination of beef leaving Western packing houses, and to obtain cultures for subsequent laboratory tests. Since carbon dioxide (CO₂) inhibits the growth of slime-producing bacteria and does not harm the meat, they considered its use in the



atmosphere of refrigerated transport vehicles as one method of solving the slime problem.

In the field tests, bacterial counts were determined for six different surface areas on carcasses at two plants. The sides tested had hung in coolers for about 24 hours after slaughter and were destined for shipment the same day. Six square centimeters of surface were sampled at each location on 12 sides in each plant. All samples were processed in a temporary laboratory in one of the plants. Later, in the laboratory, 75 strains of bacteria were isolated, purified, and classified, and 10 of the fastest-growing strains were selected for carbon-dioxide storage tests.

Technician counts bacterial colonies (insert) which produce off-odor and slime on meat when their numbers reach about one hundred million per square centimetre of surface.

Un technicien compte les bactéries; dès que leur nombre atteint environ cent millions au centimètre carré, la substance gluante d'où émane une odeur désagréable apparaît.