

Proposed Standards for Paper Milk Containers

J. R. SANBORN

*New York Agricultural Experiment Station,
Geneva, New York*

SANITARY REQUIREMENTS OF FOOD CONTAINER BOARD

There is no reason why a paper container made from clean, sound, pulp wood according to methods consistent with food standards should not be hygienically suitable for perishable foods. Investigation has demonstrated the feasibility and effectiveness of this means of packaging milk.

Commercial mill practices in manufacturing pulp and paper and the condition of finished products are often not sufficiently sanitary to meet with the approval of food sanitarians and public health officials. The paper maker needs a sanitary technique comparable to the procedures employed for edible products. The intimate associations of cellulose material with food and household uses admit of no compromise with cleanliness and microbiological control.

Fear of increased operative costs and hesitancy to make changes from long established practices intensify the opposition to improved sanitary methods on the part of some pulp and paper mills. On the other hand, several producers of food wrappers and container board already exercise effective sanitary control which enables them to man-

ufacture a clean, high quality product practically free from microorganisms. By insuring purity of process water, cleanliness of mill systems and operations, and adequate protection of the finished product, these plants are setting a standard of quality which indicates the suitability and safety of properly made paper for the packaging of perishable and easily contaminated food products such as milk.

Consistently high standards of quality in paper mill operations and possible approval by public health officials will depend on constant adherence to a program of microbiological control. The industry has suggested that sanitary inspections be made of plants manufacturing milk container board. Apparently the only way this can be done is by federal supervision or voluntary action on the part of pulp and paper mills or conversion plants. Many purchasers and consumers of paper food containers are sensitive to the bacterial counts of contained foods and to the presence of undesirable organisms. With all the cleanliness and care used in preparing and processing foods, it is obviously inconsistent to package these foods in unsuitable and contaminated paper.

Read before the International Association of Milk Sanitarians, Louisville, Kentucky, October 11-13, 1937.

SANITARY QUALITY OF PAPER MILK CONTAINERS

An institute has been established at the New York State Agricultural Experiment Station for the purpose of securing fundamental information on the sanitary condition of paper for use in contact with such perishable foods as milk and milk products, and establishing standards for this paper and its fabricated forms which will provide health laboratories with cri-

- 3 Suitable protection and wrapping of finished board
- 4 Mechanical handling of board and containers at conversion factories and milk plants
- 5 Protection of board, adhesives, moisture-proofing materials, and finished containers from careless exposure to human contact, contamination, dirt, flushing water, or insects
- 6 Detailed knowledge and careful selection of all materials composing the container to avoid the possibility of incorporating substances having germicidal



SOME TYPES OF PAPER CONTAINERS NOW ON THE MARKET

teria for estimating sanitary quality in paper containers.

During this investigation consideration has been given to certain principles of sanitation which should be observed in the manufacture and use of paper milk containers. The following items present in concise form some of the factors involved:

- 1 Use of virgin pulp only
- 2 Pure process water and strict microbiological control at pulp and paper mills

or bacteriostatic effects, the use of which is prohibited unless they have been shown to be nontoxic to human beings and without effect on milk.

The bacteriological condition of the original container board usually influences directly the bacterial counts of finished containers. Strictly sanitary methods of handling, conveying, and storing good quality board aid in preserving its sanitary condition. Health laboratories are therefore primarily in-

terested in the hygienic state of the original container board as it is received by conversion factories or milk plants.

MUNICIPAL REGULATIONS AND CONTROL

Critical examination of food wrapper and container board will reveal information relative to the care and sanitary precautions taken by pulp and paper mills in the manufacture of these important grades of paper. Health laboratories may confirm by identification of fibers the nature of the pulp used; calculate the dirt content according to a method of numerical estimation suggested by the Pulp Testing Committee of the Technical Association of the Pulp and Paper Industry; examine slime spots for evidences of slime-forming organisms, growth fragments, or characteristic products of slime production.

Appreciable quantities of dirt and foreign matter may be introduced into new paper and board during their manufacture. Particles of metal, pipe scale, sand, and carbonaceous matter sometimes occur as well as various foreign fibers and organic residues, the presence of which is occasionally associated with unhygienic or careless practices.

Accumulations of microbial growth or slimes in pipe lines, chests and tanks are frequently dislodged and carried along by pulp streams to paper machines where considerable operative difficulties may result. Slimes are caused by bacteria, filamentous fungi, or yeastlike organisms, representative species falling under the genera *Aerobacter*, *Achromobacter*, *Flavobacterium*, *Pseudomonas*, *Bacillus*; *Penicillium*, *Mucor*, *Aspergillus*,

Cladosporium, *Trichoderma*, *Oidium*, *Monilia*. The presence of slime spots in samples of paper suggests inadequate control over the development of microorganisms in pulp and paper mills. Many slime-forming species are unusually aggressive and persistent, controllable only by specific remedial measures and consistent application of programs of slime eradication and prevention. Only those mills which successfully control microorganisms within their systems should be considered by health officials for an approved sanitary status in the manufacture of food wrappers and containers.

It is also possible to grade paper products such as milk container board according to their bacterial content based on the number of colonies developing on standard agar per gram of disintegrated stock. Disintegration of container board may be accomplished aseptically by means of special beaters, shredders, grinders, or agitators. When properly carried out the process is completed in a relatively short time. Ten cc. portions of the pulp suspensions containing ten grams of board to a liter of sterile water, are plated out on standard agar in both 100 mm. and 150 mm. petri dishes. In the case of the regular size plates, 2 cc. amounts of suspension are introduced into each dish, thereby facilitating the counting of colonies from board containing relatively large numbers of organisms. The large size plates, accommodating the entire 10 cc. portion of pulp suspension, furnish the more useful method for the examination of improved milk container stock.

Samples of container board taken at any stage prior to moisture-proofing should not have a

count exceeding 500 colonies per gram of disintegrated board. Certain pulp and paper mills which are able to maintain effective control over the development of microorganisms within their systems, manufacture a product having counts of less than 100 per gram. Ten cc. rinses of paraffined containers made from low count board are often practically free from bacteria. On the other hand, containers produced from board which approaches the maximum count of 500 may yield 100 colonies per container. Average plate counts for all types of paper milk containers are usually less than 50 per container, which is standard for the Baltimore regulation discussed below.

Rinse tests on fabricated containers are made in conformity with the latest standard methods recommended by the American Public Health Association. Paper containers are rinsed with 10 cc. of sterile water all of which is plated out on standard agar, by distributing the rinse among three regular size plates or introducing the entire quantity into a 150 mm. dish. Plates are incubated at 37° C., and counts are made at the end of 48 and 72 hours. It may be considered that present standards for paper containers should be in accord with those suggested by the American Public Health Association for glass bottles. Sanitary conditions in pulp and paper mills, container manufacturing plants and dairies usually enable paper containers to meet a much stricter standard than those ordinarily considered for glass.

Isolated attempts are being made by control officials to regulate the handling and sale of milk and milk products packaged in paper. While

these actions are based on information available at the time of formulation, recent findings indicate that the data are usually inadequate. The regulation adopted by the Baltimore City Health Department is deserving of serious study. In accord with this regulation it will be generally agreed that all paper, cardboard or other non-glass containers should be approved by the Commissioner of Health and conform to certain general rules regarding labelling and designation. Item 4 of the more technical portion of the regulation states:

"The paper blanks or non-paraffined containers shall be received by the milk plant in tightly closed packages or cartons and shall be manufactured from the best obtainable white spruce pulp or other material approved by the Commissioner of Health."

In the light of the results of recent investigations, this item may be effectively amended according to the suggestion given below.

"Container board in rolls, sheeted stock or blanks shall be received by conversion or milk plants suitably wrapped and sealed, and shall, until used, be kept unopened, in a clean, dry place."

"Only virgin pulp shall be used in manufacturing milk container board, which is low in dirt count, free from slime spots and has a bacterial count which does not, at any time, exceed 500 colonies per gram of disintegrated board."

Item 5 of the Baltimore regulations makes the following statement:

"The container, if glued, shall be glued with material made from a base of soybean, tapioca, or other product approved by the Commissioner of Health."

The suggested revision of this item would be as follows:

"The gluing of the container shall be accomplished with non-fermentable adhesives of synthetic, thermoplastic varieties or such types having vegetable or casein bases as produce rapidly-drying

films which resist dissolution, decomposition and leaching.'

Item 6 of the Batlimore ruling is as follows:

"The container, if it be one which requires paraffining, shall be paraffined in the milk plant where it is filled with milk or milk products; and shall be mechanically conveyed from the paraffining apparatus to the filling and sealing equipment; and the paraffining, conveying, filling and sealing of all containers shall be so accomplished as to prevent any possible hand or other contamination."

In view of the fact that paraffining may not completely sterilize containers and that premade containers may be as effectively protected from contamination as those that are filled with the milk immediately after paraffining, both types of containers should be permitted. The condition of paper milk containers in actual use at milk plants is the most reliable index to their sanitary quality. Wording such as the following might be substituted.

"Moisture-proofing of containers shall be accomplished by means of fully refined paraffin wax or other suitable materials which are odorless, tasteless, and non-toxic. The operation of paraffining machines shall be supervised by competent mechanics.

"All stock and containers shall be handled mechanically so far as possible and be paraffined, conveyed, filled and sealed so as to prevent contamination from manual contact, dirt, and insects."

This form of amended regulation would seem to provide sufficient restriction and sanitary control without shutting out high quality containers which may reach milk plants already paraffined. It has been demonstrated that it is entirely possible to make paper wrappers and containers which are suitable for milk and other perishable foods. As manufacturers continue to progress in sanitary methods of production and handling, it is probable that standards and specifications will become more stringent.