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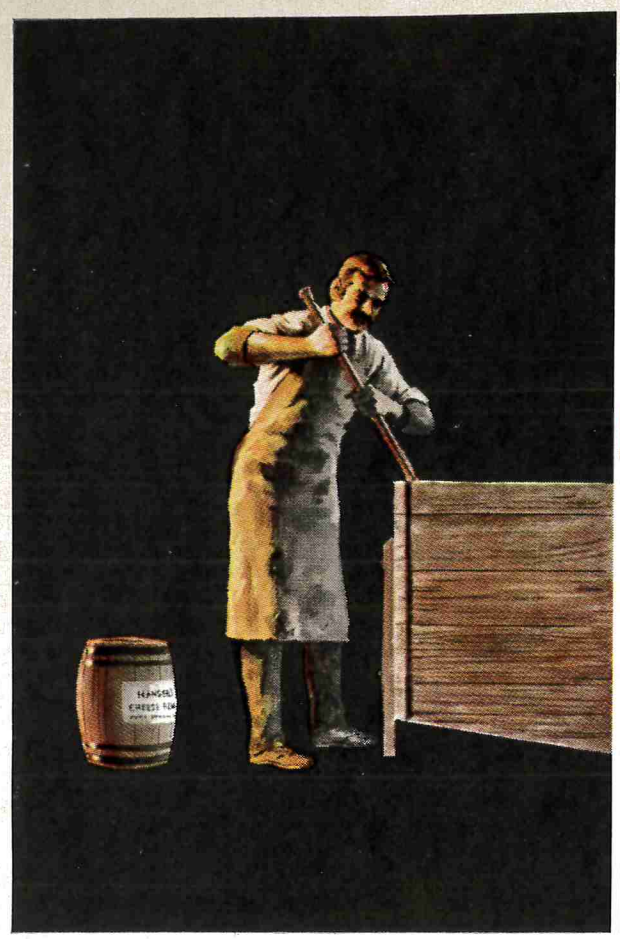

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BACTERIAL COUNTS OF PREPACKAGED, FROZEN AND UNFROZEN PORK AND VEAL CUTLETS – BREADED AND UNBREADED[1]

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(Received for publication March 1, 1965)

Summary

Eleven different brands (93 packages) of frozen and unfrozen (breaded and unbreaded) pork and veal cutlets were purchased during 12 months from 4 large volume stores. Initial bacterial counts ranged from 15,000 to 25 million per g. Samples taken from 62 packages of frozen pork and veal cutlets and stored at 2 to 3 C for 3 to 4 days showed bacterial populations varying from 400,000 to more than 6 billion per g. The average of the median counts of all brands was 64 million. In samples from the 62 packages stored 7 days at 2 to 3 C, the average of the median counts from all brands was 1.8 billion per g, or a 28-fold increase in the bacterial count during 3 to 4 extra days of storage. Obvious spoilage was much greater in the 7 day samples. Obvious spoilage (odor, sliminess) was greater in 31 stored samples of unfrozen pork cutlets compared with previously frozen pork and veal stored similarly, i.e., at 2 to 5 C.

The little information available on the microbiology of prepackaged pork and veal cutlets prompted this study of populations of microorganisms (mainly bacteria), and their effect on the keeping quality of such products found in food markets, and subsequently in homes.

Dyett and Shelly *(1)* reported that sausage containing 65% fresh pork wrapped in cellulose film yielded a plate count of 10^8 organisms per g after being stored 3 to 4 days at 3 to 5 C.

Halleck, Ball, and Stier *(2)* reported that fresh ground fat pork with an initial count of 130 bacteria per g, then packaged in cans and stored at 4.5 to 6.5 C had a bacterial count of 19 million per g after 14 days, mainly *Pseudomonas-Achromobacter* species. Hedrick, Parrish, and Bailey *(3)* studied the effect of preslaughter treatment of animals on meat quality and found that bacterial growth during storage of prepackaged loin chops was enhanced in preslaughter adrenaline injected Hampshire hogs compared with nontreated animals. The higher bacterial counts were thought to result from decrease glycogen and higher pH. Miller *(4)* found 1.5 million gram-negative psychrophilic bacteria per g in unseasoned ground pork prepared from a carcass stored 10 days at 1 C.

Miller *(5)* examined 10 different brands of fresh pork sausage with bacterial counts ranging from 10,000 to 180 million per g when purchased. The cheaper brands were generally higher both initially, and after being stored at 3 to 7.5 C.

Turner and Campbell *(6)* examined more than 300 packages of smoked sausages and cured ham and found that bacterial numbers varied widely between replicate samples of one code-date from each packer. They suggested that processing methods for sliced cooked ham are not adequate to provide reasonable storage life under normal conditions. They recommended a code-dating system for consumers.

Experimental Procedure

Eleven brands of frozen and unfrozen pork and veal cutlets were purchased at about weekly intervals for 12 months from 4 large volume stores in Riley Co., Kansas. Within 15 minutes after purchase the packages were placed at 2 to 3 C and initial microbiological analyses were made on each package within 5 hours.

Four portions from each package were removed and re-wrapped in "saran wrap." Two of the portions were placed at 2 to 3 C, and 2 at 5 C. After 3 to 4 days one sample from each of the two temperature ranges was removed and analyzed; the two remaining samples were held 7 days before analysis.

Appropriate dilutions in 0.15% peptone water were made starting with 10 g of cutlet. The first dilution was shaken 5 min on a Kahn shaker. This usually partially or almost completely disintegrated the sample (because of previous processing). Further dilutions from the liquid phase were shaken 25 times by hand. Eugonagar was the medium used, and plates were incubated 3 to 4 days at 23 C.

Results and Discussion

Bacterial counts on 62 packages of frozen pork and veal cutlets (breaded and unbreaded) at time of purchase ranged from 20,000 to 15 million per g, while the medians of all brands (except C) varied from 200,000 to 500,000 (Table 1).

After 3 to 4 days at 2 to 3 C counts on samples from 62 packages were 400,000 to >6 billion, and the average of the medians of all brands was 64 million bacteria per g. At 5 C for 3 to 4 days the counts were higher (Table 1), with some spoiled

[1]Contribution 420, Department of Bacteriology, Kansas Agr. Exp. Station, Manhattan.

TABLE 1. BACTERIAL COUNTS OF FROZEN, BREADED AND UNBREADED, PORK AND VEAL CUTLETS SOON AFTER PURCHASE AND AFTER STORING AT 2 TO 5 C FOR 3 TO 7 DAYS

Product	Number of packages	Counts per g at time indicated[a]				
		Initial counts	Time and temperature of storage (portions of opened packages)			
			3 to 4 days at:		7 days at:	
			2 to 3 C	5 C	2 to 3 C	5 C
Brand A Breaded pork	16	20 T to 2.5M Md. = 350T	600T to 200M Md. = 12M	5M to 1.8B Md. = 150M	10M to >6B Md. = 1.5B	200M to >6B Md. = >6B
Brand B Breaded pork	9	100T to 400T Md. = 200T	300T to 165M Md. = 6M	1.5M to 600M Md. = 10M	900T to 250M Md. = 38M	80M to 2.5B Md. = 1B
Brand A Breaded veal	12	40T to 7M Md. = 500T	1M to 1.2B Md. = 210M	1.5M to 2.5B Md. = 235M	15M to >6B Md. = 650M	50M to >6B Md. = 3.5B
Brand B Breaded veal	4	85T to 2.2M Md. = 280T	10M to 195M Md. = 160M	43M to >6B Md. = 550M	330M to >6B Md. = 3.5B Samples from 2 pack. covered with mold	>6B to >6B Md. = >B Samples from 2 pack. covered with mold
Brand C Breaded veal	4	80T to 8.5M Md. = 1.2M	400T to 30M Md. = 11.5M	2.5M to 165M Md. = 33M	79M to 220M Md. = 175M	200M to 2B Md. = 1.5B
Brand D Unbreaded veal	7	15T to 15M Md. = 450T	600T to >6B Md. = 29M	5M to 1.5B Md. = 107M	3B to >6B Md. = >6B	180M to >6B Md. = >6B
Brands E, F, G, H Unbreaded and breaded veal	10	23T to 10M Md. = 400T	700T to >6B Md. = 21M	1.4M to >6B Md. = 200M	100M to >6B Md. = 2B	220M to >6B Md. = 4.5B

[a]Symbols: T = Thousand; M = Million; B = Billion; Md. = Median.

TABLE 2. BACTERIAL COUNTS OF UNFROZEN, UNBREADED, PORK CUTLETS SOON AFTER PURCHASE, AND AFTER STORING AT 2 TO 5 C FOR 3 TO 7 DAYS

Product	Number of packages	Counts per g at time indicated[a]				
		Initial counts	Time and temperature of storage (portions of opened packages)			
			3 to 4 days at:		7 days at:	
			2 to 3 C	5 C	2 to 3 C	5 C
Brand I	12	80T to 25M Md. = 1.3M	3.5M to >6B Md. = 550M	8M to >6B Md. = >2B	230M to >6B Md. = >6B	300M to >6B Md. = 6B
Brand II	8	130T to 10M Md. = 525T	800T to 3B Md. = 200M	130M to >3B Md. = 800M	>4B to >6B Md. = >6B	>4B to >6B Md. = 6B
Brand III	11	100T to 4M Md. = 1.8M	350T to >6B Md. = 200M	60M to >6B Md. = 1.5B	>4B to >6B Md. = >6B	1.5B to >6B Md. = >6B

[a]Symbols: T = Thousand; M = Million; B = Billion; Md. = Median.

samples.

Sixty-two samples held 7 days at 2 to 3 C showed counts ranging from 900,000 to 6 billion. The median counts of all brands averaged 1.8 billion per g, a 28-fold increase over comparable samples held 3 to 4 days at the same temperature, i.e., 2 to 3 C. Spoilage was considerable in these samples. The medians of all brands stored at 5 C for 7 days averaged more than 4 billion per g, and as expected spoilage was greatest among those stored 7 days.

Initial bacterial counts on 31 packages of unfrozen pork cutlets soon after purchase varied from 80,000 to 25 million per g. Obvious spoilage (odor, sliminess) was greater in stored samples of unfrozen pork compared with previously frozen pork and veal stored similarly, i.e. at 2 to 5 C.

Pseudomonas-Achromobacter species, microbacteria, lactic acid bacteria, and micrococci were cultured most commonly from cutlets at the time of purchase. *Pseudomonas-Achromobacter* species dominated in the majority of packages; microbacteria were next, and micrococci dominated occasionally.

On the other hand, in samples from 9 packages microbacteria dominated the flora throughout the storage period. In a few instances there was an abnormal odor, but not like the extremely unpleasant spoilage characteristic of samples with counts of greater than 6 billion in which *Pseudomonas-Achromobacter* species dominated.

Micrococci (white or lemon yellow) dominated the flora initially in 7 packages of cutlets, but in only one package did they dominate the flora after 7 days. Two packages of frozen, breaded veal cutlets (brand B) purchased several days apart at the same store yielded mold colonies on the initial plate count. After 7 days, samples of meat from the 2 packages were completely covered with mold growth.

ACKNOWLEDGMENT

The author acknowledges the technical assistance of William Randall, student in Veterinary Medicine, Kansas State University, Manhattan.

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A SIMPLIFIED COLIFORM TEST FOR MILK PRODUCTS

ANDREW MOLDAVAN

Guaranteed Pure Milk Co. Ltd., Montreal, Quebec

Editorial Note: Quality control personnel concerned with detection and control of coliform bacteria in the processing of various milk and other food products undoubtedly will be interested in this brief account of the usefulness of the simplified presumptive test reported herein. While this procedure was published many years ago, its redescription with comments relative to its application over a long period of usage was thought to serve the interest of many JMFT readers.

In 1915, M. H. McCrady, Director of the Quebec Provincial Health Laboratories introduced the coliform test for milk, using the fermentation tube method. Later, McCrady and Archambault *(3)* further refined the test to assess plant sanitation as reflected in recontamination of pasteurized products. The experience of the past 50 years has proven the value of the test for this purpose, as indicated by Archambault *(2)*.

While official testing must follow the details prescribed in "Standard Methods for the Examination of Dairy Products" *(1)*, there is need for a simplified procedure especially adapted to use in a plant laboratory. Where serious contamination of product has occurred, speedy discovery is extremely important. The most precise and elaborate test loses much of its value if the product has been marketed before the results are known.

The fermentation tube method, officially employed in Quebec and Ontario, calls for the use of inverted vials to detect gas production by coliforms. This has its drawbacks. First, the amount of gas collected in the inverted vial is not representative of the total inoculum, as only 10 to 50% of the inoculum finds its way into the inverted vial *(4)*. Second, the official method prescribes that the brilliant green lactose bile broth be distributed in tubes containing inverted vials, then autoclaved to sterilize it. Third, the washing of the inverted vials is time-consuming. To overcome these objections, the following simplified procedure was developed in 1930. Since that time our laboratory has performed over 600,000 coliform tests using this procedure, which was published in 1935 *(4)*.

SIMPLIFIED AGAR PLUG COLIFORM TEST PROCEDURE

The brilliant green lactose bile broth (2%) is boiled for 30 min. (More than 10,000 negative controls have shown that autoclaving is not necessary.) The medium is cooled to room temperature, then 9, 18 or 27-ml portions are carefully introduced into sterile test-tubes. A solution of plain agar (1-2%) is also boiled for 30 min and cooled to about 50 C. Tubes of broth are then inoculated as follows:

9 ml medium + 1 ml milk
18 ml medium + 2 ml milk
27 ml medium + 3 ml milk

Tubes are swirled to mix the contents, then 2 ml of the melted agar solution is poured slowly down the inside wall of the tube to form a layer over the inoculated medium. On solidification the agar forms a seal which traps any gas formed within the medium during incubation at the prescribed temperature *(4)*. In a positive test, tiny bubbles of gas form a layer of foam under the agar plug; then as the volume of gas increases the agar plug is forced upwards.

ADVANTAGES OF THE SIMPLIFIED COLIFORM TEST

Because of the simplicity of preparation it is possible to set up 100 tests per hour even in the most modest laboratory.

Positive gas production corresponds to the full amount of the milk tested, not just of a portion of it.

Because all the gas produced is trapped beneath the agar seal, a small bubble is readily seen. With heavy recontamination, this may be in 8 hrs or less, while with the ordinary degree of recontamination the agar seal has been forced upwards in 16 hrs or less. (It must be borne in mind that some strains of coliforms are not very active gas producers, hence the volume of gas liberated is not always proportional to the initial number of coliform organisms.) Thus serious recontamination can be detected and remedial action taken much earlier than is possible with the official plate or tube methods.

Further advantages of the agar plug method are that no plug or other closure is required for the tube during incubation; tubes are washed much more easily than are inverted vials; and the difficulty, especially with cream, of seeing whether or not gas has formed in the inverted tube when the inoculated broth is so opaque, is entirely avoided.

For the plant laboratory, the agar plug procedure enables a close check to be made on the sanitary condition of equipment beyond the pasteurizer. An efficiently operated plant will rarely have a sample showing more than 10 coliforms per 100 ml *(2)*, a much more realistic standard than that currently being considered for the forthcoming edition of the Pasteurized Milk Ordinance of the U. S. Public Health Service.

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PROBLEMS OF AGING BULK TANKS[1]

H. V. ATHERTON

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University of Vermont, Buelington

Bulk cooling of milk has been an established fact for at least a decade. People used to say that farmers would never pay that kind of money for a bulk tank when their old can cooler was still doing a good job. But that was before farmers began installing bulk tanks, pipeline milkers, CIP systems, gutter cleaners, and a host of other new mechanical tools in the barn and milkhouse at a rate none of us could even believe possible.

There was, and is, a lot of pride in these installations that farmers purchased, many times at the expense of postponing needed improvements in the homes. In much of the country, adjustments have been made and a major portion of our milk is cooled in bulk tanks. Our milk quality as a whole is considerably improved over that delivered ten years ago. There is no question in anyone's mind that bulk tanks are here to stay.

We have had our problems during the past 10-12 years. The automatic improvement in milk quality which was supposed to happen overnight just did not quite happen that way. Our research and that of several other workers have shown that quality problems with bulk cooling of milk on farms can not be truly evaluated using the standards of a decade ago. Through the years we are learning there is more to quality than a low standard plate count, but it has not been an easy message to get to the several segments of the dairy industry.

After a decade of bulk handling, a new problem cames along to bother the dairy industry. Equipment wears out. Usually controls wear out quicker. No one knows just when a given tank or its controls will cease to function properly but it is recognized the day must come. Faulty fat tests and quality problems will occur with increasing frequency and intensity as more and more tanks reach this uncertain age when continued usage under varying conditions of temperature, moisture, and care begins to "take its toll."

With increasing age of tanks, there is a loss of this pride of ownership which was so evident when tanks were new. Unless milk producers are properly instructed, sanitation slips and remains unnoticed because plate counts do not indicate sanitation errors as they did with can cooling. Deposits of milkstone or water minerals remain on the tank surface. Pitting takes place under these films and a continuing sanitation problem exists. Milk quality suffers because the bacteria which thrive in these films will grow at refrigeration temperatures and are capable of breaking down milk fat and protein.

Milk quality would suffer less if tanks would operate properly until they wear out and then just stop. The condition would be obvious and something could be done about it immediately. Unfortunately, this is the exception rather than the rule. The controls may function improperly or erratically for months without anything being noticed. Such improper functioning may cost the producer considerable money from low fat tests and cause the milk handler to suffer serious decline in the sales appeal of his milk products.

When bulk tank controls cease to operate properly, either freezing or churning of the milk is likely to occur. The milk loses it normal physical character. However, close attention to the operation of the tank can save the industry a lot of unnecessary expense from fat losses and quality problems.

The bulk milk collector must be made aware of the problems of improperly functioning bulk tanks. In many cases, he is the only one aware that something is wrong. At least, if he is alert to his responsibility to the producer and the milk plant, he can be the first to observe the effects of erratic tank operation. Bulk milk collectors should look at the bottom of the tank after the milk has been collected and before the tank is rinsed with water. The presence of butter particles (sometimes as big as peas but anything you can see is "too big") or flakes is a good indi-

[1]Presented at the annual meeting of the Central Ontario Milk Sanitarians Association, January 27, 1965, at Toronto, Canada.

cation something is wrong. Milk may freeze during the first milking and then thaw as additional milk is added. Even though one does not see ice floating around in the milk at collection time, the fat and the protein have been altered and will not go back into their original state. When insufficient cooling occurs, churning is common as the milk is agitated during the second, third, and fourth milking. The collector should be made aware of the quality and sampling problems caused by freezing and thawing so he will inform the producer in time to avoid extensive losses.

The milk producer can make easy routine inspection to determine if the tank is working properly. Several things should be checked as often as possible. Is the milk being cooled properly? Is the holding temperature the same as usual? Does the compressor cut in and cut out when you expect it to? Or, does it take several hours to cool milk down to 40 F? Does the compressor seem to be running a lot more than usual? Is the compressor still warm during the middle part of the day? If these latter conditions exist, faulty controls or low refrigerant may be the reason. In any case, something is wrong and the refrigeration service man should be called. Lost fat will pay for a lot of service calls.

Just looking at the milk may tell a lot about its temperature history. Are butter particles floating on the surface? Or is there floating ice? Either is a mighty expensive sight, payable both in cash and in lower milk quality.

Let us review some of the problems caused by improperly functioning old (or new) tanks. Is enough ice being built in an ice bank tank to properly cool the milk supply during peak production? Or do the controls stick so the ice keeps forming, causing a pressure on the milk holding tank? Possibly the controls stick so the agitator goes all day or does not start when new milk is added to that already in the tank. Occasionally "malty" milk flavors have been caused by failure of the compressor to respond during extremely cold spells. Thus no cooling occurred until the compressor warmed up in midday. The industry used to have problems of corrosion, especially in the ice bank type, due to bimetallic corrosion resulting from construction with dissimilar metals, but that does not seem to be a problem in recent years. Likewise, tank manufacturers appear to have found the way to avoid the rather common problem of some years ago of oil dripping from the agitator motors after several years of use.

The more common problems relating to faulty operation of aged tanks have to do with milk quality and butterfat control. It is next to impossible to get a proper fat test on milk which has been churned or frozen. Few producers realize that a difference of 0.1% in fat test will cost him about $45 per month if he delivers 4000 pounds of milk every other day. Fat tests are likely to be far more than 0.1% in error when milk has been frozen or churned.

When milk is churned or frozen, the protective membrane around the butterfat globules is destroyed. Milk lipase then may attack the milk fat. Rancidity or unclean flavors are common as a result.

The milk company objects to buying milk that has been frozen or churned. The lower price the farmer gets for his milk through faulty fat tests does not help the buyer any. This is money lost. The industry has additional problems with churned or frozen milk. Bottled milk from these sources often shows a "cream plug" on the top of the milk. Cream oils-off in coffee or "feathers" (similar to high acid milk). Whipped cream will not maintain its normal stability—it "droops" and gets soggy. Any of these conditions is distasteful to the housewife.

All of us should be concerned about this potential problem of aging tanks. The situation will get worse instead of better unless something is done about it. Every clump of butter in the bottom of the tank means something has happened to the normal fat emulsion and the fat test and general quality will be lowered. The dairy industry can not afford the use of faulty bulk tanks. Improperly operating tanks are easy to detect if they are checked periodically.

STORAGE OF EVISCERATED HADDOCK IN REFRIGERATED SEA WATER TREATED WITH GAMMA RADIATION [1, 2]

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(Received for publication November 11, 1964)

Summary

The storage life of eviscerated haddock held in sea water at 32 F was significantly extended by continuously recycling the sea water through a field of gamma radiation. The storage life was eventually limited by growth of bacteria on the surface of the fish even though the bacterial concentration of the sea water remained at a relatively low level. Accumulation of salt in the flesh might also eventually effect the quality of fish stored in this manner.

Due to the need to extend the time during which fish may be held in the fresh condition aboard fishing boats, many experiments have been carried out to discover a method more efficient than the current one.

Boyd et al. *(2)*, Steiner and Tarr *(14)*, Tomiyama et al. *(17)*, Tarr *(16)*, Harrison and Roach (*8*), Southcott et al. *(11, 13)* and Stern et al. *(15)* have compared the results of holding fresh fish in ice with and without antibiotics and in refrigerated sea water with and without antibiotics. The concensus was that refrigerated sea water holding provided greater storage life than holding in ice and that the addition of tetracycline antibiotics to either extended the storage time during which fish could be held in the refrigerated state without extensive decomposition.

Roach and Harrison *(10)* found that chilled 6% sodium chloride brine gave better results than chilled sea water when used for holding raw whole shrimp aboard fishing boats.

Farber (5) found that 2 ppm of chlortetracycline (CTC) had no preservative effect on raw headless shrimp (frozen and defrosted) held in 5% brine at 45.6 F.

Ferman et al. *(6)* found that 5 ppm of CTC in ice or sea water greatly extended the storage life of sea bass, weakfish, croaker, scrod, salmon and halibut. No off-odor was reported in treated bass with bacterial counts as high as 28 x 10^6 per g of flesh and in scrod with bacterial counts as high as 45 x 10^6 per g of flesh.

Southcott et al. *(12)* stored lingcod in artificial sea water at 30 and 32 F with and without 10 ppm of added CTC and made organoleptic tests and bacterial counts periodically. Product stored without CTC was still fresh after 11 days and product stored in refrigerated sea water containing CTC was still fresh after 14 days. Fish, in refrigerated water which had bacterial counts as high as 23 x 10^6 per ml, were still fresh; however, fish in refrigerated water containing CTC were still fresh in cases in which the water counts reached 91 x 16^6 per ml. Bacterial counts on flesh portions were always below 0.83 x 10^6 per g in fish which were judged to be fresh organoleptically.

Cohen and Peters *(4)* reported the results of holding ocean perch in refrigerated sea water at 30 F or in ice. Organoleptic tests and chemical determinations were used as criteria of quality. Fish stored in refrigerated sea water were edible for about 7 days longer than fish stored in ice.

Boyd and Southcott *(3)* held lingcod in refrigerated brine at 30.2 to 32 F and subjected the brine to ultraviolet irradiation during circulation. A control system was used in which fish were held in refrigerated brine which was not irradiated. Ultraviolet light was effective in preventing bacterial development in brine but did not improve the quality of stored fish. Ultraviolet irradiation caused odor and color changes in the brine and odor changes in the fish.

In view of these latter results, it was considered worthwhile to investigate the possibility of holding eviscerated fish in refrigerated sea water while treating the sea water with a source of ionizing radiation, gamma rays.

Methods

Materials.

The fish used in this study were "hooker" (caught by long line) haddock approximately 18 in. in length and two days out of water. These were procured from a local fish processor and were gilled and eviscerated only.

The sea water was obtained from an area of the greater Boston harbor, not polluted with chemicals, and was filtered and brought to a boil prior to use.

Three fish were placed in a refrigerated water

[1]Contribution No. 630 from the Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts.

[2]This work was performed under contract No. AT(30-1)-3343 with the United States Atomic Energy Commission.

bath[3] and chilled sea water was added to just cover the fish. This usually amounted to four and one half gallons. The bath was equipped with a pump for circulating the water, and also with a perforated plate at the bottom which agitated the water through a pulsing action. The temperature of the sea water was maintained at 32 F ± 1.

Irradiation of refrigerated sea water.

Two different procedures were employed for irradiation of the sea water. In the first system the sea water was continuously recirculated from the refrigerated bath to an insulated glass reservoir flask which was located in an area in a cobalt-60 radiation field[4] where the radiation intensity was 2250 rad per min. The reservoir was either a one-liter flask with a flow rate of 2 liters per min or a 4-liter flask with a flow rate of 1 liter per min.

In the second method the sea water was irradiated by a batch process. Approximately half of the sea water was drained from the bath, filtered through glass wool, and irradiated in one gallon tin containers with 100,000 rad of gamma radiation. This partially exposed the fish to air. The remaining half of the sea water was then drained and the irradiated sea water was returned to the tank. The second drained portion was similarly filtered, irradiated and returned to the bath. This procedure was carried out once each day. During the irradiation treatment, which required 30 min, the water temperature rose to approximately 39 F, being brought back to 32 F within a 2 hr period thereafter.

Bacteriology.

Total plate counts were made periodically on the refrigerated sea water by spreading a one-tenth ml portion of the sea water or appropriate dilution thereof over the surface of pre-poured Eugonagar plates. The total number of colonies was counted after a 5 day incubation at 68 F.

The diluent was composed of 1 g trypticase[5], 1 ml 0.1 N sodium hydroxide, 1 ml antifoam solution (10 ppm Dow Corning Antifoam AF) and 1.25 ml 0.0003 M monobasic potassium phosphate per liter. The diluent was used in the chilled state.

For making skin or flesh counts a fillet was removed from a fish and was skinned. A two square inch section was cut from the skin. This was shaken vigorously 100 times with 100 ml chilled diluent and appropriate dilutions were plated out.

A 22-g portion of the flesh was blended for three minutes with 198 ml chilled diluent and decimal dilutions were plated.

[3]Blue M Magni Whirl Model MR-3220, Blue M Electric Company, Blue Island, Illinois.
[4]U. S. Atomic Energy Commission Mark 1 Food Irradiator.
[5]Baltimore Biological Laboratory, Baltimore, Maryland.

TABLE 1. PLATE COUNT OF WATER AND OF HADDOCK FLESH AND SKIN DURING STORAGE IN REFRIGERATED SEA WATER

Storage time (days)	Sea water	Flesh	Skin
	(per ml)	(per g)	(per in.^{2})
0	3,800		
1	16,000		
2	19,000		
3	32,000		
4	36,000		
5	49,000	10,000	1,000,000
7	1,700,000	190,000	1,300,000

RESULTS AND DISCUSSION

In Table 1 are presented the total plate counts of haddock held in unirradiated refrigerated sea water over a 7-day period. At the end of the 5th day a portion of the fillet sampled for bacterial content was tasted after having been cooked by steaming. The fish was judged to be of good quality. After the 7th day the fish were still acceptable from a flavor standpoint; however, it is considered that the fish would have been of unacceptable quality had the experiment continued another day. The sea water had become slightly cloudy and had a foul odor due to the metabolic products of the microorganisms growing in it. Although the bacterial content of the flesh was not high after the 7th day and probably would not have been high from a spoilage standpoint after the 8th day, it was believed that the odoriferous compounds which had formed in the sea water would have diffused into the flesh of the fish and would have imparted an off-flavor.

It should be pointed out that the maximum holding times obtained in this study are not absolute, but only relative. Had the experiment been initiated with fresh-out-of water fish, a longer period of acceptable quality would have resulted. The initial plate count of the sea water represents the bacterial concentration 2 hr after the fish had been placed in the tank. During this period bacteria were washed from the surface of the fish into the sea water. In another control experiment (results not shown) in which the initial plate count of the sea water was 36,000 per ml, a level of 15,000,000 per ml was reached after 7 days. This water had a pronounced foul odor and the fish contained in it had a definite off odor. It is interesting to note that some investigators reported fish to be of acceptable quality after storage in refrigerated sea water which had reached a bacterial concentration in the upper millions. In

TABLE 2. PLATE COUNT OF REFRIGERATED SEA WATER HOLDING FISH. SEA WATER CONTINUOUSLY PUMPED (2 LITERS/MIN.) TO A ONE LITER FLASK LOCATED IN A GAMMA RAY FIELD (2250 RAD/MIN.)

Storage time (days)	Total count
	(per ml)
0	700
3	1,000
4	2,800
6	16,000
7	35,000
10	220,000
11	730,000

some of these experiments antibiotics had been added to the sea water and it is conceivable that the resulting bacterial flora was not of the putrefactive type. However, some of the experiments were conducted with plain sea water and in this case one would have to assume either a difference in initial flora or a more critical judgment of organoleptic quality on the part of the present authors.

The plate counts of the refrigerated sea water undergoing continuous irradiation are shown in Table 2. The experiment was terminated at the end of 11 days because from their odor the fish appeared to be on the verge of unacceptability. The irradiation treatment seemed to have extended the storage life of the fish a few extra days compared to the control method, but it was felt that if a higher irradiation dose were applied, a more significant extension of shelf life might have resulted. Thus, the reservoir flask in the radiation field was changed from the one liter size to a four liter flask and the flow rate decreased from two liters per minute to one liter per minute. With these two innovations the residence time of the sea water in the reservoir flask was increased, thus permitting an increase in the total radiation absorbed. The results of this trial are presented in Table 3. One of the fillets was tasted after the 14th day. This fillet had a good texture and good flavor and there was no evidence of an irradiated flavor. There was a slight salty taste however, probably due to diffusion of salt from the water into the fish tissue.

Another fish was filleted after 18 days of storage but was not tasted because a slightly decomposed odor could be detected. This fish, as with the 2-week old fish, had a firm texture which facilitated the filleting operation. However, there was a noticeable rusting in certain areas of the fish, particularly the belly portion. It will be noted that following 18 days the plate count of the sea water was low whereas the skin count was high. It thus appears that even though it may be possible to maintain a low bacterial count in the refrigerated sea water through some treatment such as irradiation, bacteria on the surface slime or in tiny fissures on the skin will continue to proliferate and eventually cause spoilage. There may have been some free radical or peroxide formation in the water in the reservoir flask, but by the time this water returned to the main storage tank the free radicals would probably have combined or the peroxide would probably have been expended and thus not have been available to destroy any bacteria on the surface of the fish. The inclusion of a small amount of antibiotic to the sea water might have been of benefit in retarding bacterial growth on the skin.

TABLE 3. PLATE COUNT OF HADDOCK FLESH, SKIN, AND REFRIGERATED SEA WATER DURING HOLDING. SEA WATER CONTINUOUSLY PUMPED (1 LITER/MIN.) TO A FOUR LITER FLASK LOCATED IN A GAMMA RAY FIELD (2250 RAD/MIN.)

Storage time (days)	Sea water	Flesh	Skin
	per ml)	(per g)	(per in.^{2})
0	4,000		
2	900		
4	700		
7	800		
9	5,200		
11	9,800		
14	19,000	110,000	750,000
16	27,000		
18	30,000	4,100,000	420,000,000

A final experiment was conducted in which the sea water was drained from the tank once per day, irradiated with 100,000 rad and returned to the tank.

The predominant species of bacteria making up the flora of marine animals are members of the genus *Pseudomonas*. Goldblith et al. *(7)* reported the 37% surival dose for two different pseudomonads to be about 4200 rad. This would correspond to a 90% destruction dose of approximately 10,000 rad. Thus, a treatment of the sea water with a dose of 100,000 rad should effect a considerable reduction in the bacterial count.

It can be seen from the results shown in Table 4 that even though the daily irradiation treatment did reduce the sea water count about 100-1000 fold, there was a gradual build up of the bacterial popu-

TABLE 4. PLATE COUNT OF HADDOCK FLESH AND SKIN AND REFRIGERATED SEA WATER HOLDING FISH. SEA WATER IRRADIATED IN BULK ONCE PER DAY WITH A DOSE OF 100,000 RADIATION

Storage time (days)	Sea water		Flesh	Skin
	Before irrad.	After irrad.		
	(per ml)	(per ml)	(per g)	(per in.²)
1	50,000	30		
2	28,000	10		
3	31,000	30		
4	32,000	10		
6	40,000	220		
7	45,000		37,000	4,000,000
8	83,000	2,400		
9	200,000	6,000		
10	340,000		140,000	1,500,000

lation. Whether this increase was due to an actual growth of the organisms in the sea water or organisms being washed off the skin of the fish was not known. The fish were filleted and tasted after the 7th and 10th day of holding. The fish were slightly salty, but otherwise of good flavor and texture. The experiment was terminated on the 10th day because the sea water had a slight off odor. Thus, even though the daily irradiation treatment never allowed the bacterial count in the sea water to build up to a high level, there was an accumulation of bacterial metabolic end products. It should be noted that under the conditions used in this particular experiment it was not possible to maintain a temperature of 32 F in the refrigerated water at all times.

In this study it has been demonstrated that the shelf life of haddock held in refrigerated sea water can be extended by irradiating the sea water. The most significant extension resulted when the sea water was continuously irradiated. However, better results might have been obtained with the second method had a somewhat different system been used. Further studies are necessary to determine the optimum parameters for flow rate, reservoir size for irradiating the water, and radiation flux. The saltiness imparted to the stored fish is noticeable but probably would not be objectionable to most people. This condition might be obviated through the use of an isotonic saline solution rather than sea water. However, water of the latter type would have a higher freezing point than sea water and water temperatures below 32 F or slightly less probably could not be used.

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EFFECT OF BULK TANK GAUGE ROD STORAGE METHODS ON MILK WEIGHT LOSSES[1]

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Summary

Storage of the gauge rod outside the farm bulk milk tank more clearly aligns the technique presently used by regulatory officials in the calibration of farm tanks. Outside storage was related to a definite decrease in the amount of shrinkage per route studied. The study suggests that outside storage more consistently and more easily provided the collector with a gauge rod that had been washed clean, rinsed under hot water, allowed to drain dry and to attain room temperature prior to its use for measurement.

Introduction

The official (regulatory) method of calibration of a farm bulk milk tank (Connecticut, New York and Massachusetts) requires the gauge rod to be clean, dry and at room temperature before each reading (Figure 2). The present practice of measuring milk in farm bulk tank permits the milk collector to remove the gauge rod from its storage in the cold milk, wipe with an appropriate tissue in the reading zone, reinsert and read. The question arises as to the accuracy of the measurement of milk under these conditions. Since the inception of bulk milk handling, it has become apparent that a more exacting method would be desirable thereby eliminating inadvertent "hit or miss" techniques often employed (Figure 3).

Under present regulations, many northeastern states base the official calibration of farm bulk milk tank at the time of sealing on a clean, dry gauge rod at room temperature. The rod is scrubbed and meticulously polished with fine pumice stone before any official measurements are taken. At no time is the gauge rod permitted to be soiled in the measurement zone.

The gauge rod when stored inside the milk tank picks up condensation; also, a film of butterfat appears in the area of measurement which results in a blurred and indistinct line. The air in an average milkroom has a relatively high humidity; therefore, a condensation problem results when the air is warmer than the milk. This is most apparent during the summer months. The collector removes the rod from the milk, wipes it with a tissue, replaces the rod back into the milk. As soon as the cold steel is exposed to the moisture-laden air, moisture will condense on the rod just above the milk line. Before the rod can be removed for reading, the moisture on the rod above the milk line causes the milk meniscus to move up the rod from 1 to 2 graduations and results in an inaccurate reading.

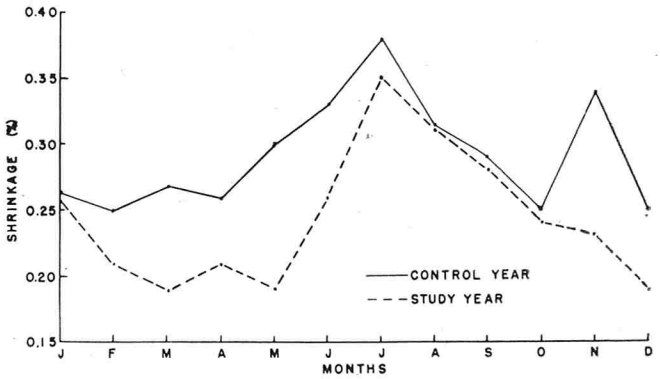

Figure 1. Average percent weight shrinkage of milk in bulk tanks from three routes.

With the change from milk can to bulk milk handling, the time-honored custom of measuring the amount of milk has been changed so that the bulk milk of several producers may be commingled in a single compartment of a tank truck. If there is an abnormally high shrinkage as represented by the difference between the total of the farm weight slips and the amount weighed in at the plant, it becomes difficult if not impossible to determine which producer's milk weight was incorrectly ascertained.

The present study was undertaken to determine if it is reasonably correct to calibrate farm milk tanks officially with a clean, dry gauge rod stored at room temperature and then allow a bulk milk collector to read the same gauge rod after storage in cold milk and base payment on the weight recorded after such a reading. The National Bureau of Standards suggests that the gauge rod be stored outside the milk tank until ready for measuring. Several states agree and have adopted this procedure. Industry in some areas of the country require their milk collector-haulers to wash the rod under running water, wipe dry and measure. While there is apparently a need

[1]Sub-committee Report, Farm Practices Committee of the Connecticut Association of Dairy and Food Sanitarians, Inc.

Figure 2. (A) Preparing gauge rod for calibration; (B) scrubbing rod preparatory to rinsing and drying; (C) "powdering" the rod just before calibration.

for standardization, there is also a need for a study of the present methods employed for measuring milk.

EXPERIMENTAL PROCEDURE

This study covered a period of thirty-six months including a control period and an experimental period. A total of three bulk routes were chosen. During the control period, the collectors employed the usual procedures for measurement which involved storage of the gauge rod inside the tank. The farm weights were then compared with the plant weights. The plant scales were routinely serviced and sealed within acceptable tolerances. The plant weights were obtained by pumping the complete contents of each tanker into a storage tank mounted on scales with a capacity of 34,000 pounds. The farm weights, plant weights and the differences were recorded daily, compiled and made available for comparative studies. During the study period, field conditions on the three routes were controlled to the extent that the clean, dry gauge rod was stored outside the tank in a capped, vented, transparent plastic tube (Figure 4). In a study of 267 gauge rods it was determined that 260 were not longer than 36 inches in length. The material finally selected was transparent plastic molded into tubes one inch in diameter and 36 inches long. The tubes were capped at both ends with removable vented caps of the same material. The top cap had a rectangular cut to facilitate insertion of the rod. The tube was attached to a piece of pine board with two vinyl covered stretch clips. The unit was installed in a fixed position convenient to producer and to the collector by use of two masonry nails. The installation was at an angle to permit easy insertion and removal of the rod. Unit cost per receptacle and sundry materials amounted to $2.50 A notice explaining the study was posted in each milk-room alongside the receptacle. The producer was to return the clean, dry rod to the receptacle for use by the collector.

The routes were surveyed periodically to ascertain that the receptacle was being used for storage of the rod. A check also was made on the cleanliness

Figure 3. Demonstration of technique commonly used by milk collectors: remove rod from cold milk, wipe with tissue, reinsert, remove, read.

Figure 4. Storage and care of the clean, dry measuring rod during the *study* period.

of the rod. Furthermore, checks were made to assure that insertion of the rod into the milk was deliberate, that it was seated completely without dropping, that the milk was quiescent upon insertion, and that a sharp, straight distinct line for reading was formed upon withdrawal of the rod.

The data was compiled as follows: The plant weights were obtained after completely pumping the contents of each tanker into the storage tank. The difference between farm and plant weights gave the shrinkage for each day of the month. The average percent shrinkage for each month was calculated and these values were transformed to the arc sin for use in analyzing the data *(2)*. An analysis of variance was made on the study and control phase data. The analysis included variability among study phases, routes and months *(2)*. Duncan's multiple range test was used to determine differences in the data between months at the one percent level of significance *(1)*.

Results and Discussion

The data illustrated in Figure 1 as well as analysis of variance of data shown in Table 1 ($P = 0.01$) suggests that the clean, dry gauge rod stored outside the tank at room temperature resulted in a decrease in the difference between farm and plant weights. The data also indicate (Table 2) that the month of July during both the control and study years had significantly greater shrinkage than some of the colder months of the year. Furthermore, month-to-month shrinkage variations appear to be similar when the study year is compared with the control year (Figure 1).

While the decreases in the difference between farm and plant weights are notable throughout the study, the small differences that occurred during the hot humid months of July and August (see Figure 1) was less than had been expected. This may have been due to several variables which were unable to

Table 1. Milk Shrinkage by Months and Routes Based on Two Procedures for Measuring Milk in Bulk Tanks

	Control year[a]				Study year[b]			
	Routes				Routes			
Month	16	11	12	Avg	16	11	12	Avg
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Jan.	.28	.25	.25	.26	.37	.21	.21	.26
Feb.	.24	.23	.28	.25	.25	.22	.17	.21
Mar.	.29	.22	.29	.27	.19	.22	.16	.19
Apr.	.25	.22	.31	.26	.29	.24	.12	.21
May	.36	.27	.27	.30	.18	.22	.16	.19
June	.28	.31	.38	.33	.32	.22	.23	.26
July	.38	.36	.37	.37	.38	.33	.34	.35
Aug.	.33	.24	.36	.31	.36	.30	.28	.31
Sept.	.39	.22	.26	.29	.34	.25	.27	.28
Oct.	.31	.23	.19	.25	.29	.20	.15	.24
Nov.	.34	.34	.32	.34	.32	.17	.18	.23
Dec.	.30	.17	.28	.25	.22	.12	.25	.19

[a]Gauge rod stored inside the tank.
[b]Gauge rod stored outside the tank.

TABLE 2. STATISTICAL SIGNIFICANCE OF MILK SHRINKAGE BY MONTHS BASED ON TWO PROCEDURES FOR MEASURING MILK IN BULK TANKS[a]

Month	Control year[b]		Study year[c]	
	Shrinkage	Statistical[d] significance	Shrinkage	Statistical[d] significance
	(%)		(%)	
Jan.	0.26	a c	0.26	a b c
Feb.	0.25	b c	0.21	b c
Mar.	0.27	a c	0.19	b c
Apr.	0.26	a c	0.21	b c
May	0.30	a c	0.19	c
June	0.33	a c	0.26	a b c
July	0.37	a	0.35	a
Aug.	0.31	a c	0.31	a b
Sept.	0.29	a c	0.28	a b c
Oct.	0.25	b c	0.24	b c
Nov.	0.34	a c	0.23	b c
Dec.	0.25	b c	0.19	b c

[a]Average of three routes.
[b]Gauge rod stored inside the tank.
[c]Gauge rod stored outside the tank.
[d]A month with any letter or combination of letters is significantly different ($P < 0.01$) in amount of shrinkage from any other month that does not have the same letter or combination of letters.

be corrected, such as:

a. The receptacle confined moisture-laden air in some poorly ventilated milkrooms.

b. The clean, dry rod was not always returned to the receptacle.

c. Inadvertent careless handling, dropping of the rod, placing directly in a patch of foam, incomplete draining of the milk in the tank and improperly seated paper gaskets resulting in leakage of milk from the tanker.

The first possibility could be corrected by locating the rod in the open air on the outside of the tank. Then the second and third remain a continuous job for educational forces in the field and "in-service training" at all levels of industry.

The study clearly demonstrated that the gauge rods on the study routes which were stored outside the tanks were clean, dry and at room temperature. Conversely, several surveys made on non-study routes revealed that the vast majority of gauge rods, insert holes and interior brackets were coated with a film of butterfat and/or soil. Wiping the gauge rod and washing it are two separate and distinct techniques in preparing it for use in making measurements. There is little doubt that wiping a gauge rod with a tissue in contrast to washing it is completely inadequate in removing soil and/or a film of milk fat from a cold stainless steel rod. Wiping milk from the rod in a manner peculiar to each collector results in a measuring line that is generally rough or uneven depending on the "hit or miss" technique used; whereas, a properly washed, clean, dry rod always gives a straight prominent line for measuring.

Periodic checking of the routes generally showed the gauge rods to be exceptionally clean, dry and well cared for. Wherever the removal of the rod left an opening in the tank cover exposed, a rubber umbrella type butterfat bottle stopper was used to keep the opening covered during the period of outside storage of the rod. These were tight fitting, easy to keep clean and easily removed.

The majority of the sixty or more producers were cooperative and some were actually reluctant to terminate the study and return the rods to the tanks. The cooperative attitude of collectors toward the study was invaluable.

Accuracy in measuring milk in farm bulk tanks is only as accurate as the method used. After working with the two techniques used in this study for the past several years, we are convinced that outside storage of the gauge rod as compared to the "hit or miss" procedure used during the control period was superior in obtaining correct gauge rod readings. Several states already have adopted regulations requiring outside storage of the gauge rod; they are as follows: Wisconsin, Maryland, Nevada, Oklahoma, South Carolina and California. The National Bureau of Standards recommends adoption of this method of storage and reading. Most state regulations follow the principle of outside storage in all official calibrations. A simple sanitary device mounted conveniently on the outside of the tank can easily support the rod in a clean and well ventilated milkroom.

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WATER QUALITY CONTROL PROBLEMS IN THE PACIFIC NORTHWEST[1]

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One of the first lessons that must be learned by career trainees in environmental health or sanitation field services is that water, clean water, is the first and most important element in our business. Whether it be water for drinking and cooking, for cleansing, for transport of wastes, for irrigation, for recreation, or water for industry, the quality and quantity of water have high priority in creating a safe environment for people.

Water has moved into the public spotlight over the past decade. It is receiving the attention so long deserved in long-range resource conservation planning. This has resulted from rapid population and industrial growth, new technology and changing land use practices—all demanding water. In fact, water is today the nation's foremost natural resources problem.

We are not running out of water, but water needs have increased tremendously and will continue to increase, and we must recognize that the supply *is* exhaustible. One of our major problems will be to get the right amount of water of suitable quality at the right place at the right time to meet all demands. To accomplish this, both quantity and quality must be carefully managed.

Water has always been an important and attractive resource in the development of the Pacific Northwest. Its abundance in the region has improved and increased the productivity of agricultural lands, has sustained our important commercial and sports fishery, has permitted the development of a substantial hydro-electric power system, and has served as a means of transportation and as a source of domestic and industrial water supply. Of equal importance is the contribution that water has made to recreation and the beauty it adds to this area's unique scenic attractions.

Unlike some parts of the nation, water quality in the Pacific Northwest has not yet been seriously affected by man's development and utilization of watershed resources, except in a relatively few instances. Experience here has demonstrated, however, that it is much easier to *keep* water clean than it is to restore it to usable quality after it has once been permitted to deteriorate. A substantial share of the quality control effort in this area, therefore, has been directed toward keeping clean water "clean." Nevertheless, there are areas in which we must rehabilitate waters which have been damaged by man-made pollutants. Unprecedented increases in population, expansion of industry, changing land use practices, new technological advances—these developments are constant reminders that we must make a more vigorous effort to maintain the water quality of the region at a level desirable for all uses.

The physical and economic characteristics of the region have always had a substantial impact on requirements for water quality control. For the purposes of this discussion, the area involved includes all of the Columbia river drainage and all of the coastal streams north of the Oregon-California border. This area encompasses some 250,000 square miles approximately half of which is in forests. The other half is divided between open range and agricultural production.

Precipitation, an important factor in stream flow, varies from 10 to 60 inches annually in the low lands and mountains of the interior. Along some of the Pacific Coast areas, precipitation reaches 90 to 100 inches annually. Since most of the precipitation east of the Cascade mountains falls as snow, the period of major run-off occurs in the late spring and summer. By contrast, most of the run-off in coastal streams and in those west of the Cascades occurs during the fall and winter months. This means that low flows occur during different seasons and quite frequently during periods of extensive industrial and agricultural activity. These phenomena affect planning for water quality management.

RESOURCES AND INDUSTRY IN THE NORTHWEST

The development and utilization of natural resources has long been a key factor in advancing the region's economy. Forestry, agriculture, tourism, minerals and commercial fishing, in that order, are basic to the area's income. These are strongly supported by water resources that have been and are being developed for power, irrigation, water supply, transportation, recreation, and stream flow regulation. These developments form the base for substantial manufacturing industries.

People are an important resource too. The 1960 population of the Pacific Northwest was about

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[1]Presented at the Fifty-first Annual Meeting of THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIROMENTAL SANITARIANS, INC., Portland, Oregon, August 18-21, 1964.

[2]Director, Pacific Northwest Water Laboratory, Division of Water Supply and Pollution Control, Public Health Service, U. S. Department of Health, Education and Welfare, Corvallis, Oregon.

6,000,000. The Senate Select Committee on Water Resources in one of its 1960 reports (1) estimated that the region's population by 1980 would increase by one-third and would be more than double its current level by 2000. About two-thirds of the present population are located in the area west of the Cascades, and this trend is expected to continue.

Forestry products from the Pacific Northwest supply a substantial amount of materials for the nation's use: shingles and shakes (95 percent), plywood (85 percent), saw timber (33-1/3 percent) and pulp (17 percent). A wide variety of agricultural food products come from almost every part of the region. The western slopes of the coastal mountains and the fertile valleys west of the Cascades support a diversified dairy and poultry industry. Wheat, one of the area's major crops, is produced in eastern Washington and northeastern Oregon. Fruits and vegetables in the western valleys and on lands east of the Cascades, potatoes and sugar beets along the Snake river, and cattle and sheep on the upland ranges are all a major part of the region's productivity.

Recreational opportunities and scenic beauties attract an increasing number of visitors to the area each year. Tourism, estimated at three-quarters of a billion dollars annually, is the number three factor in the region's economy.

Sand, gravel, and other construction materials constitute the greatest quantity of mined materials, but significant amounts of metals are mined in the vicinities of Butte, Montana, and Couer d'Alene, Idaho.

Commercial fishing (for salmon, sole, tuna, and shellfish along the Pacific Coast) and related industries represent a substantial financial asset to the region. The sports fishery lures thousands of people to the northwest each season to try their skill for trout and salmon in mountain streams and lakes, in bays and coastal estuaries, and in the Pacific Ocean.

PRINCIPAL SOURCES OF POLLUTION

Without an adequate supply of clean water, however, it is unlikely that the Pacific Northwest would be as attractive to industry nor would it occupy such an enviable position as a place to live, work, and play. These assets are often accompanied by liabilities. One of these is the waste waters produced by people and by industry. Almost any substance added to water is a potential pollutant. For example, even common sodium chloride, sufficiently concentrated, can adversely affect water uses. In low concentration, this same substance may be relatively harmless. Pollution could be defined, therefore, as any impairment of the usefulness of natural waters.

Traditionally, domestic sewage and industrial waste waters have been and are still the principal causes of pollution. In recent years, however, more attention is directed to such factors as storm water runoff, irrigation return flows, radionuclides, agricultural chemicals, wastes from timber processing, housing development, the construction of highways and dams, as well as some of the natural phenomena that are detrimental to surface and underground waters.

To enumerate the characteristics of each waste water responsible for pollution in the Pacific Northwest would be too time-consuming here. Sufficient to say that pollution in this region's surface waters come from the following sources:

1. Domestic sewage
2. Industrial waste waters from:
   a. Manufacture of pulp and paper
   b. Food processing: Fruits and vegetables, Meat, Milk, and Poultry
   c. Tanning
   d. Mining: Minerals, Gravel and sand
   e. Manufacture of chemical products
   f. Lumbering: Timber harvesting, Manufacturing
3. Agriculture:
   a. Erosion
   b. Irrigation
   c. Chemicals: Pesticides, Fertilizers
4. Construction
   a. Highways
   b. Housing development
   c. Dams
5. Transportation
   a. Wastes from vessels
   b. Accidental spills of chemicals in transit by land or water
6. Natural contamination
   a. Gonyaulex catenella in shellfish
   b. Arsenic in ground water

Now let us look at some of the water quality problems that remain to be solved in the Pacific Northwest. The Willamette river basin has long been a focal point for pollution control activities in Oregon. This stream drain about 11,000 square miles and its basin contains two-thirds of the state's population. Thirty years ago raw sewage from municipalities and waste waters from pulp and paper mills and food processing plants reduced dissolved oxygen concentrations to almost zero in the lower reaches of the river during periods of low flows, usually in August and September. This condition eliminated a fall run of salmon upstream. No city would use the river for water supply and recreational uses were seriously impaired. These facts, when they became known, led to the enactment of state pollution control laws. Interestingly, the people themselves, rather than the legislature, voted Oregon's original statutes in the general election of 1938.

Over the years, an aggressive control program has

brought about the construction of at least primary sewage treatment facilities for practically every city in the basin and some treatment or exclusion from the stream of all industrial waste waters. The latter includes storage of concentrated sulfite pulp mill wastes during the critical season and the treatment of most cannery and other food processing wastes with domestic sewage. These improvements, substantial as they are, have not kept pace with an urban population that had doubled and an industrial productivity that had increased several fold since the state's water pollution control laws were first adopted.

While oxygen levels in the critical areas of Portland harbor have improved, they are still below the minimum standard of 5.0 mg/l established by the Authority in 1949. Bacterial concentrations in most of the river remain several times higher than is considered safe for recreational use. As a result, the Sanitary Authority had no alternative but to insist that secondary treatment be provided for all domestic sewage, including the industrial wastes from food processing treated in public facilities, and that stream loadings from pulp mills be reduced 85 percent during periods of critical flow. In addition, effective removal of settleable solids from pulp and paper waste waters was required to prevent nuisance conditions and further oxygen depletions.

In the lower Columbia river, Sphaerotilus, a bacterial slime, has for years been a continual source of trouble. It clogs commercial fishing nets and damages the gear of the sport fishermen. Joint studies by the states of Washington and Oregon as early as 1940-41 indicated that some of the nutrient material for the slime originates from the large quantities of spent sulphite liquor discharged into the stream from pulp mills at Camas, Vancouver, and Longview. Efforts by the mills to reduce the amount of slime by dilution, impoundments and controlled release have not proven entirely successful. Nutrients added to the stream from upstream land drainage or by the area's now larger quantities of sewage effluents may be partially responsible. Further research and investigation to develop more effective treatment or disposal methods are most certainly indicated before the Sphaerotilus problem will be entirely solved.

Pulp and paper mill wastes discharged into marine waters at Anacortes, Bellingham, Everett, and Port Angeles, Washington have stimulated research and field investigations to determine the effects of such wastes on water quality, water use and the marine environment. These studies which began during the summer of 1962 represent a cooperative effort on the part of the Public Health Service, the Washington State Pollution Control Commission, fish and game departments, universities, and industries. Major elements of the program include (1) inplant surveys to charterize the quantity and quality of waste discharges; (2) oceanographic studies to determine dispersion and persistence of pulp mill wastes, the characteristics of industry-caused sludge beds, and the effect of surface waste concentrations on light pentration (3) biological investigations to gain additional information on plankton populations, oyster mortality, distribution-migration of juvenile salmon, and bottom fisheries; and (4) economic studies to determine uses of Puget Sound waters in affected areas, the economic health and future of the pulp and paper industry in the study area, and the impact on the industry of any remedial measures that may be required.

Much more needs to be known about factors that influence the disposal of waste effluents in marine waters along the Oregon and Washington coastline. Information must be obtained on the nature and quantities of wastes to be expected from development of the region's natural resources, and the methods and facilities that must be devised to protect marine waters from unrestricted waste disposal.

Irrigation return flows and wastes from the processing of potatoes, sugar beets, and other agricultural products, constitute the principal sources of pollution in the middle Snake river basin. This river heads in western Wyoming, crosses Idaho, and forms a part of the Idaho-Oregon boundary, joining the Columbia river south of Pasco, Washington. Irrigation return flows contain agricultural chemical nutrients that cause prolific algae growths. These and other organic materials create depressed dissolved oxygen levels in downstream impoundments. High bacterial loadings from domestic sewage and livestock feeding areas, plus turbidity, color, and hardness, interfere with use of the stream as a source of water supply and for recreational purposes.

Pulp mill wastes and an effluent from municipal primary sewage treatment plant discharged into the Clearwater and Snake rivers at Lewiston are expected to create bacterial pollution and industry sludge deposits when the Lower Granite Dam 30 miles downstream is completed. Studies are under way to determine the remedial measures that must be adopted to maintain a water of satisfactory quality when the impoundment is established.

COORDINATED CONTROL PROGRAMS

Actions have been initiated under the Federal Water Pollution Control Act to abate existing pollution and prevent further pollution in three areas of the Pacific Northwest. The States of Washington, Oregon, and Idaho, have joined the U. S. Department of Health, Education, and Welfare in these enforcement actions on Puget Sound, the Lower Columbia river, and on the Snake river at Lewiston.

Aside from the actual physical control of pollution in the region's waters, major problems remain in the fields of research, water quality management, and administration. Research has become an important part of the control effort. Advanced waste treatment, removal of refractories, the development of mathematical models, and the refinement of existing laboratory techniques to provide more rapid analytical methods, and the development of efficient and effective automatic monitoring and telemetering devices are but a few of the urgent needs in the control of water pollution today.

We still do not possess sufficient knowledge of the behavior of some pollutants, or the characteristics of others, to intelligently assess their importance. This is particularly true of some of the synthetic organic pesticides. Our colleagues at the colleges and universities have been exploring with us some of these fundamental problems of water quality control for a good many years. These efforts have contributed much to the art provided some of the guidelines now used by our profession. There remains, however, a great need to translate some of this research into useful practice through the media of demonstrations, field studies or pilot plants.

Here is a task in which state water pollution control agencies, universities and the Federal government must unite. For unless those engaged in control activities are backed up by competent laboratory support for field studies, demonstrations and research, the whole program will suffer.

As part of the Federal effort, the Congress in 1961 authorized the Department of Health, Education, and Welfare to establish field facilities to conduct research, investigations, experiments, field demonstrations and studies, and training relating to the prevention and control of water pollution. One of these laboratories is authorized for the Pacific Northwest. Construction is scheduled to begin this summer on the campus of Oregon State University, Corvallis. This facility will serve the six states of Idaho, Montana, Oregon, Utah, Washington, and Wyoming plus California and Nevada to the degree necessary and possible.

Long-range planning for water quality control is another essential element in water resources conservation program. A truly comprehensive plan must encompass an entire river system and this is the approach we now take. This means establishing a cooperative working relationship with other agencies, both State and Federal, having primary interests in water resources management. This is being achieved by the creation of State and Interstate Committees or Commissions, Interstate Compacts, and by the Federal agencies acting under their respective statutory responsibilities. Under such an arrangement, a plan can be devised which recognizes the effect that all watershed activities, including water resource development, will have on the quantity and quality of water in a river basin. It develops compatible and cooperative working relationships, and if the plan's authors are sincere, the plan can be made to work. Such a plan for the Columbia river basin is now being prepared by the Pacific Northwest Basin Office, Public Health Service, Portland.

And finally, we come to the matter of enforcement. On occasion, proceedings must be initiated to obtain abatement of pollution. In today's rapidly moving industrial and urban environment, a water pollution control agency must have legislative authority to move decisively to stop promptly the discharge of any wastes that endanger human health, destroy animal or aquatic life, or otherwise impair important water uses. Water pollution control agencies must also be prepared to have the statutes under which they operate brought up-to-date as conditions change, if they expect support from the courts.

In general, reasonably good progress has been made in the control of water pollution. On the other hand, new problems, the need for accelerated research and training, and the almost daily requests for technical assistance, often coupled with insufficient support, can be frustrating to those who dare to meet the challenge of water quality control with the zeal and fervor it deserves. The speed with which we attain the regional objectives I have discussed will depend upon sufficiently staffing of State, Interstate, and Federal agencies with competent engineers, scientists and administrators dedicated to providing a supply of water suitable in quantity and quality for all beneficial uses.

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3A COMMITTEES OKAY PLASTIC FOR ROTORS IN SANITARY PUMPS

An amendment to the 3A Pump Standard for the purpose of providing for the optional use of plastic rotors or stators in sanitary pumps was signed by representatives of the 3A Sanitary Standards Committees on May 24. The new amendment will become effective on May 24, 1966 and will be published in the Journal of Milk and Food Technology for February 1966. On and after the effective date the 3A Symbol Council may authorize the use of the 3A Symbol on pumps which comply with the amended 3A Pump Standard.

3A standards for dairy equipment are the result of cooperation among three groups: (1) dairy processors, the users of dairy equipment; (2) dairy industrial suppliers and equippers, the manufacturers and sellers of dairy equipment; and (3) public health officials and sanitarians, the regulatory officials under whose jurisdiction the equipment is installed and used.

The 3A program, which is supported by every national dairy trade association, is an entirely voluntary undertaking which has resulted in standards'

being issued for 19 items of dairy industrial supplies or equipment. Equipment which complies with the standards may carry the 3A Symbol, provided its manufacturer receives authorization to do so from the 3A Symbol Council.

Generally speaking, 3A standards are acceptable in public health jurisdictions in nearly every town, city, or state in the United States. The 3A Sanitary Standards are cited in the recommended Pasteurized Milk Ordinance of the U. S. Public Health Service.

KARL FOWLER RETIRES

After 39 years with National Dairy Products Corporation's Sealtest Division, Karl H. Fowler of Wyckoff, N. J. retired on April 30. Karl's experience included various production and engineering assignments at individual plant, regional office and New York headquarters levels. After some 15 years in production management he served as production advisor and on special assignments out of the Chicago and New York regional offices.

In recent years Karl has covered the entire Sealtest Division working from New York headquarters as sanitation specialist and entomologist where his broad experience enabled him to contribute a great deal in the development of Sealtest's complete sanitation program. He has initiated many novel plant sanitation practices and was responsible to a considerable degree for much of the CIP and automation cleaning systems in Sealtest's modern plants.

Karl has long been a member of IAMFES and for a number of years has served on 3-A Standards Committees as an industry representative. Fortunately, he will continue to be of service to the industry, having accepted the position of Director of Food Plant Sanitation for Time Chemical, Inc., of Chicago, Illinois.

GEORGE SHADWICK HONORED BY HIS COMPANY

Dr. George W. Shadwick, director of technical services for Beatrice Foods Co., received a special distinguished service award at the dairy and food firm's annual meeting held in the Sheraton-Chicago Hotel in Chicago on June 2.

Dr. Shadwick, who has been with the company since 1927, was presented with the "Beatrice Oscar" in recognition of his many contributions to the welfare and progress of the company in the field of photography. Since 1940, Dr. Shadwick has photographed and produced 27 educational movies, 25 with sound tracks, 24 in color, for Beatrice Foods. He has produced 16 films for Beatrice Foods' annual meetings, one every year since 1952.

Nationally renowned as a photographer, Dr. Shadwick has at least five prize winning portraits to his credit. The first one, "Our Baby", won a gold medal at the Chicago World's Fair in 1934. Two won awards in London, England. He has won two awards for outstanding industrial films—"Milkman to Malaya" and "Johnny's Birthday Cake."

In addition, he has taken all the pictures for Beatrice Foods' color ads in leading national magazines for many years. He had also produced films for the U. S. Public Health Services, the American Butter Institute and other organizations.

Virtually all of Dr. Shadwick's photography work is done on his own time since his duties as technical director of Beatrice Foods require many extra hours and considerable traveling. (He has been around the world five times.) He plans, films and produces his pictures evenings, weekends and holidays.

Dr. Shadwick is a member of IAMFES and is widely known for his interest and activities in the field of milk and food sanitation.

MISSOURI ASSOCIATION HONORS "DUFFY" PLUMMER

At its 1965 Annual Meeting on April 5, 6 and 7 the Missouri Association of Milk and Food Sanitarians, M. D. "Duffy" Plummer received the Sanitarians Award for his outstanding work in the interest of sanitation in the State of Missouri.

"Duffy" is presently Chief of Environmental Sanitation for the Missouri Division of Health. His career in Missouri sanitation dates back to 1937 and includes construction of sewage disposal systems, vector control under a USPHS program, general sanitation activities as a county and district sanitarian and more recently direction of the State Health Division's program in environmental sanitation. He has worked diligently for the passage of a sanitarian registration bill and has contributed a great deal to the sanitarian profession.

The April conference was presented in cooperation with the Department of Dairy Husbandry of the University of Missouri and the Missouri Division of Health. An interesting program included discussions on pesticide and pest control, sewage lagooning, nursing home programs, various milk and food sanitation topics and panels on mosquito control.

Officers for 1965-66 are Earl White, Greene County Health Department, President; James Kennedy, Missouri Division of Health, 1st Vice-President; Charles Neighbors, Kansas City Health Department, 2nd Vice-President; and Erwin Gadd, Missouri Division of Health, Secretary-Treasurer.

MISSISSIPPI SANITARIANS DISCUSS JUNIOR SANITARIAN PROGRAM

Highlight of the annual meeting of the Mississippi Association of Sanitarians at Jackson on May 6 and 7, 1965, was a panel discussion on a Junior Sanitation Program. Preceding the panel were prize-winning sanitation demonstrations by the Washington County 4-H Clubs.

Miss Mary Ann Elkin of the Mississippi State Board of Health moderated the panel discussion. Other program speakers included J. A. Fairchild of the Taylor Machine Works at Louisville; S. W. Hoover of the Public Health Service regional office and C. B. Bridges of the Communicable Disease Center at Atlanta; and E. C. Handorf of the Memphis-Shelby County Health Department.

Officers elected for the coming year are P. L. Bradshaw, State Board of Health, President; L. J. Butler, President-Elect; J. T. Miller, Jr., 1st Vice-President; Ben Stewart, 2nd Vice-President; and J. O. May of the State Board of Health, Secretary-Treasurer. May reports a very interesting and fruitful meeting with ambitious plans for the coming year in promotion of better sanitation throughout the state.

CHANGE THE NAME OF "SANITARIAN"?

Two interesting surveys have come to light recently on the subject of what is a "sanitarian" and whether the name should be changed. Could it be that a sanitarian, like a rose, "by any other name would smell as sweet"?

At the University of Oklahoma three professional sanitarian students[1] surveyed members of an Army Reserve unit at the University on their knowledge concerning a sanitarian and his responsibilities as well as the functions of a health department. The unit, consisting of 42 members, were recent high school and college graduates averaging 22 years of age. While the group was admittedly small, the surveyors felt that answers would directly reflect the present day educational system and would indirectly indicate the attitude of these future community leaders regarding health department activities.

The results of the survey showed that 96% of the persons interviewed had no idea what a sanitarian was or what his duties were. Some 52% knew nothing about a health officer or public health nurse and 54% had no concept of what services were available through the health department. However, 85% knew that there was a health department in their area and 95% agreed that it was a necessary unit.

From these figures the students reporting on the survey concluded that the sanitarian ranks well below the health officer and public health nurse and that something ought to be done about it. Primary functions of the sanitarian are education and service but he is far from accomplishing his function as an educator. The surveyors suggest that the following measures would be helpful:

1. Implement community health education in the curriculum of the school system.
2. Increase health department budget expenditures on health education and public relations.
3. Increase the salary of sanitarians and offer other incentives to attract qualified persons.
4. Change the title of "Sanitarian" to a more appropriate title such as "Public Health Advisor" or "Environmentalist."

CONTRARY VIEWPOINT

No doubt most sanitarians would agree on the first three recommendations. However, there is a contrary viewpoint on the fourth, expressed in a survey by the Oregon SANI-TORIAN of its readers on the question of changing the name of the profession of sanitarian.

From a standard mailing of a questionnaire and ballot with a recent issue of 150 copies of the newsletter, 49 ballots were returned. On the ballot eight pre-selected names were listed but in the voting three additional title were recorded. The results of the balloting were as follows:

Environmental Health Engineer	— 0
Environmental Hygienist	— 2
Environmental Technician	— 3
Health Inspector	— 2
Environmental Health Specialist	— 6
Health Dept. Representative	— 1
Environmentalist	— 0
Sanitarian	—22
Deputy Health Officer	— 1
Public Health Consultant	— 5
Public Health Sanitarian	— 7

A majority vote of 59 percent favored the name of "Sanitarian" or "Public Health Sanitarian" and a number suggested the addition of "Registered" to the title. Others commented on the advisability of a qualifying term such as "environmental" and "food" or "milk" to describe the specialization or description of work done.

According to the editor of the newsletter, some vociferous opinions were expressed such as "I feel that more effort needs to be expended in trying to up-grade the name and profession and less in trying

[1]Henry P. Hutson, Troy Anderson and Jon R. Perry, Graduate Students in the Department of Sanitary Science and Public Health.

to change the name." Another voter states "I feel the name 'Sanitarian' is an honorable one and is well identified with our profession. To change the name that has been used since the inception of this work would not serve a useful purpose and would tend to destroy the identity we have with the public." This comment is interesting in the light of the Oklahoma findings.

The editor offers his interesting comments and concludes that it all seems to resolve down to the expression "by their deeds alone will you know them."

NEWS AND EVENTS

FRANK FISHER GIVEN TIM SULLIVAN MEMORIAL AWARD

Frank Fisher accepts Tim Sullivan Memorial Award Plaque from "Red" Thomasson.

At the Annual Meeting of the Indiana Public Health Association on April 28-29, 1965, the Tim Sullivan Memorial Award for 1965 was presented to Frank E. Fisher, Director of the Division of Food and Drugs of the Indiana State Board of Health.

In the formal presentation of the award plaque H. L. "Red" Thomasson, Chairman of the Award Committee outlined the purpose of the award. He stated that, as a memorial to Tim Sullivan for his dedicated and devoted service to public health, the award each year was given to a person outstanding for his similar achievements and for his own services in the interest of public health. "Red" expressed the feeling of the committee that Frank was a most fitting candidate to be honored for his contributions to the cause of public health and his continuing efforts on behalf of the citizens of Indiana.

Frank Fisher is a graduate electrical engineer associated with the Division of Food and Drugs since 1937 and Director since 1961. During his service with the Division he has achieved national recognition as an authority on low temperature refrigeration of foods. He was primarily responsible for the drafting of two Indiana laws on frozen food locker plants and frozen food processing plants which have become model ordinances for other states.

Frank acts as consultant for a number of national and state frozen food industry groups and trade associations and was Subcommittee Chairman on Freezing, Transportation and Storage of Frozen Foods for the Association of Food and Drug Officials of the U. S. In this capacity he played an important part in the drafting of the national frozen food code.

As a long time member of IAMFES, Frank has served the organization in many capacities and is presently Chairman of the Frozen Foods Committee. He is also an active member of local and regional food, drug and public health organizations and, as an instructor in the Department of Public Health at Indiana University, teaches Food Technology and Public Health Law.

STERWIN APPOINTS MANAGER FOR INDUSTRIAL CHEMICALS

Carroll W. Harding, Jr., has been appointed manager of the Industrial Chemicals Division of Sterwin Chemicals Inc., succeeding E. P. Hassler who has just retired, it was announced by Robert S. Whiteside, president.

Mr. Harding joined Sterwin in 1961 as assistant manager of the division. He was previously associated with S. B. Penick & Company's Farm Chemical and Insecticide Division. In his new position, he will be responsible for the marketing of Roccal, the original quaternary ammonium compound, Cyncal MC-14, a new algaecide for the swimming pool industry, and other products for the industrial chemical field.

Mr. Harding graduated from Long Island Agricultural and Technical Institute. He is a member of the Chemical Specialties Manufacturers' Association, the National Sanitary Supply Association and the National Swimming Pool Institute.

THE WAR THAT NEVER ENDS

A new bulletin entitled "The War That Never Ends—Facts and Figures about Pest Control" has been issued by the U. S. Department of Agriculture.

Discussing the need for chemical pesticides, the bulletin takes the position: "Pesticides are generally the most effective and, in many instances, the only weapons available to fight pests that damage or destroy crops, livestock, and forests or endanger human health and our natural resources . . . . During the past two decades, farm output per acre has increased by at least a third, keeping pace with the needs of an exploding population at home and growing markets abroad. At the same time, these chemicals have played a major role in protecting man's health and well-being. They not only are used to produce and protect the abundance and nutritional quality of our food, but serve us directly in suppressing the pests that transmit malaria, yellow fever, typhoid, and many other diseases, and in controlling poisonous plants."

From the consumer standpoint the bulletin further states: "The effectiveness of modern pesticides in controlling agricultural pests helps keep food cost down and quality high. It is estimated that if pesticides were to be completely withdrawn from farm use, crops and livestock production in the U. S. would drop 25 to 30 percent." This sharp cut would boost farm product prices 50 to 75 percent and the quality would be visibly poorer. Without pesticides some crops could be virtually wiped out.

Covered in the 12-page booklet are topics including wildlife conservation, pesticides in the home and garden, pest control by parasites, sterilization, attractants and other methods, and development of pest resistant plants. The bulletin outlines USDA policy on pesticides, its requirements for registration and labelling of commercial products, and its programs for better usage and control.

A copy of the bulletin "The War That Never Ends" may be obtained from the Office of Information, U. S. Department of Agriculture, Washington, D. C.

KAB LOCATES THE LITTERBUG

Keep America Beautiful recently conducted two polls of litter authorities in 50 states to determine (1) whether men or women litter the most and (2) where do litterbugs come from.

The first survey, which covered an equal number of men and women who are leaders of anti-litter groups or professionally involved in litter clean up, showed 73 per cent of those polled voting for men as the nation's No. 1 litterbugs. Only 12 per cent thought women litter more than men, and 15 per cent had no firm opinion.

A favorite theme among those on the women's side was: "men are too accustomed to having women pick up after them." A cynic without an opinion commented: "depends on who has to clean it up."

In the second survey KAB determined that litterbugs for the most part do their dirty work near home.

Ever since the advent of the automobile, tourists have been popularly blamed for the litter along the nation's highways. KAB questioned professional and voluntary litter fighters in the 50 states to obtain their views on litterbug behavior. More than three quarters of those participating in the survey said that local residents produce more litter than tourists.

The general opinion was summed up by one respondent as follows: "Like auto accidents, most littering occurs within 25 miles of home."

SECOND EDITION OF HEALTH DIRECTORY PUBLISHED

HEALTH ORGANIZATIONS OF THE UNITED STATES, CANADA AND INTERNATIONAL, Second Edition, has just been published by the Graduate School of Business and Public Administration at Cornell University. Like the first edition issued in 1961, the work is a complete and up-to-date directory of voluntary associations, professional societies and other groups concerned with health, medical, hospital, pharmaceutical and related fields.

A new feature introduced in the second edition is information about the many international organizations which are active in the health and health related fields. Details for each national, regional and international organization include address, names of principal officials, purposes and objectives, finances, programs and activities, publications, prizes and awards, meeting dates, affiliates, etc.

Because of the added scope of the new volume and the expansion of its content, this work is now more than ever clearly designed to guide health and medical personnel, librarians, public officials, association officers and executives, businessmen, and others concerned with the health field, to all of the sources of useful information and to identify and describe these organizations. Listings contained within the volume have been prepared in almost every case from information received from the organizations.

The book is in three parts. In the first, national and regional organizations in the United States and Canada, as well as international organizations, have been listed. The second part of the book provides listing of statewide organizations. The third part of the book is a classified list of the national, regional

and international organizations arranged under each subject which relates to their activities and functions.

The price of the new directory is $13.50 and it is available from the Publications Section of the Graduate School of Business and Public Administration, Cornell University, Ithaca, New York.

SANITARIAN EARNS Ph.D.

Dr. Howard W. Peters is the first sanitarian to receive a doctor's degree from the University of North Carolina's Department of Environmental Sciences and Engineering in the School of Public Health.

Dr. Peters was Chief County Sanitarian for the Omaha-Douglas County Health Department prior to entering the doctoral program in environmental sanitation at UNC in 1961. He had been a sanitarian for the Omaha-Douglas Health Department since his graduation from the University of Omaha in 1951, except for a year he spent at the UNC School of Public Health, earning the M.P.H. degree in 1958.

His dissertation was "The nutritional requirements of enterotoxigenic strains of *staphyloccoccus aureus*."

Dr. Peters has been appointed to the faculty of the University of Massachusetts at Amherst as Director of Environmental Health and Safety and Assistant Professor of Public Health.

USDA PESTICIDE POLICY

One of the most important responsibilities of the Department of Agriculture is to develop and facilitate the use of methods and materials for the control of pests. The Department's research, education, and regulatory programs are expected to make continuing progress in the never-ending strugle to protect man, his food and fiber supplies, and his forests from ravages of pests. Such protection is essential if the American people are to continue to enjoy their present high standard of living, and if this abundance of quality food and relative freedom from the hazards of pests is to be enjoyed by all mankind.

In protecting man, animals, plants, from and forest products, communities, and households against depredation of pests, the Department has vital concern for (1) the health and well-being of people who use pesticides and those who use products protected by their use; and (2) for the protection of fish, wildlife, soil, air, and water from pesticide pollution.

In keeping with this concern, it is the policy of the Department of Agriculture to practice and to encourage the use of those means of effective pest control which provide the least potential hazard to man and animals. When residual pesticides must be used to control or eliminate pests, they shall be used in minimal effective amounts, applied precisely to the infested area and at minimal effective frequency. Biological, ecological, or culture methods or nonpersistent and low toxicity pesticides will be used whenever such means are feasible and will safely and effectively control or eliminate target pests.

In carrying out these objectives, the Department will cooperate in the fullest with the other agencies and departments of Government, and will seek to develop broad areas of collaboration in establishing the criteria to guide the use and development of pest control materials.

Further, the USDA will urge that all users of pesticides exercise constant vigilance to assure the protection of human health by avoiding unnecessary exposure of crops, livestock, fish and wildlife.

The Department commends this policy to State and local authorities as a guide in their respective jurisdictions.

A memorandum from the Secretary of Agriculture, December 23, 1964.

A MICHIGAN SANITARIAN LOOKS AT THE FUTURE

An editorial in the mid-winter issue of the Michigan Association of Sanitarians' NEWSLETTER emphasizes the growing responsibilities of a public health sanitarian. John R. Fleming, VanBuren County Health Department, Paw, Paw, Michigan, is Editor of the NEWSLETTER and the editorial states in part:

"Certainly no period in recent history has found more emphasis placed upon the control of man's environment. World-wide patterns of population growth can be equated largely in terms of man's success in relieving himself of environmental hazards. Our conquest of space has introduced a high degree of sophistication into our concepts of environmental controls. General Motors Futurama exhibit concerns itself largely with approaches to man's occupancy of the sea, the polar regions and similar adverse environments. We stand upon the threshold of an era in which our society will possess the technical and economic capacity to create an environment suitable to our needs—not merely control that which exists.

Our greatest concern today in environmental health should be directed toward the lag phase which exists between our acquisition of technical knowledge and our ability to stimulate society to utilize the knowledge we possess. Here the greatest challenge

confronts the public health sanitarian. He is a logical leader and source of influence where environmental issues involve the community he serves. He must possess the technical and political capacity essential in influencing social change. He must recognize that sanitation is a way of life; that environmental health needs must be evaluated and approached on that basis.

Environmental health programs today generally concern themselves with remedial measures and the preservation of our environmental status-quo — an essentially envirostatic approach. Admittedly such program activities are essential to public health but not important as an end in themselves. We must press beyond this level of program activity and direct our attention to the creation of an environment suitable to man's needs — we must turn our attention to the creation of environments which will produce the maximum physical and mental efficiency in man, not simply prevent disease.

Those in the practice of public health sanitation must seek to elevate themselves above the level of environmental control officers. They must begin to think and act as environmental managers. This is the challenge confronting professional public health sanitarians in Michigan as 1964 fades away and 1965 looms ahead of us on the horizon."

HOME STUDY COURSES FOR SANITARIANS

The Public Health Service, through the Training Branch of the Communicable Disease Center, will offer sanitarians a series of home study courses beginning July 1, 1965.

The courses offered provide eleven lessons for each of the following subjects: Mathematics for the Sanitarian, Communicable Disease Control for the Sanitarian, and Insect and Rodent Vector Control for the Sanitarian. There are reading assignments and open-book examinations for each lesson. A final examination under the supervision of a monitor will complete each subject.

It is preferred that official health agencies or educational institutions arrange for and handle the administration of these courses; however, individuals who are engaged in health activities may be enrolled individually by special arrangement.

Applications or requests for information should be addressed to the Communicable Disease Center, attention: Chief, Training Branch, Atlanta, Georgia 30333; or to the Public Health Service Regional Office, attention: Chief, CDC Services. No tuition or registration fee is required. Certain subjects will require the trainee to secure additional reference material from private sources.

BAKERY ENGINEERS SANITATION BULLETIN

American Society of Bakery Engineers Bulletin No. 176 entitled "How to Maintain a High Standard of Sanitation in a Bakery" presents an interesting and enlightening commentary on some attitudes and concepts of bakery management regarding sanitation. It suggests steps that management should take to avoid adverse legal action by enforcement officials and emphasizes management's moral obligations to maintain high standards of baking operation.

The author, J. Carl Dawson, states that his "many year of experience as a preventive sanitation consultant working with many hundreds of food processing plants leads to the conclusion that the sanitation level in any such plant is directly related to the sanitation knowledge, understanding and know-how of its management." Twelve typical attitudes or concepts of bakery management are reviewed, some of which are that "a high level of sanitation can be acquired only by spending large sums of money" and "the baking temperature sterilizes and therefore corrects all evils prior to baking" and "all that is required for a high level of sanitation . . . is a good pest control operator." The fallacies of each position are pointed out.

The bulletin continues with discussions on the legal and moral obligations of bakery management. Citing provisions of the Federal Food, Drug and Cosmetic Act, important aspects are reviewed and management's position and responsibilities are outlined. It is emphasized that the law is practical and for a purpose and that compliance is a matter of good business.

It is indicated that a successful operator is expected to have a superior knowledge of his industry and of manufacturing processes. This should include a superior knowledge of sanitary problems and solutions, and a knowledge of how to run a sanitary bakery using sanitary raw materials to produce a sanitary finished product.

NEW MASTITIS CONTROL EDUCATIONAL INFORMATION

As a new service to the dairy industry the National Mastitis Council has prepared a series of envelope or check stuffers ideal for mailing to milk producers. Each stuffer, 3" by 8" in size, carries a brief message intended to help the farmer prevent mastitis in his herd.

Six attractively printed stuffers constitute the first series with the following titles: "Prevent Injuries That Can Lead to Mastitis"; "Attach Your Milker Properly"; "Clean and Sanitize Your Milking Machine;" "Machine Strip Properly"; "Don't Buy Mastitis"; and "Call Your Veterinarian".

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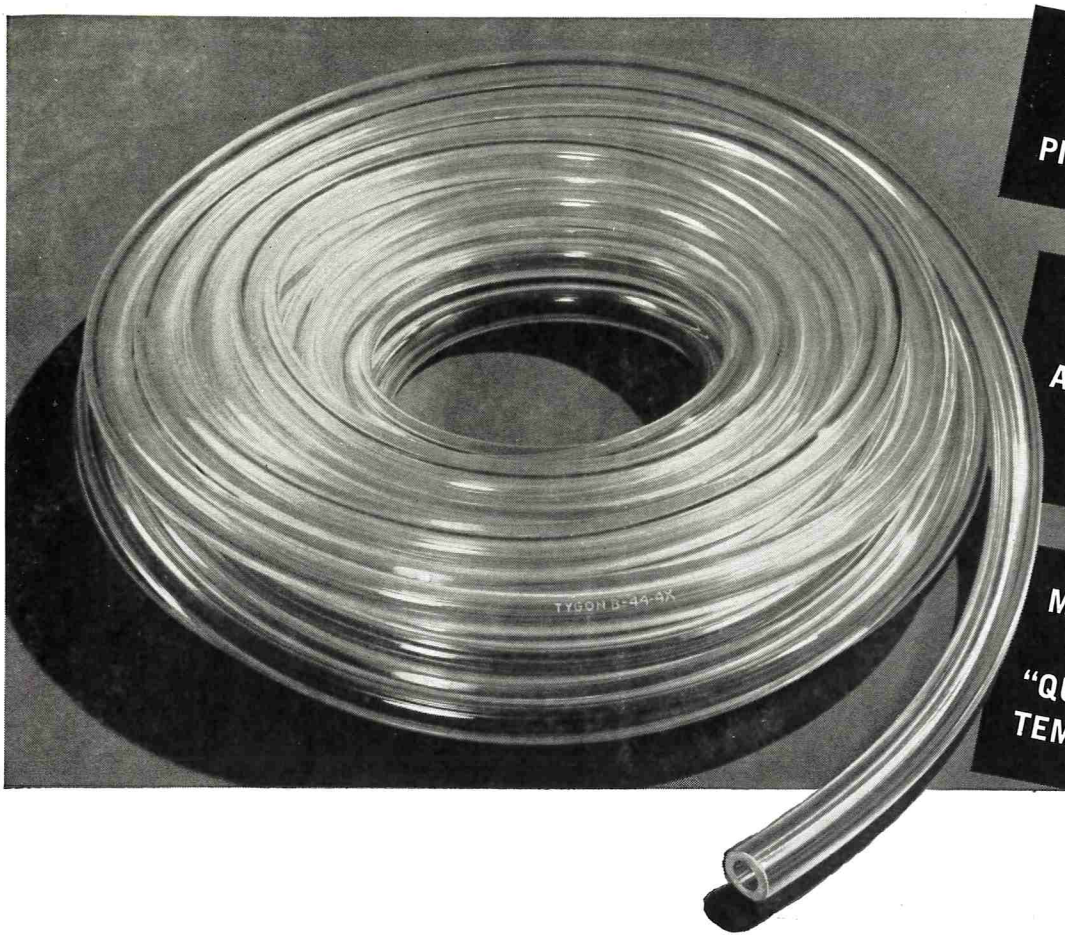

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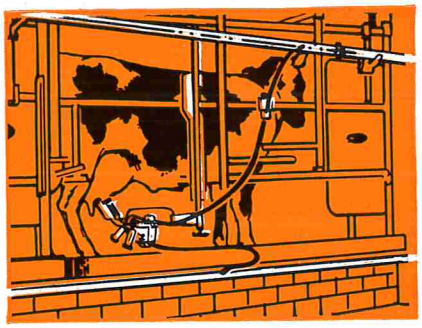

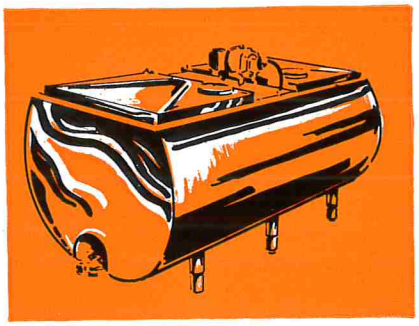

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