EASTERN HEALTH BOARD

Annual Report of the Dublin Region Public Analyst for the year 1984 by F Hill

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E A S T E R N H E A L T H B O A R D

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DUBLIN REGION PUBLIC ANALYST

FOR THE YEAR 1984

by

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HIGH COURT RULES THAT SPIRIT TRADE NAME NEGATIVES QUALIFIED STATUTORY COMPOSITIONAL STANDARD.

Prior to Autumn 1979 the alcoholic strength of Bacardi rum was 40% by volume at the point of retail sale. In late 1979 the strength was reduced to 37.5% by volume. The strength of 37.5% alcohol meets the qualified statutory minimum standard of 37.2% laid down in the English Sale of Food and Drugs Act 1955. If rum is sold in England at a lower strength than 37.2% the Food Labelling Regulations of 1980 demand that the bottle be labelled "Understrength".

Notice not now always necessary

Since the Intoxicating Liquor Act of 1960 the qualified statutory standard for rum in the Republic of Ireland is 30^{O} under proof (40% by volume or 70% proof). Our Labelling Regulations do not demand the "understrength" warning but the Sale of Food and Drugs Acts demand notice (in some situations, only, since 5th October 1984) if rum is sold below the standard.

On December 4th 1981, Inspector Denis Ryan of the Food Inspection Service of the Eastern Health Board and another inspector, in the course of their normal duties, entered a Dublin pub. Inspector Ryan asked for four glasses of Bacardi rum across the counter. The four portions of rum were mixed by Inspector Ryan and divided into three

parts, in accordance with Section 14 of the Sale of Food and Drugs Act 1875.

Each part was then marked and sealed and one of the three sub-samples was given to the vendor. A second subsample was submitted to this laboratory for analysis. No verbal or written notice was given to Inspector Ryan at the time of the purchase that the alcoholic strength of the spirit was only 37.5% by volume.

Section 6 of the Sale of Food and Drugs Act Amendment Act, 1879, provides that it shall be a good defence to prove that the admixture of water to strong rum has not reduced the strength to more than 25^{o} under proof. The Intoxicating Liquor Act of 1960 (Section 35) amended the figure of 25^{o} under proof to 30^{o} under proof. The object of Section 6 of the 1879 Act, as the authoritative Bell's "Sale of Food and Drugs Acts" (7th Edition, 1923) says on page 118, "was to lay down fair and reasonable standards of strength".

In other words, the standard gives us a cut-off point. If the strong rum is watered down more than that permitted by the standard, it is adulterated. (The strong rum distillate has a strength of 80 - 96% alcohol). However, it must be pointed out that it is not an offence to sell adulterated food (or drink) if the customer is told. This is laid down in Section 8 of the 1875 Sale of Food and Drugs Act (often called the Principal Act).

In order to commit an offence under section 6 of the 1875 Act there must be a prejudice, but if the customer is told that the food is adulterated the element of prejudice is removed and there is no offence. As Bell says on page 119 of the 1923 edition "Thus, if spirits are sold diluted beyond the limit allowed, the seller cannot be convicted if he draws the attention of the purchaser, either verbally or by notice at the time of the sale, to the extent of the dilution, since the purchaser would be held to have obtained an article of the nature, substance and quality demanded by him". Bell goes on to say, "unless clear and unequivocal notice is given to the purchaser at the time of sale the minimum applies to proprietary spirits sold under a special name and label just as much as the spirits sold as 'brandy', 'whiskey' etc.

Accordingly, enforcement authorities in the Republic always considered that this was the law pertaining to spirits sold under a trade name, and, indeed, it appeared to Irish enforcement authorities that this concept was simply carried over into the Health Act, 1947 and the Food Standards Act, 1974. Both of these acts contain provisions which provide that products sold by brand name must comply with standards laid down in regulations made under the acts (See section 56 (8) and section 2 (2) of the Health Act, 1947 and the Food Standards Act, 1974 respectively).

Certificate of Analysis

The certificate of the analysis indicated that the sample had 7% excess water by weight. This result was based on the qualified statutory standard of 40% by volume (70% proof spirit and 30^{0} under proof) at or above which spirit may be sold without notice of strength.(See Section 35 of the Intoxicating Liquor Act of 1960).

Legal Proceedings

Accordingly legal proceedings were instituted against the publican pursuant to the provisions of Section 6 of the Sale of Food and Drugs Act, 1875, as amended by the provision of the Sale of Food and Drugs (Amendment) Act, 1879, on the basis that the publican sold to the prejudice of a purchaser rum which was not of the nature substance and quality of rum demanded by the purchaser (Inspector Ryan).

Adjournments

The defendants sought several adjournments of the District Court hearing, all of which were granted. Meanwhile, Mr. Toogood, the operations director of Hedges and Butler Ltd in London, the distributor of Bacardi Rum, came to Dublin to discuss the matter with the Chief Executive Officer of the Eastern Health Board. At a later date he again came to Dublin and made representations to the Department of Health. Finally he wrote to the then Minister of Health advising that, in view of the Eastern Health Board's decision to continue the legal proceedings, he would instruct his lawyers to institute a Declaratory Action, adding that if the matter was settled amicably in the meantime he would withdraw the instructions.

Declaratory Action

Mr. Toogood was as good as his name. A declaratory action was instituted. The district court hearing was adjourned pending the outcome of the High Court declaratory action. The tables were now reversed. Bacardi International Limited and Hedges and Butler Ireland Limited became the plaintiff and the Eastern Health Board, the Minister for Health Ireland and the Attorney General became the defendants.

Declaration

The remedy of Declaration had its origin in Section 115 of the Chancery (Ireland) Act, 1867. The Declaration as its name suggests 'declares' the rights of the parties without, in fact, creating any binding obligation on the parties to the relevant proceedings although,in practical terms, it is most unlikely that any party will in fact act against the terms of a declaration already granted by a court.

Bacardi asked the High Court to declare that they were entitled to sell and to offer for sale to retail purchasers Bacardi Rum at an alcoholic strength less than 30^0 under proof (40% alcohol by volume) not withstanding the provisions of Section 6 of the Sale of Food and Drugs Act, 1875,as amended by Section 6 of the Sale of Food and Drugs Act (Amendment Act),1879,and Section 35 of the Intoxicating Liquor Act, 1960.

The enforcement authorities never objected to the Sale of Bacardi Rum provided notice was given to the customer that it did not meet the minimum strength laid down by Section 35 of the Intoxicating Liquor Act,1960.

High Court Proceedings

Plaintiffs and Defendants appeared before Mr. Justice Barron in the High Court on 5th October 1984. Three witnesses were called by the plaintiffs - the publican, the barman who served the rum and the European regional manager of Bacardi.

Both the publican and the barman admitted in evidence that they did not know that the strength had been reduced until this case arose. They agreed that it was unlikely that their customers knew either. The regional manager explained that the strength was reduced for marketing, health and social reasons.
No witnesses were called for the defence. The hearing commenced at 11 am. Much of the time was devoted to the defence allowed under subsection I, Section 6 of the Sale of Food and Drugs Act.1875. This was brought up by the plaintiffs and is irrelevant to the issue.

After a lunch break Mr. Justice Barron gave his judgement at 3.45 pm. The text of the unapproved judgement is given here in full.

UNAPPROVED JUDGEMENT OF MR. JUSTICE BARRON

The main issue, in this case, revolves around the strength at which rum may be sold to the public. Section 6 of the Sale of Food and Drugs Act, 1875, provides that, "No person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding twenty pounds", and it then sets out a certain defence. When it came to the sale of spirits, to decide the question what adulteration might be to the prejudice of the purchaser it was necessary to achieve a standard, because if you sold it neat it would be poisonous to the customer and if you dilute it too much then you were giving him an adulterated product. For the purpose of spirits, the matter was amended by Section 6 of the 1879 Act which sets out, "In determining whether an offence has been committed under Section 6 of the said Act by selling, to the prejudice of the purchaser, spirits not adulterated otherwise than by the admixture of water, it shall be a good defence to prove that such admixture of water, has not reduced the spirit more than twenty-five degrees under proof for brandy, whisky, or rum or thirty five degrees under proof for gin". In practice, if rum is sold, and contains a strength of less than 70 degrees under proof, the product is deemed to be sold to the prejudice of the purchaser. Now, that doesn't, of itself, mean that an offence is being committed because, under the principal Act, the offence is selling the spirit not of the nature, substance and quality of the spirit demanded, so it follows from that, that if you ask for a spirit which is less than the standard of

the spirit specifically in the latter Section, that it is not an offence to supply that weaker spirit.

Now, in this present case, what has happened is that the Plaintiffs, who were the distributors of Bacardi Rum, have found themselves in a position where they appear to be affected by the Criminal Law because they have made a commercial decision that the market that they cater for is best served by providing a rum not at 40% by volume of alcohol but at 37½% of level of alcohol. It is a problem that is purely a commercial one and there is no intention to break the criminal law, and I don't know whether they thought this problem would arise. The sale of spirits nowadays does not relate to just one country, and the marketing strategy must be built up for all the areas they sell the product, and I heard in the evidence that the equivalent percentage to 30 degrees under proof in this jurisdiction, in England is lower than that, and the product being marketed by the Plaintiff could not meet the same fate in England as it might be meeting here.

Now, what I am being asked, in effect, to do is to declare the legal position, having regard to the fact that a prosecution is pending in the District Court. Now, this Court has a jurisdiction on the State Side to review and control the operation of the District Court. Its function is to ensure that the jurisdiction of that Court is exercised within its powers. At the moment, there is nothing before me to indicate that the District Court

is to usurp a jurisdiction or act in excess of its jurisdiction or to do anything that it ought not to do. Issues of fact will arise for the District Court and they are solely a matter for the District Justice who hears the case. Similarly, matters of law which arise before me will arise, and the contest of facts, and the decisions on those matters of law will be a matter for the District Justice. If the decision of the District Justice is contrary to the Defendants, then it is a matter for the Defendants to appeal that decision or seek State Side relief, but nobody knows whether that situation will arise. But, coming back to the arguments which are arising before me - I am left in this position, am I being asked to grant a relief which will tell the District Court how to exercise its jurisdiction or am I being asked to make a declaration of law in the interest of the Plaintiff who is prejudiced by the uncertainty as the nature of that law. Now, it does seem to me that, certainly from the letter sent by the Eastern Health Board dated 7th May 1982, that the Plaintiffs may reasonably think that the entirety of their commercial operation in this jurisdiction is in jeopardy, and for that reason I think they are entitled to come to Court to seek a declaration as to whether or not that is so. Now, I have already referred to the provisions which have been the subject matter of the proposed prosecution, and it seems to me that what arises from those provisions is, that where a product is asked for by a purchaser and that product is rum that the offence, of selling to the purchaser of that product, is not committed if it can be shown that the admixture of water has not

reduced the spirit more than 30 degrees under proof. Now, if the purchaser has, in fact, demanded not rum but a particular rum product, then if he gets the product that he demands, there cannot be any ground for saying that the sale is to his prejudice.
Now, having said that it seems to me that leaves the position as follows - that it is a question to be determined on the facts in any particular case whether the product supplied is the product demanded. If the product demanded is a product, which does not have a strength of at least 30 degrees under proof, then it does not necessarily follow that an offence is being committed.
If the product demanded is rum, then it seems to follow that supplying a rum which is less than 30 degrees under proof, takes away from the supplier the defence given by Section 6 of the 1879 Act.

In the circumstances, what I propose to do is to make a declaration that the defence available to a supplier under the provisions of Section 6 of the 1879 Act is not the only defence available where the allegation made is as to the strength of the spirit supplied.

END OF JUDGEMENT

Costs were awarded against the Eastern Health Board.

CONSEQUENCES OF THE HEARING

The situation regarding the sale of spirits in glasses across the bar counter is now very unsatisfactory. There is a tacit understanding by the purchaser that the law protects him from the sale without notice of adulterated spirit. The distiller is at liberty to lower the strength at any time he likes. When a purchaser asks for a glass of the spirit by the brand name there is no obligation on the vendor to inform the purchaser if the spirit is of reduced strength. There would be a violation of expectation on the customer's part if he became aware that his glass of spirit contained excess water. It is not a question of getting what you ask for but what you thought you asked for. Most purchasers of spirits in glasses across the bar counter will think that there is an implied condition in the sale that the spirit meets the qualified statutory standard. If they object, the law now answers: "you got what you asked for". This answer would be of little value to a car purchaser who asked for a shiny new Rolls Royce in the window and when it was delivered he found that it only had a motor cycle engine.

The difficulty with the High Court judgement is that it assumes far too much knowledge on the part of the purchaser.
It was the intention of the Food and Drugs Acts to protect persons who had not all this knowledge.

Non Valid Distinction

The judgement makes the distinction between rum and a particular rum product. This distinction is not valid. A rum product is a substance containing rum, such as a bakery rum baba or a rum flavoured ice-cream.

Bacardi is a trade name for a particular brand of rum. It is not a rum product. The judgement distinguishes between rum and rum sold under a trade name. The distinction is overstressed, as we now have the extraordinary bizarre situation that, for the same article from the same bottle, it is not an offence to sell a glass of it if you ask for a glass of Bacardi, but it is an offence to sell it if you ask for a glass of rum and no notice is given. There is certainly a departure here from the common sense standards of every day life.

The judgement has certainly reduced the biting edge of the enforcement agencies. As regards the doctrine of notice in the context of spirit sales, the doctrine has been placed in its coffin and the lid well hammered down. It appears, in fact, that the coffin is almost at the crematorium.

The kernel of the whole question is:- Is the purchaser fully aware that the brand demanded may have a reduced alcoholic strength and that it may contain excess water? The purpose of the Sale of Food and Drugs Acts is to make provision for the customer who has not the specialised technical knowledge and that must include the vast bulk of purchasers.

Two Leading Cases

The Lord Chief Justice in Sandys v Small in 1878 said :
"I should be very sorry indeed if, in so holding, I thought I was doing anything do diminish the efficacy of a most useful Act of Parliament - useful at all events, in this sense, and to this extent, that it is intended to prevent frauds being committed by sellers of adulterated articles to the poorer classes of consumers, who have no means of ascertaining whether they really do get the article that ought to be supplied to them, and upon whom, independently of the protection that this act gives, there is no doubt that very serious frauds were committed, which the Act, to a great extent, has been the means of preventing.

In Dawes v Wilkinson, 1907, Lord Alverstone held that a particular notice was insufficient because it did not bring to the mind of the purchaser the fact that the spirit was diluted to a strength below the qualified statutory standard.

An Irish Construction

It is regrettable that an Irish High Court has construed Section 6 of the 1875 Act in such a way as to allow the sale of reduced strength branded spirits without notice when asked for by the brand name in a glass. The construction is inconsistent with the spirit of the Act. It is all the more regrettable when Dail Eireann and Seanad Eireann and the President have told us in the Intoxicating Liquor Act, 1960,

what the qualified statutory standard for rum is. What the High Court has done, in effect, is ruled that a spirit trade name negatives the qualified statutory standard laid down in the Intoxicating Liquor Act of 1960.

Hope for the Consumer

The only real hope for the purchaser of spirits in glasses across the bar counter is an absolute standard which is somewhere in the EEC pipeline. It is unlikely, judging by experience, that central legislative authorities who have responsibility for food standards in this country will intervene in the meantime.

Conclusion:

We may conclude that the High Court (with legal costs being swallowed up with great avidity) is not the right forum to resolve such issues. A simple system of reply and redress should be introduced - such as a Food Ombudsman or a Food Tribunal.

It appears that this was the first time since the foundation of the State that the High Court had to concern itself with the Sale of Food and Drugs Acts,

The outcome emphasises the uncertainty and casino like nature of legal proceedings in the food sector and serves as evidence of the desirability of updated legislation.

WATER QUALITY REQUIREMENTS FOR FRESHWATER FISH LIFE

INTRODUCTION:

The aquatic environment includes the freshwater, estuarine/coastal and marine components. Each of these categories has many beneficial uses for humans such as providing fish as food, potable water and recreational facilities. For every use of water there are certain water quality characteristics that should be met to ensure the suitability of the water for that use. There are basic physical, chemical and biological differences between the freshwater, estuarine and marine environments; thus a set of water quality requirements for freshwater fish might not necessarily be sufficient for the marine area.

This article will confine itself to water quality requirements for freshwater fish.

Protection of freshwater fish-life

An essential objective of freshwater quality recommendations is the protection of fish for commercial harvesting and sport. Such fish are salmon, trout and coarse fish like perch, roach and pike. By protection is meant not only the mere survival of fish, but the maintenance of their environment in such a state that permits reproduction, growth and all other normal life processes of fish. Fish life has many complex stages, some of

which (e.g. egg and larval stages) are very susceptible to outside stresses. Also fish are intimately interrelated with other aquatic animals and plants to form communities. The food chain is an example of this interdependence. In protection it is essential to consider both the above factors.

Concern for aquatic life has an aspect more important than the protection of the organism themselves; namely the protection of human health. Certain persistent and toxic pollutants (e.g. some metals and pesticides) can be absorbed by micro-organisms which in turn can be the food of larger organisms. The bioaccumulation continues on up the food chain until it reaches fish which are harvested and eaten by humans.

What must fish be protected from?

Fish must be protected from stress which adversely affects their natural performance and functions. Stress can take the form of sudden changes in water temperatures and pH etc or the increase in toxic substances such as metals and organic toxins. Most of these stresses are imposed by humans by their use of water to dispose of their domestic and industrial/agricultural wastes. The range of pollutants and potential toxins to aquatic life is increasing at a bewilderingly rapid rate. It is becoming more and more difficult to monitor the effects of these pollutants in waters.

Monitoring the effects of stresses and pollutants on fish

A safe level of a pollutant is one which is harmless to aquatic life under conditions of long-term exposure. Ideally the basis for establishing the safe concentration of a harmful pollutant would be to select the species in the receiving water most sensitive to the particular pollutant and to subject this species to long-term bioassays with various concentrations of pollutants, in conditions as closely as possible resembling those in the receiving water. The same procedure would apply for complex wastes containing many pollutants. In view of the cost involved in such long term testing, the "safe" level is normally estimated by determining firstly the concentration of pollutant which is lethal to 50% of a test species in 96 hours. This concentration is known as the 96 hour LC_{50} value. An "application factor" or "safety factor" is then used to calculate a concentration of pollutant which will protect all life stages of the test organism and of all the other organisms in the receiving water. The application factor should be assigned on the basis of scientific knowledge of the relationship between safe levels and lethal levels. In practice it is often based on more arbitrary judgements.

Combined effects of pollutants.

The toxicities of some agents may be affected by the presence of other toxic substances. The combined effects may be additive (no interaction between agents), antagonistic (one agent reduces the effect of another) or synergistic (the effects of both agents are increased). These interactions should always be considered when assessing the toxicities of wastes.

Water Quality Objectives

Water quality objectives can be regarded as describing minimal requirements consistent with the use of the waters for a particular stated purpose; in the present case, the maintenance of fish life. The objectives should be recognised as values based on our present state of knowledge. They should be revised as necessary to meet higher expectations of environmental quality, to reflect new knowledge of harmful effects and technical progress in industrial processes and effluent treatment.

Choice of water quality parameters

The number of potentially harmful substances finding their way into freshwater rivers and lakes is quite vast. Therefore in what follows a set of parameters will have to be given priority and many will have to be omitted. The parameters chosen can be divided into two categories:-

(i) The basic characteristics of water quality such as dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), temperature, suspended solids (SS), pH and nutrient enrichment.

(ii) The specific toxic and harmful pollutants which are thought to arise most often in Ireland i.e. selected heavy metals and pesticides, ammonia etc.

Sources of Guidelines/Objectives

Water quality guidelines have been issued in the U.S.A. by the Environmental Protection Agency and in Europe by the European Inland Fisheries Advisory Commission (E.I.F.A.C) for fish bearing freshwater. In Ireland the conclusions of a Department of the Environment Technical Committee on Effluent and Water Quality Standards (Memorandum No 1; Water Quality Guidelines, 1977) may be regarded as tentative national objectives.

The "EEC Directive (78/659/EEC) on the Quality of Freshwater needing protection or improvement in order to support fish life" may be regarded as standards which are binding on Member States in certain specified circumstances.

The guidelines given below for the various parameters are culled from the above publications. They are mostly criteria for waters supporting salmonid fish (e.g. salmon, trout), which are those needing most protection. Thus they should protect other less sensitive species.

Discussion of the Water Quality Parameters.

Recommendations for the main water quality requirements for freshwater fish are given in Table 1.

The individual parameters are elaborated on over.

Dissolved oxygen and BOD

Fish breathe by forcing the water in their mouths out over their gills. Dissolved oxygen present in the water, is absorbed by the blood vessels within the gills. Any reduction of dissolved oxygen in the water can reduce the efficiency of oxygen uptake by fish and hence reduce their ability to meet the demands of their environment. There is evidently no concentration level to which the oxygen content of natural waters is reduced without causing or risking some adverse effect on the reproduction and growth and hence the production of fishes inhabiting those waters. An illustration of this is the severe retardation of development of salmonid eggs buried in gravel, when an adequate supply of oxygen is not maintained in the interstices of the gravel. Also reduced oxygen levels increase the toxicity of some pollutants e.g. cyanide.

Natural variation of Dissolved Oxygen levels.

The saturation concentration of dissolved oxygen in clean surface waters is a function of water temperature, salt concentration and atmospheric pressure.

The actual dissolved oxygen at any time is a function of the combined influences of a number of factors. On the one hand, oxygen is consumed by both suspended and benthic micro-organisms and also by any chemical reducing agents. On the other hand, oxygen is produced by photosynthetic organisms during daylight hours, most of which also consume oxygen during respiration,

Because of the highly variable nature of these influences the oxygen concentration of a surface water is rarely at equilibrium but may vary from deficit to supersaturation depending on the balance between oxygen producing and oxygen consuming agents.

The principal effect of organic pollution in waters is the depletion of the water dissolved oxygen content during the period of conversion into stable compounds by microbial and chemical action. The amount of oxygen required to break down an organic pollutant is described as the Biochemcial Oxygen Demand (BOD).

Temperature

Temperature is one of the most important factors regulating the composition, variety and activities of living species in an aquatic environment. Changes in ambient water temperatures have complex and diverse effects which are not yet fully understood.

Some effects of changing temperatures

Increased temperature in polluted waters increases oxygen consumption by accelerating the biodegradation of organic matter both in the water column and in benthic deposits. This effect is magnified by the fact that the solubility of oxygen in water decreases as the temperature increases.

Natural diurnal and seasonal changes in the temperatures of water bodies caused by climatic conditions determine the community structure and diversity of species and are necessary to regulate certain life functions. For example, slight increases above naturally occurring temperatures in early spring can lead to advanced spawning with the result that young fish are hatched before their normal food source is available.

Suspended Solids (SS)

The effects of suspended solids on fish can be summarised as follows:-

i) direct effects such as clogging of gills resulting in fish kills, reduced growth or reduced resistance to disease.

ii) prevention of the successful development of fish eggs and larvae by blanketing the bottom of water bodies.

iii) Interference with natural movement and migration of fish

iv) reduction of available food supplies by blanketing benthic populations and by a decrease in primary food production caused by reduced light penetration.

pH

Addition of alkalis or acids to water may be harmful not only by producing alkaline or acidic conditions but also by increasing the toxicity of various components in the water. For example the toxicity of ammonia increases as the pH increases while the toxicity of sulphides increases as the pH decreases.

Nutrient enrichment

The problem of eutrophication is associated with nutrient enrichment of water bodies. The excessive nutrients promote the growth of nuisance algae and plants which clog the water body and disrupt the aquatic life. This is particularly a problem in lakes.

Specific Pollutants.

Metals - The toxicity of some metals to fish is very dependant on the water hardness.

Cadmium - This metal is an extremely dangerous cu mulative poison. In fish there is insidious, progressive chronic poisoning because there is almost no excretion of the metal. The toxicity of cadmium depends on the water hardness.

Mercury - The toxicity of mercury is strongly dependent upon the mercury species present. Organic mercury, and in particular methyl mercury, is the most toxic form. Some microbes are capable of biosynthesizing methylmercury from mercury ions. Aquatic organisms concentrate methylmercury in their bodies either directly from the water or through the food chain. Rainbow trout are able to similate and concentrate methylmercury directly into the muscle tissues from ingested food. It has been shown that rainbow trout contained mercury levels of 400 µg/kg and 1730 µg/kg in their muscle and kidney tissue respectively after being exposed to 60 µg/l of organic mercury for one hour a day over ten days.

Chromium - Hexavalent chromium is more toxic than the trivalent species. The most stable valence state is the trivalent and chromium is present in biological material mostly in this state. It has been shown that the principal entry route of chromium into fish is via the gills and that rainbow trout exposed to 2.5 mg/l hexavalent chromium accumulated insignificant amounts of chromium in the muscle. Hence human consumption of fish muscle taken from water contaminated with this or lower levels of chromium would probably represent no serious health hazards. There is a great range of sensitivity to chromium among different species of fish and in different waters. The chronic toxicity of chromium to fish is a major problem. Hardness of the water seems to have little effect.

Lead - water hardness has extreme effects on lead toxicity.

Copper and Zinc - Copper is known to be particularly toxic to algae and mollusks. Again the toxicity of copper and zinc depends on the hardness of the water.

Other Toxic Substances

Ammonia - Ammonia results from the decomposition of organic matter. It is also discharged from a wide variety of industrial processes and cleaning operations that use ammonia or its salts.

The toxic form of ammonia to fish is the unionized ammonia, which increases with increasing pH and temperature.

Sulphides - Sulphides are constituents of many industrial wastes such as those from tanneries, paper mills, chemical plants and gas works. Hydrogen sulphide may be generated by the anaerobic decomposition of sewage and other organic matter in the water and in sludge beds. The toxic form of sulphide is the undissociated H_2S whose concentration is increased as the pH decreases, and as the oxygen level decreases and as the temperature increases.

Cyanide - The cyanide radical may be present in many industrial wastes such as metal plating operations, gas works and chemical industries. The toxicity of cyanide varies widely with pH, temperature and dissolved oxygen concentration.

"Free cyanide" (CN^- ion and HCN) occurs mostly as molecular hydrogen cyanide., the most toxic form, at pH levels of natural waters. The HCN derives from dissocation of the complex cyanide ions (themselves relatively harmless) which can be greatly influenced by pH. It has been demonstrated that the toxicity of the nickelocyanide complex increases a thousand fold on going from pH 8.0 to 6.5.

Chlorine - Chlorine and chloramines are widely used in treatment of potable water supplies and sewage treatment plant effluent and in power plants, textile and paper mills and certain other industries. The toxicity of chlorine to aquatic life will depend upon the concentration of residual chlorine remaining and the relative amounts of free chlorine and chloramines. Chlorine added to water containing nitrogenous materials rapidly forms chloramines, thus problems of toxicity in most receiving waters are related to chloramine concentrations.

Phenolics. Phenol and phenolic wastes are derived from petroleum and chemical industries and domestic and animal wastes.

The range of toxicity of phenols to aquatic life is very large, thus it is difficult to set limits for phenolics as a whole.

Phenols affect the taste of fish (see tainting substances) at levels that do not affect the fish physiology adversely.

Tainting substances - Many wastes can impart objectionable taste, odour or colour to the flesh of fish. Such tainting can occur in waters with concentrations of the offending material lower than thoserecognised as being harmful to an animal.

Phenols and petroleum products are often associated with tainting of fish.

Oils and Greases - Since oils and greases include thousands of organic compounds with varying properties, it is not possible to set numerical values as water quality objectives. Adverse effects on fish life may be lethal, sublethal, chronic or the fish may be tainted.

Pesticides - Another category of individual pollutants is pesticides. More than 200 pesticides are used in Ireland in the agricultural, industrial and domestic sectors. As regards fish bearing waters, the pesticides of greatest concern are those that persist for a long time and bioaccumulate. Pesticides are toxic to aquatic life over wide ranges of concentrations and great differences in susceptibilities to different compounds exist between species and within species.

Some organochlorine pesticides (e.g. DDT, aldrin, lindane) are considered especially hazardous because of their persistence and accumulation in aquatic organisms. These compounds and some of their metabolites are directly toxic to various aquatic species at concentrations less than 1 µg/l. Their accumulation in aquatic species presents a hazard, both real and potential, to animals and higher trophic levels including man.

Use of Antibiotics in fish-farming

With the increase in fish farming in the recent past, the use of antibiotics such as oxytetracycline, erythromycin, kanamycin to prevent and control fish diseases such as furunculosis has become more prevalent.

Administration of Antibiotics.

The safest way of administering antibiotics to fish is as food additives. The advantage of this method is that there need not be any environmental problem caused by the escape of the drug from the fish farm.

Code of practice* for use of antibiotics in fish-farming.

Certain requirements need to be satisfied before an antibiotic is used in fish farming. Among these are:-

*Discussed at the European Association of Fish Pathologists Symposium, Plymouth, 1983.

1. The drug must not be discharged into waterways.
   This reduces the risk of developing a resistant microflora.
2. It must be rapidly broken down in the fish tissue so that the human consumer does not ingest antibiotics.
3. Any break-down products must be harmless to fish and to humans.
4. Toxins or carcinogens must not be formed during cooking of contaminated tissue, so that the customer is not as risk.
5. Its use must be highly controlled to prevent misuse.
6. It should not be medically important.
7. It must be used at the correct dosage, for the required period.
8. Effective quality control of the drug is necessary.
9. It must not be detrimental to the human handler.
10. It must be inaccessible to inexperienced personnel.

Conclusion

Freshwater fish are a valuable natural resource. Given the increasing competing demands of man on freshwater it is becoming more difficult (and more expensive) to ensure their protection and survival.

TABLE 1

Water Quality Recommendations for Freshwater Fish.

Parameter	Recommendation
Dissolved Oxygen (DO)	Dissolved oxygen content of freshwater to be greater than 9 ppm at least 50% of the time. DO content to be greater than 7 ppm 100% of the time.
Biochemical Oxygen Demand (BOD)	BOD to be less than 3 ppm.
Temperature	The water temperature should not be increased artificially by more than $1.5^{o}C$
Suspended Solids (SS)	For a high level of protection the suspended solids level should be less than 25 ppm. The degree of protection decreases as the suspended solids level increases.
pH	The pH should lie in the range 6.5 - 8.5. The incremental change by artificial means should be less than 0.5 units.

continued

Table 1 (continued)

Parameter	Recommended limit
Metals	
Cadmium (Cd)	Limit depends on water hardness:-

Hardness: ppm $CaCO_3$	Max Conc. of Cd ppb
Less than 50	0.4
Greater than 50	1.2

Mercury	Less than 0.05 ppb
Chromium	Total chromium less than 0.05 ppm
Lead (Pb)	Limit depends on water hardness:-

Hardness ppm $CaCO_3$	Maximum conc. of total Pb ppm
0 - 30	0.004
30 - 100	0.025
100 - 300	0.05
> 300	0.10

Copper (Cu) and Zinc (Zn) — Limits depend on water hardness:-

Hardness ppm $CaCO_3$	Maximum concentration of Copper ppm	Zinc ppm
0 - 10	0.005	0.03
10 - 50	0.022	0.2
50 - 100	0.04	0.3
100 - 300	0.112	0.5

Table 1 (continued)

Parameter	Recommended limit
Nickel	Multiply the LC 50 - 96 hr for the most important local species by application factor of 0.02.
Silver	Less than 0.01 ppm
Iron	Less than 1 ppm
Other Toxic Substances	
Ammonia	Conc. of unionized ammonia should be less than 0.02 ppm - N
Sulphides	Total sulphides less than 0.002 ppm
Cyanide	Free cyanide less than 0.005 ppm
Chlorine	Total residual chlorine less than 3-5 ppb
Phenol	Less than 1 ppb

Table 1 (continued)

Parameters	Recommended limits
Oils and greases	Should not be present in quantities such as to i) form visible film on the surface of waters ii) form coatings on the beds of watercourses, benthic biota or food sources. iii) Cause deleterious effects on aquatic life iv) Impart a detectable taste or odour to fish.
Tainting substances	Should not be present in concentrations that produce undesirable flavours which are detected by organoleptic tests performed on the edible portions of aquatic organisms.

PESTICIDES	MAXIMUM CONCENTRATION ALLOWED (ppb)
Aldrin	0.003
Dieldrin	0.003
DDT	0.001
Demeton	0.1
Endosulphan	0.003
Lindane	0.01
Malathion	0.1
Parathion	0.04
Azinphos - methyl	0.001
Diazinon	0.009
Dichlorvos	0.001
Disulfonton	0.05
Trichlorphon	0.002
Carbaryl	0.02

THE LEGAL CONTROL OF MEAT AND MEAT PRODUCTS

MEAT

The phenomenon of urbanisation in the first half of the 19th century saw the first enactment designed to hygienically control meat which was sold to the public. Under the Towns Improvement Clauses Act of 1847, later incorporated into the great social enactments - the Public Health (Ireland) Acts of 1878, 1880 and 1911 urban sanitary authorities are bound to make bye-laws for the licencing, registration, inspection, cleanliness and prevention of cruelty within private slaughter houses.

The Slaughter of Animals Act 1935 extended to rural authorities the powers granted to the urban sanitary authorities.

However, it is optional for the sanitary authorities (both urban and rural) to make meat inspection bye laws which arise under Section 1 of the Public Health Act 1911.

Of the meat reaching the home market 98% of bacon, 10% of beef and 15% of mutton is produced in export plants. This represents some 60% of the total Irish market supply (Collins, 1977, J. Irish Med. Assoc. 70, 603). The remaining 40% of meat consumed at home (total annual trade value of meat consumed is approximately £800m) is produced in about 6 public abattoirs and over 1000 private slaughterhouses which are not registered as export premises.

The Veterinary Inspection Order of 1929 made under The Public Health (Ireland) Act of 1878 demands that the inspecting Veterinary Surgeon shall seize the entire carcase and all organs and viscera if evidence of any of 32 diseases is found including:- anthrax, decomposition, jaundice, malignant neoplasms, odour, swine fever, tetanus, trichinosis, tumours.

After the introduction of the Food Hygiene Regulations in 1951, it was decided, with regard to meat inspection, that the duties of Veterinary Inspectors would continue as in the 1929 Veterinary Inspection Order, but power to deal with meat and meat products considered unfit for human consumption would in future be exercised under Article 11 (which gives power to seize unfit food) of the Food Hygiene Regulations. In addition, veterinary inspectors would for the purposes of the Food Hygiene Regulations be responsible for the complete inspection of meat and meat products derived from cattle, sheep, pigs and goats, at butchers' (including pork butchers') shops and stalls and for ensuring compliance with the regulations in respect of these premises.

At present unfit meat may be seized by the Local Authority Veterinary Inspector but it can only be destroyed by an order of a District Justice if the owner does not surrender it. But a Veterinary Inspector of the Department of Agriculture in an export premises may destroy unfit meat under the Fresh Meat Act 1930.

Under the present administrative system two thirds of carcases for the home market do not undergo veterinary inspection at slaughter. A Department of Agriculture Survey in 1982 confirmed that there is a disparity between the operators of slaughter houses used for the home market throughout the country in the application of hygiene. But export premises licensed by the Department of Agriculture maintain a uniformly high standard of hygiene.

Export Canned Meat

Control over the processing and export of canned meat is operated under The Slaughter of Cattle and Sheep Act 1934. A standard schedule of conditions is drawn up, subject to which licences are issued by the Department of Agriculture for the manufacture of canned meat products.

Updating Legislation for the Home Market.

Detailed legislation on operational hygiene in relation to carcase dressing is desirable. The Food Hygiene Regulations 1950 - 71 were not directly intended for slaughter house operations. The Agricultural Produce (Fresh Meat) Acts 1930 and the EEC Council Directive on Intra Community Trade in Fresh Meat both of which control meat exports incorporate operational hygiene legislation in detail. Why not use them for the home market?

Late in 1984 the Government made a decision to bring the legislation concerning the home market up to that pertaining to the export market.

The ultimate aim must be that every animal slaughtered for sale to the public as meat must be subjected to ante-mortem and post-mortem veterinary examination. The introduction of a licencing system for vehicles used to convey meat and meat products, a condition of the licence being that certain hygienic standards are met, is overdue.

BACON

Regulations governing the production and export of bacon are contained in the Pigs and Bacon Acts 1935 - 1961 and the Pigs and Bacon Act (Part II) Regulations 1965. This latter document deals with the detailed requirements for the slaughter of pigs, dressing of carcases and production of bacon and the condition of bacon at the time of consignment and the packing and conveyance of bacon. However, only those premises which comply with the requirements laid down in the Agricultural Produce (Fresh Meat) Acts 1930 and the EEC Council Directive on Intro-Community Trade in Fresh Meat (64/433 EEC) are allowed to export.

MEAT PRODUCTS

Lack of Compositional Standards

Not since the ninteen forties and early fifties has there been a minimum legal compositional standard for a meat product. In those days under an emergency pricing order there was a minimum legal compositional standard of 35% meat for a pork sausage (65% of the meat had to be pork).

While the standard has long since gone the lower range of variation of meat contents in sausages today approaches the 35%. Fourteen home produced brands examined in 1983 by S.N. Reid in An Foras Taluntais had meat levels ranging from 41% to 75% with lean meat values of 24 to 57%, fat values 17 to 35% and connective tissue contents of 4 to 15%. Unbranded sausages sold in butcher shops showed ranges of 58 to 74% for total meat and of 36 to 47% for lean meat. Some 300 sausage makers produce about 13,000 tons a year.

Generally there is no relationship between price and the compositional quality of pork sausage with respect to the amount of lean contained. In the context of price control, price must be related to quantity and compositional quality. The estimated annual per capita consumption of pork sausages is about 10 lbs with sales approximating £25,000,000 annually. A mandatory compositional standard would be in the interests of the consumer. A meat content of not less than 65% of which at least 50% must be lean as in the U.K. would protect the consumer. The collagen (connective tissue) to crude protein (excluding soya protein) ratio should also be regulated.

The Beef Burger

The market value of beefburgers is estimated at £7m per annum. The arrival from America of the fast food chains McDonalds and others has elevated the consumers' expectation of beefburgers. The fast food chains by way of a franchise arrangement apply strict quality standards and control. Only prime beef cuts are used and the all meat burgers usually contains less than 20% fat.

The more familiar packaged type burger available in retail outlets, Birds' Eye, Findus etc contain 80% meat. Other ingredients might be, rusk - a biscuit meal to retain fat and prevent shrinkage, vegetable protein(soya) together with emulsifiers to bind the product and help prevent it breaking up during cooking,powdered or whole onion as the principal flavouring, monosodium glutamate as a flavour enhancer and salt, spices as seasoning and sulphur dioxide as preservative.

Thirdly there is a cheaper type of product with 50% meat, finding growing popularity.

Again a set of mandatory compositional standard would aid the consumer. Three standards are suggested:-

1. All meat burger 80% lean, 20% fat.
2. Standard burger 80% meat. Not less than 65% of meat must be lean.
3. Economy burger. 60% meat of which at least 65% must consist of lean meat.

To the consumer lean meat is a piece of red muscle tissue without much visible fat and without much visible gristle. The lean meat of a beefburger should have a connective tissue (gristle) content of less than 20%.

MASSAGED AND TUMBLED HAM

European technology in the 1960's gave us massaging and tumbling of cooked cured meat products. The Irish consumer has noticed that sometimes his prepacked or sliced to demand ham has a rubbery texture. What he is really getting is tumbled ham. Pork legs (or pork shoulders in the case of cooked pork shoulder or picnic ham products) are deboned and then injected with brine to a higher level than the Wiltshire type ham (2-4 days curing required). Massaging or tumbling treatment rapidly distributes the brine and effects the curing process over a 16 - 24 hour period. The brine will in addition to nitrate and salt contain phosphate. The phosphate enhances the ability of the meat to retain water (probably because of the relaxation of the muscle fibres and the development of interfilament spaces in which the water becomes trapped). During the tumbling or massaging (the distinction is related to the severity of the mechanical action in the tumbling machine,originally a butter churn) a proportion of the meat proteins actin and myosin is dissolved to give a protein solution with adhesive properties. During tumbling or massaging this sticky protein solution appears at the outer surfaces of the meat pieces as a tacky exudate. Pieces of meat which have been extensively tumbled in polyphosphate solution become integrated into a sticky mass and the individual muscles are not as easily recognised. The application of light pressure and heat to an aggregate of meat pieces which have been treated in this way fixes the original discrete pieces into a coherent product by the binding action of the coagulated protein.

Wouldn't it be nice for the consumer if the Labelling Regulations were used to ensure that the customer knew what he was getting and that he was clearly informed about the true nature of the product. The correct designation should be Tumbled Ham and not simply Ham.
S.I. No 205 of 1982 (Labelling, Presentation and Advertising of Foodstuffs) Regulations should be enforced in this situation.

Fore quarter beef, usually only suitable for braising or mincing can be converted to "steak like" products by cutting the meat into small flakes and then compacted into solid form in a hydraulic press.

SALTY BACON

Cured bacon requires 2-3% of salt. Farm and Food Research News (An Foras Taluntais) reported in December 1984 the results of a consumer survey carried out in Dublin on back rashers with three levels of salt averaging 2.6%, 4.9% and 6.2%.

Of the 300 households assessed the low salt cure was preferred by over 50% and the medium cure was also preferred to the high salt cure by over half the respondents. About 15% of the respondents were indifferent. A sizeable minority felt that both rashers and bacon available on the market were saltier than they would like. The results indicate a need for the labelling of salt content of bacon and rashers sold. A maximum salt content declaration would not be unduly demanding on the curer particularly in view of dietary concerns about salt.

MINCED MEAT

A declared maximum fat content is needed in the interest of the consumer. Two levels are suggested 30% and 25%.

NUTRITIONAL GUIDELINES

A FUNCTION OF GOVERNMENT

One of the main functions of government is to make better provision for the health of the people and to maximise the quality of life for all citizens.

Accordingly, governments have an obligation to provide nutritional guidelines for consumers. These guidelines must be based on current scientific evidence and provide guidance for making personal decisions about one's diet. It is now widely accepted that dietary moderation, the maintaining of ideal body weight and the avoiding of excess caloric intake together with regular physical exercise are sound public health measures.

Heart disease persists as a major public health problem effecting the adult population in Ireland. It is recognised to be multi-factorial in origin. One of the established factors involved in the development of heart disease is diet and the food supply from which it derives.

LARGE CALORIC INTAKE OF THE IRISH

Except for the periods of the famines in 1740 and 1847 Irish people have always enjoyed a very large caloric intake. In 1980, the total calories per capita per day was 3367*, where as in the United Kingdom it was 2780. The O.E.C.D. in 1970 attributed to us a total consumption of 3,473 calories per capita per day (the highest in the world). It is likely that these figures somewhat overestimated the situation.

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*Our calories come from:- Protein 10.6%, Fat 41.4%, Carbohydrate 48% (Sucrose 13.2%, Glucose 2.4%, Complex Carbohydrate 32.5%)

PLETHORA OF REPORTS

At the present time there is a plethora of reports regarding diets recommended to the public. They have been released from various public and private organisations. Since there is an agreement among these reports on some issues and disagreements on others it is not suprising that the public are rather confused. Most of these reports have dealt with dietary advice designed to curb the chronic degenerative diseases which plague the western world.

DEPARTMENT OF HEALTH (IRELAND) NUTRITIONAL GUIDELINES

It is obligatory on Governments that they inform consumers of the increasing consensus among nutritional professionals that have evolved in recent years. Accordingly, the Department of Health in Ireland has an official policy on nutritional guidelines.
It can be found in the three Reports of the Food Advisory Committee:-
"Guidelines for Preparing Information for the Public on Healthy Eating", 1984, "Diet and Coronary Heart Disease",1984 and "Nutritional Preparation for Pregnancy", 1984.
An outline of the guidelines is given here.

1. Mixed Diet

The normal diet should be based on a wide and varied range of food stuffs. Total daily food intake should include items from the four food groups, protein food, vitamins and minerals, energy foods and dairy products.

2. Energy Balance.

Dietary energy is derived from carbohydrate, fat and protein; for some the contribution from alcoholic beverages is also significant. An intake of energy in excess of basic metabolic needs and habitual activity levels will lead to fat deposition. If sustained this will result in increased body weight leading to overweight and obesity. These conditions are associated with suboptimal physical development, increased respiratory and orthopaedic problems and a higher incidence of cardio-vascular and metabolic diseases.

The guidelines recommend that the ideal body weight within the optimum weight range be maintained by adjusting energy intake in relation to physical activity patterns. We note that to burn up calories supplied by 1 pint of beer, 1 X 2.2 oz chocolate bar, 2 slices of toast with butter and marmalade the following minutes of walking, respectively are required, 36, 67, 74.

3. Fat

It is recommended that fat intake should not exceed 35% of total energy derived from the diet. Reduction should be principally saturated fatty acids which currently compose 80 - 90% of fat intake. At least 3% of dietary energy should be in the form of essential fatty acids chiefly cis-cis-linoleic. In the Irish diet the principal sources of linoleic acid are cereals, chicken fat, pig fat and vegetable oils. In the context of international food supply polyunsaturated fats such as maize (corn) oil, sunflower seed oil and soya bean oil are the richest sources of linoleic acid.

Too high a proportion of saturated fatty acids (which form a major proportion of animal and milk fats, some vegetable fats and hydrogenated fats) can contribute to an increase in blood cholesterol levels and also to low density lipoprotein and triglycerides in blood. These elevated levels are associated with the formation of raised plaques in the lining of the arterial system including the coronary arteries supplying the myocardium.

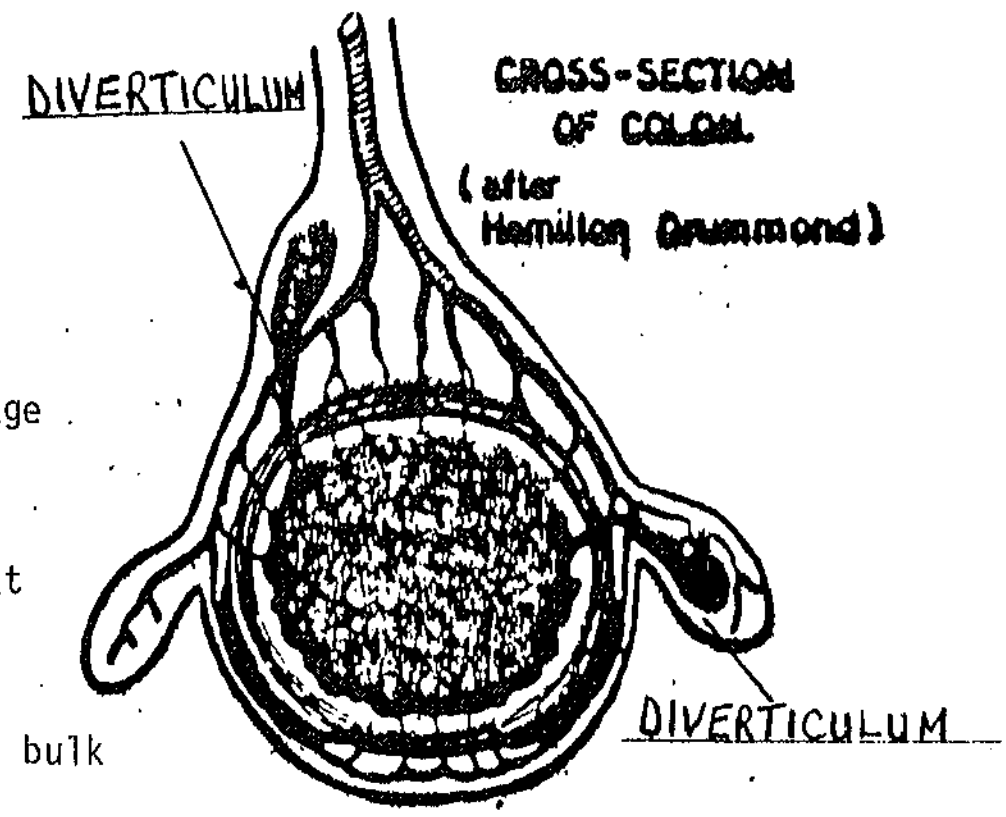
The elevated levels are also associated with changes occurring in the mechanisms initiating and controlling the coagulation of blood which involve prostaglandin synthesis and lead to an increased tendency to spotaneous clotting. This tendency promotes the formation of thrombi in the coronary arteries particularly in association with degenerated plaque on the lining of the blood vessels.

These changes operating independently or in conjunction with each other lead to a restricted supply of oxygen and nutrients to critical areas of heart muscle.

A chronic restriction results in angina and acute restriction in infarction.

There is substantial evidence on a group and community basis that a reduction in blood cholesterol level contributes to a reduction of coronary heart disease risk. A reduction of blood cholesterol is assisted by reducing saturated fatty acid intake while increasing polyunsaturated fatty acid intake has an additive but a weaker effect.

4. Fibre



Dietary fibre often called roughage is the term used to describe predominantly plant material, that is resistant to enzyme digestion in the human gut, and so provides bulk in the stools.

Countries which have high fibre diets have few of the western diseases, such as constipation, diabetes, and diverticular disease of the colon. Raising dietary fibre intake will increase stool bulk and promote laxation.

The anatomy of colonic diverticula is shown in the figure. Diverticula are hernias (blow outs) and must be caused by the weakness of the colonic wall and or high intracolonic pressure the latter following perhaps eating or emotional upset. Pain and abdominal discomfort are caused by the colon struggling with small stiff stools which result from a fibre deficient diet. The guidelines recommend that dietary fibre intake should be adjusted to 22 - 35 grams per day. Fibre should be taken in the form of whole foods, wholemeal bread, wholegrain cereals, fresh fruit, nuts, unprocessed vegetables, rather than as fibre preparations. Excessive fibre consumption can have unfavourable effects on micronutrient absorption and should be avoided.

5. Protein

Protein intake of western societies is usually above requirements and is largely drawn from animal sources. Consumption of protein in considerable excess (50 - 100%) of metabolic needs may be detrimental to health and contribute to certain chronic diseases. Furthermore animal protein is compositionally linked to saturated fat either in intermuscular or intramuscular form. Thus a high meat consumption will mean a high fat intake. Protein intake levels recommended are 1 gram dry weight per kilogram body weight per day. It is also recommended that a greater proportion than has been the custom should be derived from vegetable sources (cereals and pulses). Such a modification in sources of protein would tend to reduce saturated fatty acid intake while increasing that of polyunsaturated fat and of fibre.

6. Salt

High salt intakes (over 10 grams of sodium chloride per day) can produce hypertension in up to 20% of the population genetically susceptible to sodium overload. These levels of intake are also associated with a progressive rise of blood pressure with age and an accompanying increase of premature heart attacks and strokes. Infants and young children are also vulnerable to sodium overload arising from the limited capacity of their system to excrete any excess intake. A reduction is current salt intake to nine grams per day for adults would be expected to decrease the incidence

of hypertension in susceptible individuals, modify the secular increase in blood pressure with age and compliment drug therapy for established hypertension. Salt should be kept to a minimum in the diets of infants and young children.

7. Sugar

The nutritive value of sucrose and other sugars lies in their energy content. In the opinion of many nutritional experts, some control of sugar consumption is indicated for individuals whose body weight is excessive. The U.K. Committee on Medical Aspects (C.O.M.A.) of Food Policy in 1984 recommended that intake of simple sugar (sucrose, glucose and fructose) should not be increased further. The Irish Guidelines indicate that for many people sugar intake should be limited to 10% of dietary energy or approximately 70 grams per day for adults. It is useful to remember that 4 teaspoonfuls of sugar provide 100 calories.

DENTAL CARIES

Sugars are an important factor in the development of dental caries particularly in young children. The incidence of dental caries in children in Ireland is significantly reduced by fluoridation of the public water supplies at a level of 0.8 - 1.0 parts per million of fluoride.

8. Alcohol

Excessive intake can erode the dietary nutrient base as well as affecting the absorption and metabolism of specific nutrients. It is recommended that alcohol intake should not exceed 5% total energy intake. Alcohol should not be allowed to substitute for meals or part of meals. A moderate intake would be 1 - 2 units per day (1 unit = ½ pint of beer, or 1 glass of wine (port or sherry) or 1 small whiskey (35.5 mls)). The U.K. C.O.M.A. Report 1984 considered 80 grams per day intake of alcohol (3.3 large glasses of whiskey, 40% volume) excessive for men and 52 grams per day (2.1 large glasses of whiskey 40% volume) excessive for women.

One may wish to compare these intakes to those guidelines set in the context of the Road Traffic Act 1978.

As a general guide, it may be stated that a man of eleven stone would be unlikely to exceed a blood alcohol level of 100 milligrams per 100 millilitres unless he drank more than 4½ fluid ounces (3.6 half glasses) of whiskey or rum or brandy in a period of 2 hours or 2¼ pints of beer or stout in the same period.

So if observed the nutritional guidelines for alcohol intake keep one well within the Road Traffic Act Guidelines.

U.K. GOVERNMENT RECOMMENDATION

The U.K. Government recommends that for maintaining good health women should consume between 2,150 and 2,500 calories a day depending on how active they are and men should eat between 2,400 and 3,350 calories a day. But Dr. Prentice of the Dunn . Nutrition Unit at Cambridge considers that these figures are too high by 300 or 400 calories.

9. Pregnancy

The guidelines recommend a balanced and varied diet, starting well before conception with particular emphasis on the intake of red meat (in moderate amounts) and green leafy vegetables. Smoking is to be avoided and alcohol limited during pregnancy.

10. Lactation

Breastfeeding should be the exclusive source of infant food for the first three months of life.

UPDATING OF GUIDELINES

The guidelines are based on currently available information and prevaling scientific opinion. New information is constantly generated by research in human nutrition which may be relevant to those guidelines and recommendations. It is envisaged therefore that the guidelines will be reviewed regularly approximately every two years in order to bring them up to date.

TRANSLATION INTO PRACTICE

The following approach would help to translate the guidelines into practice:-

1. A public education programme in nutrition to be carried out by the Health Education Bureau.
2. Health and nutrition education in the classroom.
3. Extensive use of T.V. and the media.

4. Food Labelling

The following information on a label would enable the informed consumer to make a comparison between foods.

(a) Percent and type of fats, (saturated, unsaturated).

(b) Amount of Cholesterol.

(c) Amount of Sugar

(d) Amount of Salt

(e) Amount of non collageneous protein

(f) Amount of fibre

(g) Amount of alcohol

OTHER RECOMMENDATIONS

The agricultural sector can help by breeding leaner animals. The refining of cereals should be reduced (extraction rates for flour could be increased) and manufacturers including bacon curers can reduce the salt added to their products. Likewise, the sugar and fat content of processed food could be reduced.

CONCLUSION

The recommendations are based on observed associations and it would be prudent behaviour to make every effort to apply them. All we have to do dietetically to continue on a disaster course is to ignore them. Submission to the guidelines should help redress the enormous emphasis on cure relative to prevention, the former receiving some 99% of total health expenditure in most Western Countries.

ALUMINIUM IN PUBLIC WATER SUPPLIES

Aluminium is added to public water supplies to remove suspended and dispersed organic particulate matter in the process of flocculation. Organic particles exist in a colloidal suspension by possessing negatively charged surfaces, thus repelling each other and setting up electric double layer interactions between particle surfaces and water molecules. Particles also exist in suspension by partial solvation and diffusion. The addition of polyvalent cations eg. Al^{3+} or Fe^{3+} will destabilize the suspension and allow the particles to aggregate into floc s. The presence of these electrolyte species causes a compression of the electric double layer around the particles. When the range of double layer repulsive interactions is sufficiently reduced, to allow particles to approach close enough, weak van der Walls attractive forces predominate and coagulation occurs. Typical coagulants are aluminium, $Al_2 (SO_4)_3$ 14 H_2O and ferric salts eg. Fe Cl_3 and $Fe_2 (SO_4)_3$. In solution at pH 6 - 8 aluminium forms polynuclear charged hydrolysis species, chiefly $Al_8 (OH)_{20}^{4+}$. The amount of aluminium required is that determined experimentally necessary to achieve sufficient colloid turbidity removal as required, normally less than 100 ppm, range 30 - 50 ppm. Other chemicals may be added in small quantities to improve the size, toughness, and settleability of the floc formed, and these are termed coagulant aids. The original coagulant aids used were natural materials such as activated silica (sodium silicate modified), sodium alginate starch or tannin by-products. Modern synthetic compounds have also been developed mostly polyacrylamides or

substituted polyacrylamides. These are known as polyelectrolytes, all of which are water soluble, with ionizable groups along the chain. Evidence suggests that polyelectrolytes form interparticle bridges between floc particles and hence larger floc particles are formed. Typical doses of polyelectrolyte are less than 1 ppm. Floc is separated primarly, by settlement in flat or V shaped tanks and secondly by filtration.

DUBLIN SUPPLIES:

Both the Liffey/Leixlip and Liffey/Poulaphouca Waterworks flocculate with aluminium and polyelectrolyte and separate by settlement and filtration. The Dodder (Ballyboden) waterworks uses aluminium only followed by settlement and filtration and the Vartry (Roundwood) supply has no chemical coagulation treatment but instead has a slow sand filtration system.

The coagulation process is dependant on such factors as turbidity, organic colour, dissolved ions, pH and temperature. Since the amount of aluminium added is critical, not only from the point of view of flocculation kinetics but also because of the residual level of soluble aluminium sulphate remaining after flocculation, the waterworks chemist is presented with a multivariate system of parameters to take account of, on a continuous basis.

The quantity of aluminium to be added is usually determined by laboratory jar tests where different quantities of aluminium are added to cover a range of concentrations. Flocculation time and efficiency is monitored and the best flocculation concentration dose thus determined is applied in the plant.

One of the largest practical problems in the application of coagulant to water is the difficulty of matching laboratory test systems to conditions in the plant. This can be aggravated by short term water parameter fluctuations. The brown floc material and high levels of aluminium (See Table 1) found in the Dublin water supply (especially the Liffey/Leixlip) would have resulted from either the addition of excess aluminium or not allowing sufficient settling time in the tanks. The addition of excess aluminium upsets coagulation kinetics and slows flocculation (requiring a longer settling time) therefore allowing flocculation material, uncoagulated particles and soluble aluminium sulphate to pass from the settlement tank and through the filters. The presence of soluble aluminium sulphate in the distribution system results in further flocculation of particulate matter and post treatment plant precipitation of aluminium hydroxide. Subsequent agitation and water turbulence dislodges this floc material from the pipe walls giving dirty water at the consumer outlet.

The presence of aluminium floc in water is aesthetically objectionable as is the accompanying water discoloration. The presence of aluminium at levels greater than 100 ug/L causes discoloration which is enhanced by the presence of iron.

Renal failure patients and aluminium toxicity.

Soluble aluminium salts in potable water are of no toxicological significance to the consumer since these salts are minutely absorbed from the gastrointestinal tract. Elevated levels

of soluble aluminium in tap water however are of major concern to clinicians working with patients suffering from renal failure. Recent research has shown that water aluminium concentrations below 200 µg/L (used in the preparation of dialysis fluid) may result in a condition known as aluminium encephalopathy. After it was found that some patients on long-term haemodialysis developed anaemia, bone disorders, and a neurological syndrome, the analysis of brain tissue indicated a higher concentration of aluminium than in unaffected patients. It was also found that patients who developed dialysis encephalopathy were found in areas in which the water supply had a high aluminium content. A change in the method of water purification in Chicago in 1972 resulted in a higher (3-4 times) aluminium content in the water used for dialysis. Within six months, twenty patients had developed dementia, nineteen died. There was no analytical data of autopsy tissue available for this population since it was a retrospective study. The neurological disorder associated with aluminium toxicity is characterised by progressive dementia, facial grimaces, speech disturbance, myoclonic seizures and involuntary movements. The binding of aluminium with nervous tissue causes neurofibrillar degeneration. The toxicity of aluminium is related to its effects on phosphorus and phosphate metabolism ie. phosphate depletion in tissues, negative phosphorus balance, lowered phosphate absorption from the digestive tract and adverse alterations in phosphorylation reactions in the tissues.

Aluminium uptake during dialysis

The process of haemodialysis involves passing the patients blood through an apparatus consisting of a cellophane semipermeable membrane placed on a warm bath of nutrients and salt solution.

The waste products and other materials carried in the blood stream are dialysed across the membrane into the bath. During this process some trace elements including aluminium are transferred across the membrane into the blood stream. Aluminium, therefore, in either the water used for diluting the dialysate from the concentrate or in the concentrate itself (prepared commercially) has easy access to the blood stream. Levels in dialysis concentrate for most part do not exceed 200 ug/L and with dilution (1 : 35 or 1 : 120 ratio) this level becomes insignificant. Tap-water therefore is the only important source of aluminium to the bloodstream of dialysis patients. Up to 300 litres of water are used during a 4 hour dialysis period for one patient. The use of purification methods, ie. carbon filtration, de-ionizers and reverse osmosis in dialysis units serve to reduce aluminium concentrations in tapwater to safe levels, prior to its mixing with dialysis concentrate. Some problems have been experienced even with these purification methods. Excessively high aluminium concentrations in tap water causes overload of these systems necessitating frequent changes of cartridges and requiring constant monitoring of aluminium concentrations in water and in reverse osmosis effluent. Secondly, some difficulty has been encountered in adapting reverse osmosis modules with low throughputs to existing dialysis instruments. Thirdly, not all dialysis instruments have a reverse osmosis facility as the final stage in the water putrification process. Significant quantities of aluminium do exist in water which has only been carbon filtered and de-ionized.

The most desirable situation is, not only to monitor carefully the aluminium water levels before and after purification so that cartridges are removed before saturation with aluminium and other impurities, but also to monitor patient serum levels immediately

after dialysis to ensure a minimum aluminium uptake. More importantly, it is desirable that aluminium levels in tap water are kept to a minimum.

Recommendations and controls for aluminium in renal dialysis.

A C.E.C./I.U.P.A.C international workshop entitled "The Role of Biological Monitoring in the Prevention of Aluminium Toxicity in Man". "Aluminium analysis in biological fluids", made the following recommendations.

- serum aluminium concentrations should never exceed 200 µg/L
- concentrations over 100 µg/L cause some concern and would require more careful monitoring.
- concentrations from 60 - 100 µg/L cause no concern that the patient is in danger of aluminium toxicity.

For water treatment it recommended reverse osmosis, since it provides a low aluminium water content (<10 µg/L) and a low content of other cations and eliminates organic contaminants. It suggested that water for dialysate preparation should not exceed 10 - 15 ug/L of aluminium to minimise significant body uptake of aluminium during dialysis.

An E.E.C. draft proposal for a Council Directive relating to the aluminium content of water used for dialysis, dialysis fluids, and tissue fluids, specifies a limit of 15 µg/L for water intended for preparation of dialysis fluids, a limit of 15 µg/L for dialysis concentrates and 10 µg/L in dialysis fluid sold for C.A.P.D. (Continuous ambulatory peritoneal dialysis).

The limits were set in consideration of a number of facts. Namely that the Council Directive 80/778/EEC on the quality of water for human consumption did not consider aluminium as a toxic substance and therefore set a maximum admissible concentration of 200 µg/L with a guidelevel of 50 µg/L. Scientific data had clearly demonstrated a possible risk of encephalopathy from aluminium, with body bur den increases at levels of over 20 µg/L in the dialysis fluids. The efficiency of water treatment methods was dependant on the chemical form of the aluminium present in the water. A further reduction in the limit for aluminium in dialysis fluid is envisaged since the European Parliament in May I984 gave its approval to a draft directive (COM (83) 368 final) for protecting dialysis patients by minimising their exposure to aluminium. It called on the Commission to set a date by which the aluminium content of dialysis fluids should be reduced to 10 ug/L, suggesting in its amendments that, if the technical requirements can be met, this figure should be made binding as from 1st January 1988.

Aluminium concentration in Public Supplies

Tables 1 and 2 shows the results of analysis of 548 water samples for aluminium. With the exception of the raw water from dialysis purposes all waters had undergone some type of treatment, not necessarily aluminium addition. The results show that a significant proportion of water in the Dublin region had levels in excess of the E.E.C maximum admissible concentration and W.H.O. guidelevel values of 200 µg/L, with most samples exceeding the E.E.C guide level of 50 µg/L. Only a small percentage of samples were within the E.E.C. draft directive limit for dialysis waters. Some

exceptionally high values were obtained from samples from the Liffey/Leixlip and Liffey Poulaphouca supplies indicating problems with flocculation at these works. The lowest city values were recorded for the Vartry supply, where aluminium treatment is not applied. Samples from outside Dublin, overall had lower levels than within, but nevertheless having significant percentages of results above E.E.C. guide limits. Many rural supplies do not have flocculation facilities.

Michael Murphy.

Table I Aluminium levels in Waters 1/11/1982 - 3/9/1984 tested at Public Analyst's Laboratory, Dublin

Results in parts per million

COUNTY	NO	Mean ppm	Std. Dev.	Range ppm.	Median ppm	90th % Value	% > .015 ppm(a)	% > 0.05 ppm(b)	% > 0.2 ppm(c)	Frequency distribution ppm								
										0 - 0.05	0.051-0.1	.101-.15	.151-.2	.201-.25	.251-.3	.301-.35	.351 - .4	.401-.00
Kildare	57	0.137	0.159	0.005-0.995	0.102	0.258	82	68	21	18	10	8	9	6	2	1	2	1
Wicklow	8	0.056	0.041	0.014-0.135	0.053	0.075	75	20	0	4	4	1	0	0	0	0	0	0
Meath	33	0.173	0.232	0.005-1.07	0.105	0.468	85	55	30	15	1	5	2	2	3	1	0	4
Louth	5	0.I55	0.197	0.005-0.50	0.088	0.175	90	80	20	1	2	1	0	0	0	0	0	1
Westmeath	16	0.084	0.144	0.005-0.605	0.058	0.140	8I	38	6.3	10	2	3	0	0	0	0	0	1
Offaly	12	0.085	0.078	0.017-0.276	0.050	0.170	100	50	8.3	6	2	2	1	0	1	0	0	0
Laois	42	0.130	0.443	0.005-2.88	0.036	0.173	67	38	4.8	26	6	4	4	0	0	0	0	2
Carlow	10	0.798	1.80	0.005 - 5.8I	0.127	0.40	70	50	50	5	0	0	0	2	0	0	1	2
Cavan and Monaghan	108	0.304	0.558	0.005-4.9I	0.118	0.854	81	67	39	36	14	11	5	6	4	4	3	25

(a) EEC draft directive for dialysis waters limit 0.015 ppm

(b) EEC directive (80/778/EEC) Guide level 0.05 ppm

(c) EEC directive (80/778/EEC) Maximum admissible concentration 0.20 ppm.

Table 2 Aluminium levels in Waters 1/11/1982 - 3/9/1984 tested at Public Analyst's Laboratory, Dublin

Results in parts per million

Source Area	No	Mean	Std. Dev	Range	Median	90th % Value	% > 0.015 ppm(a)	% > 0.05 ppm(b)	% > 0.2 ppm(c)	Frequency distribution								
										0.-.05	.051-.1	.101-.15	.151-.2	.201-.25	.251-.3	.301-.35	.351-.4	.401-.45
Water for dialysis suitability raw & treated	38	0.098	0.141	0.005 - 0.738	0.043	0.195	81.5	42	7.9	22	4	3	6	1	0	0	0	2
City Supply, Vartry	27	0.149	0.236	0.005 - 1.22	0.079	0.265	96	63	26	10	6	4	0	4	0	1	1	1
City Supply, Dodder	27	0.534	0.540	0.03 - 2.31	0.288	1.23	100	93	63	2	3	1	4	2	2	0	2	11
City Supply, Liffey Poulaphouca	27	0.540	0.722	0.017 - 3.70	0.325	1.33	100	96	67	1	1	3	4	1	3	1	3	10
Postal Codes, D 3, 5, 9, 11, 13, & 15. (Liffey/Leixlip)	137	4.22	12.7	0.01 - 86.5	0.199	14.1	98.5	96	50	6	27	19	17	13	8	6	7	34
Postal Codes D 1,2, 7, 8 & 10 (Liffey, Poulaphouca)	75	0.694	3.59	0.008 - 30.9	0.158	0.492	97	84	40	12	12	12	9	9	3	5	1	12
Postal Codes D 6, 12, 20, 22, 24,(Dodder)	30	0.370	0.776	0.005 - 4.4	0.225	0.50	97	90	60	3	4	5	0	6	3	0	1	8
Postal Codes D 4, 14, 16, (Vartry)	29	0.226	0.188	0.005 - 0.869	0.194	0.428	93	86	48	4	4	3	4	5	1	2	2	4
Dublin County North & West	49	0.209	0.205	0.014 - 1.12	0.124	0.455	98	92	35	4	11	10	7	4	3	3	1	6
Dublin County South East	30	0.498	2.11	0.005 - 11.6	0.060	0.150	90	57	7	13	10	4	1	0	0	0	0	2

LEAD IN HOUSEHOLD DUST

It is important to know the level of lead in household dust since the environment within the house is the one to which people are exposed for most of the day. Household dust can be indirectly ingested and if resuspended can be inhaled. It is especially important for young children whose hand to mouth activity predisposes them to the ingestion of quantities of lead from dust which would be far in excess of their lead intake from either inhalation or from food.

Petrol lead emissions to the atmosphere constitute the major proportion of air and dust lead found in our streets, buildings and on household surfaces. Industrial lead emissions though causing much higher atmospheric lead levels are localised and isolated. Lead emissions from either source deposit in the form of surface dust giving concentrations of up to 2,000 ppm on street gutters and pavements and lesser concentrations inside houses. It is well established that atmospheric lead concentrations decrease rapidly with decreasing distance from the roadway hence the generally lower lead concentrations found in households. Lead concentrations in household dusts are usually less than 1000 ppm but higher concentrations can be found in heavy traffic areas and concentrations of several times this value can be found in places where the soil or outside dust lead concentration is particularly high or in the houses of lead workers. A recent study in Birmingham found median lead concentrations of 1,700 ppm and 1,600 in dusts from outside and inside houses respectively, for samples taken within 400 metres of a battery factory. It found median dust lead concentrations of 1,200 ppm

and 1,000 ppm from outside and inside houses respectively for samples taken throughout the city. These results indicate a considerable degree of contamination within the home. Household samples taken close to the factory had a large proportion (24.2%) of results greater than 5,000 ppm indicating that the physical transport of lead from the factory to the home on workers clothes etc. is significant.

Table 1 presents the results of lead analysis on 20 household dust samples taken in 1984 in residential areas around Dublin. The mean value 297 ppm is low by comparison with results from a survey in 35 U.K. towns in Great Britain with a mean of 1,263 for 977 urban household dust samples, and by comparison with the Birmingham results. These studies include samples from heavy traffic as well as residential sites which would account for some of the difference. External dust samples in the vicinity of schools in Dublin had a mean of 837 ppm for 70 city centre samples and 580 ppm for 146 suburban samples indicating the likely difference between suburban (residential) dust lead levels and city centre (heavy traffic) levels. The latter value (580 ppm) also indicates the likely difference to be found between residential external household dust lead concentrations and residential internal household dust lead concentrations (297 ppm) in Dublin.

Michael Murphy.

Lead levels on 20 household dust samples

taken in residential areas in Dublin.

No	Source	Lead in parts per million on the dried sample
1	Killester	275
2	Raheny	159
3	Rathgar	205
4	Navan Road	418
5	Glasnevin	181
6	Finglas	291
7	Ballymun	204
8	Palmerstown	287
9	Dundrum	263
10	Rathgar	503
11	Glasnevin	608
12	Donaghmede	383
13	Donnybrook	469
14	Finglas	397
15	Walkinstown	253
16	Sandymount	170
17	Clontarf	178
18	Chapelizod	55
19	Inchicore	441
20	Drumcondra	215

Median	310 ppm
Mean	297 ppm
Std. Dev.	148
Range	55 - 608 ppm

FLUORIDE LEVELS IN PIPED WATER SUPPLIES 1984

Parts per million of Fluoride

SUPPLY	Total number of samples	% Complying with the Regulations	0.8 - 1.0	0.5 - 0.7	<0.5	>1.0
Vartry (Roundwood) 17 million gallons per day	90	82.2	71	1	2	16
Dodder (Bohernabreena) 4 m gallons per day	81	79.0	64	1	-	16
Liffey (Poulaphouca) 32m gallons per day	83	67.5	56	4	3	20
Liffey (Leixlip) 19m gallons per day	85	85.8	73	2	1	9
Wicklow	51	33.3	17	17	7	10
Kildare	104	41.3	43	24	10	27
Meath	56	64.2	36	2	10	8
Louth	67	65.7	44	8	10	5
Monaghan	47	63.8	30	4	5	8
Cavan	78	57.7	45	8	16	9
Offaly	82	29.3	24	16	24	18
Westmeath	47	48.9	23	1	4	19
Longford	71	38.0	27	7	16	21
Laois	36	63.9	23	-	7	6
Co. Dublin Supply	37	70.3	26	2	3	6
TOTAL	1015	59.4	602	97	118	198

Regulations made under the Health (Fluoridation of Water Supplies) Act 1960 specify 0.8 - 1.0 parts per million of fluoride in piped water supplies. Only 59.4% of the samples tested had a fluoride level 0.8 - 1 ppm which is considered to give the maximum dental benefit to children. There is room for improvement in dosage rates in the smaller supplies. The Sanitary Authorities fluoridate water on an agency basis for the Health Boards. The cost of fluoridation is paid for by the Health Boards.

William J. Harrington.

ENFORCEMENT OF FOOD LEGISLATION IN THE REPUBLIC

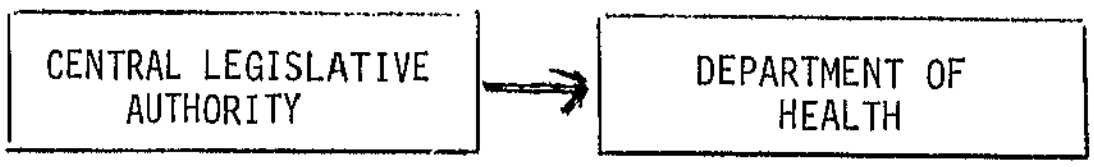
We again point out that responsibility for food control in the Republic of Ireland is very much diffused between the Department of Health (and its agencies, the Health Boards), the Department of Industry, Trade, Commerce and Tourism, and the Department of Agriculture. It would be advisable to allot responsibility for the overall control of food to a single primary agency.

The accompanying three tables indicate the complexity of the situation. It is now accepted internationally that full control can be more effectively exercised if one authority is responsible for the food from production to consumption.

Late in 1983 Mr. Bruton, Minister for Industry, Trade, Commerce and Tourism set up a co-ordinating group to examine the roles of Departments and State agencies within the food industry. While the group is very much concerned with the promotion and development of the food processing industry one can hope that some disentanglement of the legal cobweb will be a spin off from the group's deliberations.

ENFORCEMENT OF FOOD LEGISLATION IN THE REPUBLIC

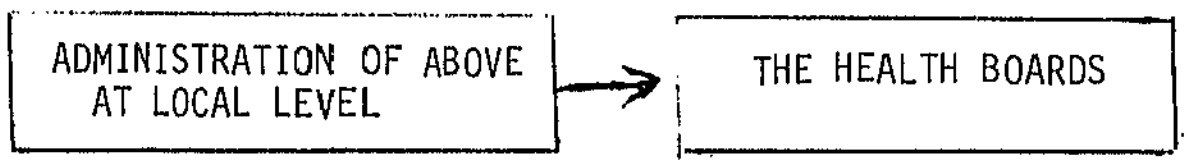
Table I



SALE OF FOOD AND DRUGS ACTS 1875 - 1936 (ADULTERATION)

THE HEALTH ACTS 1947 - 1970 (ADDITIVES AND CONTAMINANTS IN FOOD)

FOOD HYGIENE REGULATIONS 1950 - 1971
(All foods exlcuding meat and milk and fresh and smoked fish)



As regards the sale of fresh meat, bacon, fresh and smoked fish and poultry at retail level the Minister for Health has responsibility under the Food Hygiene Regulations 1950 - 71. The Minister for Agriculture has a supervisory interest but the administration at local level is by the Sanitary Authority (Corporation or County Council Veterinary Officer). However, a prosecution will be brought by the Health Board as the Veterinary Officer is an approved officer under the Food Hygiene Regulations.

ENFORCEMENT OF FOOD LEGISLATION IN THE REPUBLIC

Table 2

Central Legislative Authority	→	Department of Agriculture

Milk and Dairies Acts 1935, 1956 (Milk Hygiene) The Department of Health through its agencies the Health Boards is concerned with the recording and control of scheduled diseases e.g. tuberculosis, diptheria etc. listed in the Milk and Dairies Act 1935 (Section 40) which are likely to be caused by infected milk.		European Communities Act 1972 Pesticide Residues on Raw Fruit and Vegetables Quality Standards for fresh fruit and vegetables. Eggs. Poultry (other than retail)	Food Standards Act 1974 Sugars Potatoes
Administration at Local Level	Sanitary Authority, Corporation or County Council Veterinary Dpt	Department of Agriculture	Department of Agriculture

ENFORCEMENT OF FOOD LEGISLATION IN THE REPUBLIC

Table 3

Central Legislative Authority	→	Department of Industry, Trade, Commerce and Tourism (D.I.T.C.T)

Food Standards Act 1974		European Communities Act 1972
Jams Cocoa, Chocolate Fruit Juices Fruit Nectar s		Labelling of Prepackaged Foodstuffs Regs. 1982* S.I. No 205 of 1982 Packaged Goods Quality Control Act 1980
Administration at Local Level	D.I.T.C.T	D.I.T.C.T. *Health Boards enforce the provisions dealing with:- List of Ingredients Date of Minimum Durability Storage Conditions Instructions for use.

Monthly Mean Lead Levels in Air. 1984

Volumetric Measurements - micrograms per cubic metre

LOCATION	O'Connell St	Dame St.	Pearse St.	Kilbarrack	Branch Rd.	Ringsend	CYMS Ringsend & Ringsend H.C.	Fisher Metal Clondalkin	Mt. Pleasant Tce	Newbridge Kildare
DESCRIPTION	Heavy Traffic	Heavy Traffic	Heavy Traffic	Suburban	Industrial	Industrial	Industrial	Industrial	Industrial	Rural Towns
SAMPLING	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	During working hours	Continuous
FREQUENCY	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	-	Weekly
LEAD LEVELS										
January	0.988	0.7II	I.47	0.I86	0.237	2.40	2.4I	-	-	-
February	I.22	I.48	2.40	0.222	0.239	I.57	I.II	2.72	-	-
March	I.I4	I.56	I.43	0.I96	0.247	I.36	0.279	I.92	-	-
April	0.924	I.29	I.I4	0.206	0.36I	2.09	0.375	5.26	-	-
May	I.00	I.02	I.36	0.I38	0.I42	0.3I3	0.994	0.940	-	-
June	0.650	I.0I	I.22	0.076	0.I43	I.I7	I.76	4.82	-	-
July	I.08	0.699	I.I4	0.050	0.058	0.342	0.568	3.I3	-	-
August	0.982	I.0I	I.45	0.084	0.239	0.676	0.557	2.47	-	-
September	0.866	0.748	I.67	0.I05	0.I28	I.40	0.843 *	4.73	-	-
October	0.769	0.577	I.89	0.I22	0.285	I.36	0.437 *	5.94	9.I6 (7 day)	Newbridge Oct, Nov, Dec 0.740 Kilcullen Dec 0.892
November	I.I2	2.09	I.93	0.I36	0.426	2.30	0.487 *	4.43	0.804 (6½ days)	
December	I.77	I.72	2.I4	0.I57	0.294	2.3I	0.287 *	8.20		
Annual Mean	I.04	I.I6	I.60	0.I40	0.233	I.44	0.842	4.05	-	-

E.E.C. Directive Limit: 2µg/m^3, expressed as an annual mean

* H.C.: Health Centre

Monthly Mean Metal Levels in Air. 1984

Volumetric Measurements - micrograms per cubic metre

LOCATION		O'Connell St	Pearse St	Dame St	Kilbarrack	Branch Rd	Ringsend	CYMS Ringsend & Ringsend Health Ctr.
DESCRIPTION		Heavy traffic	Heavy traffic	Heavy traffic	Suburban	Industrial	Industrial	Industrial
JANUARY	Cadmium	0.005	0.008	<.005	<.005	<.005	0.013	0.016
	Copper	0.029	0.029	0.015	0.010	0.010	0.031	0.032
	Zinc	0.096	0.079	0.091	0.052	0.303	0.105	0.094
FEBRUARY	Cadmium	<.005	<.005	<.005	<.005	<.005	0.010	0.007
	Copper	0.119	0.044	0.124	0.076	0.066	0.137	0.094
	Zinc	0.221	0.160	0.236	0.150	1.25	0.320	0.246
MARCH	Cadmium	<.005	<.005	<.005	<.005	<0.005	<.005	-
	Copper	0.041	0.033	0.038	0.008	0.013	0.028	-
	Zinc	0.156	0.129	0.156	0.050	0.755	0.135	-
APRIL	Cadmium	<.005	<.005	<.005	<0.005	<.005	<.005	<.005
	Copper	0.043	0.035	0.030	0.011	0.014	0.033	0.011
	Zinc	0.121	0.146	0.268	0.051	0.205	0.134	0.041
MAY	Cadmium	<.005	<.005	<.005	<.005	<.005	<.005	<.005
	Copper	0.039	0.027	0.036	0.068	0.015	0.017	0.052
	Zinc	0.106	0.087	0.095	0.068	0.390	0.082	0.192
JUNE	Cadmium	<0.005	<0.005	<.005	<0.005	<0.005	0.008	<.005
	Copper	0.030	0.032	0.034	<0.005	0.014	0.021	0.044
	Zinc	0.078	0.095	0.086	0.027	0.738	0.094	0.148
JULY	Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	0.050	0.006
	Copper	0.044	0.036	0.032	<0.005	0.013	0.011	0.006
	Zinc	0.091	0.080	0.076	0.016	0.[illegible]	0.033	0.065
AUGUST	Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Copper	0.031	0.040	0.029	0.008	0.013	0.013	0.026
	Zinc	0.110	0.141	0.103	0.041	0.311	0.061	0.115
SEPTEMBER	Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005
	Copper	0.047	0.049	0.035	0.010	0.020	0.027	0.016
	Zinc	0.087	<0.116	0.108	0.046	0.429	0.102	0.060

Monthly Mean Metal Levels in Air, I984

Volumetric Measurements - micrograms per cubic metre

LOCATION		O'Connell St	Pearse St	Dame St	Kilbarrack	Branch Rd	Ringsend	CYMS Ringsend & Ringsend Health Ctr.
DESCRIPTION		Heavy traffic	Heavy traffic	Heavy traffic	Suburban	Industrial	Industrial	Industrial
OCTOBER	Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Copper	0.044	0.065	0.022	0.0I2	0.02I	0.029	0.0I9
	Zinc	0.094	0.I48	0.098	0.099	0.372	0.073	0.068
NOVEMBER	Cadmium	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005
	Copper	0.039	0.043	0.035	0.007	0.0I6	0.04I	0.0I4
	Zinc	0.II6	0.I46	0.2I5	0.056	I.03	0.I46	0.079
DECEMBER	Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005
	Copper	0.043	0.049	0.036	0.0II	0.0I5	0.026	0.0I2
	Zinc	0.II9	0.II9	0.II7	0.037	0.677	0.I22	0.059
		(CONTINUOUS SAMPLING WITH A WEEKLY FREQUENCY)						

LOCATION		Newbridge, Co. Kildare.	Kilcullen, Co. Kildare.
DESCRIPTION		Rural town	Rural town
	Cadmium	<.005 Oct,	<.005
	Copper	0.023 Nov.	0.0I5 Dec.
	Zinc	0.070 & Dec.	0.039

SERIOUS CONTRAVENTIONS OF THE SALE OF FOOD & DRUGS ACTS I875 - I936 AND THE HEALTH ACTS I947 - I970

Seven Public Analyst's Certificates under the Sale of Food and Drugs Acts I875 - I936 and thirty eight under Regulations made under the Health Acts were issued during the year in respect of samples which contravened provisions of the Acts.

SALE OF FOOD AND DRUGS ACTS I875 - I936

One sample of whiskey from the North Eastern Health Board contained I6.I% excess water, being 39.2^{O} under proof. A second formal sample (a vendor's sample) submitted by a solicitor contained I5.5% excess water being 40.4^{O} under proof. A third whiskey from Dublin City had an excess water content of 20.4 per cent by volume, being 44.5^{O} under proof.

A sample of stoned dates contained 8 saw-toothed grain beetles, 3 lesser grain beetles and I dried fruit beetle.

A sample of wheatflakes from Wicklow was infested with live and dead mites.

A sample of milk taken in Dublin City contained only 8.4I% of milk solids other than milk fat and was I.06% deficient of the minimum amount of milk solids which it should contain.

CONTRAVENTIONS OF REGULATIONS MADE UNDER THE HEALTH ACTS I947 - I970

Thirty eight Public Analyst's Certificates were issued in respect of formal samples submitted under the Health Acts. Thirty one samples did not have preservatives declared. Two others did not have preservatives declared and in addition contained excess of sulphur dioxide. Four were concerned with the presence of sulphur dioxide in minced meats (minced meat should not contain any preservative) and one certificate was concerned with a deficiency in milk fat in ice-cream.

The Preservative in Food Regulations demand thatif a food contains preservative the customer should be informed by a declaration. The customer can make up his own mind then whether he wants to consume some preservative or not. Samples of food violated by reason of non declaration were dried fruit salads, burgers, sausages, sultanas and dried apricots.

A sample of raspberry ripple ice-cream only contained 4.3% of milk fat instead of 5%.

Other Unsatisfactory Official Food Samples:

A further forty one official (non milk) samples were adversely reported on to the Health Inspectorates. Many of these were informal and outlines of the details of many of them are given here. Twenty two samples were adversely reported on because of the presence of mites and/or insects and a further sixteen samples, sausages, spice burger, sultanas, dried apple rings,

dried apricots, raisins were adversely reported on because there was no declaration of preservative (sulphur dioxide). A swiss jam roll contained I30 parts per million of undeclared sorbic acid and another cake was found to contain 275 parts per million of undeclared sorbic acid.

Sixty seven samples of milk were unsatisfactory as regards compositional standards. Fifty six failed to meet the demand of 8.5% non fatty solids, four were deficient in meeting the minimum milk fat level of 3%, four were deficient in both non fatty solids and fat and three contained added water.

Two samples of ice-cream contained only 3.9% and 3.4% milk fat instead of the legal minimum of 5%.

A red wine vinegar had 6% acetic acid declared but contained only 4.56%.

PUBLIC INTEREST COMPLAINT FOOD SAMPLES 1984

A total of 405 food samples submitted by the Health Inspectors as a result of complaints about food purchases were examined in 1984. They represented an increase of approximately 22% over the previous year. The bulk of the samples (348) were from within the Eastern Health Board area. Two hundred and sixty five (65%) complaints were considered to have been substantiated. The remainder were groundless, trivial or involved foods which were too old or too decomposed to allow an opinion to be formed about them.

Bread was the subject of the largest number of complaints (62) closely followed by meals and snacks (57). Other prominent food groups were cakes pastries and biscuits (40), meat and meat products (27), canned vegetables (22), and pasteurised milk (20).

BREAD

Of the 51 substantiated complaints about bread, 19 involved pellets of bakery char, dirty dough, finely divided char or pellets of compressed dough which had been baked in the bread. Only a very small amount of extraneous matter in a pellet of dough is sufficient to give it a dark colour which is obvious to the consumer, particularly in white bread. Frequently the pellets superficially resemble rodent faecal pellets. There were 14 incidents of foreign objects baked in bread. Fragments of cleaning cloths (2) glass (2), wood (2), stones (2), metal objects (2), twine (3) and a cigarette butt were the offending objects. Ten instances of moths, moth larvae, woodlice

or flies in bread were reported. Other problems arose from incomplete mixing of dough (3), mould growth (2), rodent faecal pellets (1), bread baked without salt (1) and physically damaged bread.

MILK

Most of the problems with pasteurised milk again arose from milk filled into dirty bottles or containers with foreign bodies. Four bottles examined had mould, algae, grit, decomposed remains of a slug or plant tissue debris adhering to the inside of the bottles. The following were found in milk bottles or other milk containers: a cellophane cigarette packet cover, cement, adhesive gum, a fragment of a broken milk bottle, resin, grit and metal fragments, a cigarette butt, a dead spider (in a plastic milk container), charred wax (in a carton). Bacterial growth in refrigerated milk without souring led to 5 complaints involving sweet curd, phenolic or bitter taints in milk. Bacillus species were prominent in such milks.

READY TO EAT FOODS

Of the 57 complaints about ready to eat foods such as restaurant and take-away meals, snacks and delicatessen foods, 30 were substantiated. Twelve of the complaints not substantiated involved allegations that the meat component of a meal or snack was not the species claimed by the vendor. There were 8 instances of foreign objects in the ready to eat foods. The items involved were pieces of sharp perspex, a clump of hairs, dust and debris, a metal washer, a cigarette butt, twine (in 3 samples), and a rubber finger protector. This latter item was served in a hamburger. At a glance it could be mistaken for a condom. There were 4 instances of spoilage of cooked sliced meats and 2 instances of mould spoilage in a sausage roll and a scotch egg. Twelve samples

contained insects or their larvae. Cockroaches were found in fish in batter, curry and fried rice. Aphids were in cooked cauliflower and a salad sandwich. Moths were found in a salad and in a curry with rice. Fly larvae were present in fish in batter and sliced ham. Flies were present in a batterburger and in a salad. A beetle was present in the bread of a sandwich. Other complaints involved green dye on the pastry of a meat pie, char particles on meat in a curry and bile taint in a cooked chicken portion. Large numbers of the food poisoning microorganism Bacillus cereus were present in a portion of fried chicken in batter which was alleged to have caused illness.

Other public interest complaints about food involved:-

1 dead housefly in a can of tuna

2 dried chilli peppers in a can of sardines

Mould growth on the surface of bottled baby food

4 instances of insects or larvae in canned vegetables

3 instances of spoilage of canned vegetables (2 cans punctured)

A mass of tomato rot fragments in tomato juice.

The core of a canned carrot filled with earth.

A bean sized stone in a can of baked beans.

A piece of corrugated cardboard in a can of tomatoes.

A large glass fragment in a jar of beetroot

Numerous char particles in canned baked beans

3 instances of insects in canned fruit

2 instances of spoilage of canned fruit as a result of punctured cans

A substantial amount of gum on the inside of a can lid.

A large piece of tissue paper roller towelling in canned peaches

2 instances of arthropods in fruit juices.

2 instances of mould spoilage of fruit juice, cartons perforated

Turbidity in a carton of apple juice, due to age.

3 instances of decomposition of flavouring oils in carbonated soft drinks.

Spoilage of an ale filled into a defective bottle

5 instances of soft drinks filled into dirty bottles

Mould growth in a soft drink as a result of a punctured can

1 dead beetle in a bottle of lemonade

A large fragment of a broken lager bottle in a bottle of lager

A yeast sediment in a bottle of cider

Yeast fermentation of an orange crush drink

4 instances of insects in jams and marmalades

1 cigarette filter tip in a jar of mincemeat

1 dead woodlouse packed with frozen breaded prawns

A 39 mm long blue plastic filament in a fish finger

12 codworms in a fillet of cod

1 dead woodlouse packed with frozen green beans

2 pellets of partially decomposed pea debris among dried peas

A 7g mass of cooking oil soaked potato debris among frozen fast-fry chips

A portion of a slug among frozen peas.

6 instances of insects or their larvae in fresh or dried fruit.

A piece of metal wire processed in pressed ham

Extensive penicillium mould in a cooked meat pie.

2 incidents of putrid chickens

2 dead houseflies in a packet of dripping

1 dead spider in a sausage

Putrefaction of vacuum packed frankfurters

Gut contents on raw meat portion

1 dead spider in a dessert mix.

1 dead spider beetle in a packet of dried infant food.

Larder beetles and larvae in soup powder.

Mould growth in a packet of tea.

A packet of sugar contained 17% salt

5 incidents of arthropods in breakfast cereals

3 incidents of insects in confectionery

A chocolate bar was tainted with disinfectant

A metal staple was present in a chocolate bar

Coconut marshmallows had a soapy taste due to age

11 instances of dry grains, pulses, nuts and flours infested with arthropods.

1.23g of insect faecal pellets among 227g of sesame seeds

41 insect faecal pellets (0.07g) among 4 oz of sesame seeds.

7 instances of insects or their larvae in cakes, pastries or biscuits.

7 instances of mould growth in cakes and pastries

2 instances of cigarette butts in cakes

2 instances of rodent faecal pellets on cake and pastry.

Spots of cement on biscuits.

Bloom on the chocolate coating of biscuits

Ester odour taint in buns

A large portion of an unused adhesive bandage in brack

A portion of a wire cored brush in a cake

A thin filament of plastic in a biscuit

Extensive rodent damage to a cake. Rodent hairs present.

A piece of bonded metal and plastic in a doughnut.

A thumb tack in a doughnut

A sharp fragment of steel in a cake

A piece of hard plastic with sharp edges in a cake

A pellet of grit in a brack

1 human hair in a packet of dried baby milk food

A piece of fibrous plant tissue in dried baby milk food

1 dead psocid in dried baby milk food

4 instances of insects or their larvae in cheese

2 packs of rancid butter

3 instances of discolouration of cheese by small amounts of extraneous matter

Lumps of hard cheese in slices of processed cheese

1 dead brown house moth in a packet of potato crisps

4 instances of cooking oil soaked food debris in potato crisps and similar products

A fragment of a metal rivet in a packet of potato crisps

1 dead insect pupa in a rum and cola drink

Mould growth in 4 freeze drink sachets.

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Mites, insects, other arthropods and their larvae, pupae or eggs found in food samples during 1984.

Canned fish 1	-	1 Dead housefly
Canned fish 2	-	1 large marine isopod crustacean
Canned vegetables 1	-	1 dead brown house moth larva
Canned vegetables 2	-	1 dead ground beetle
Canned vegetables 3	-	2 dead pea weevils
Canned vegetables 4	-	1 dead caterpillar
Canned fruit 1	-	1 dead wasp
Canned fruit 2	-	1 dead fluit fly
Canned fruit 3	-	4 dead rove beetles
Canned fruit 4	-	1 dead wasp in each of 3 cans
Fruit juice 1	-	1 dead golden spider beetle
Fruit juice 2	-	1 dead spider
Milk 1	-	1 dead insect larva "leather jacket"
Milk 2	-	1 dead spider .
Yogurt 1	-	1 dead fruit fly
Yogurt 2	-	1 dead rove beetle
Yogurt 3	-	1 dead caterpillar
Jam	-	1 dead lesser housefly
Honey	-	1 dead fruit fly
Marmalade 1	-	1 dead wasp
Marmalade 2	-	1 dead wasp
Frozen breaded prawns	-	1 dead woodlouse
Frozen vegetables	-	1 dead woodlouse
Citrus fruit 1	-	8 live mediterranean fruit fly larvae
Citrus fruit 2	-	9 live mediterranean fruit fly larvae
Citrus fruit 3	-	6 dead mediterranean fruit fly larvae
Dried fruit 1	-	10 live sawtoothed grain beetle pupae, 9 live larvae, 1 live beetle, 2 dead beetles.

Dried fruit 2	-	2 dead grain beetles, 2 dead red rust flour beetles
Dried fruit 3	-	2 dead grain beetles, 7 dead red rust flour beetles
Dried fruit 4	-	Infested with sawtoothed grain beetles
Dried fruit 5	-	3 live Indian meal moth larvae
Dried fruit 6	-	1 dead wasp
Beef dripping	-	2 dead houseflies
Pork sausage	-	1 dead spider
Dessert mix	-	1 dead spider
Infant food mix	-	1 dead spider beetle
Soup powder	-	1 dead larder beetle larva,, 2 live larder beetle larvae, 1 live spider beetle, 1 dead spider beetle
Breakfast cereal 1	-	1 dead meal moth larva
Breakfast cereal 2	-	19 live psocids
Breakfast cereal 3	-	1 dead moth larva
Breakfast cereal 4	-	1 dead brown house moth
Breakfast cereal 5	-	1 dead earwig
Breakfast cereal 6	-	18 dead crustaceans
Breakfast cereal 7	-	1 live spider beetle, 2 spider beetle larvae
Breakfast cereal 8	-	2 live confused flour beetles, 2 dead beetles 5 dead pupae
Confectionery 1	-	2 dead black ants
Confectionery 2	-	1 dead wasp
Confectionery 3	-	1 dead fly
Rice 1	-	3 dead rice weevils
Rice 2	-	1 dead moth
Rice 3	-	6 live moth larvae, 1 dead moth pupa
Wholemeal	-	Infested with psocids
Flour 1	-	Infested with psocids
Flour 2	-	Infested with psocids
Flour 3	-	Infested with psocids
Bran 1	-	1 dead rove beetle

Bran 2	-	7 live moth larvae
Wheatflakes	-	Infested with psocids
Dried fruit and nut mix	-	1 dead cigarette beetle
Bread 1	-	1 live brown house moth larva with sliced bread
Bread 2	-	1 dead moth
Bread 3	-	1 dead woodlouse
Bread 4	-	1 live brown housemoth larva with sliced bread
Bread 5	-	1 live granary weevil on bread
Bread 6	-	1 dead moth
Bread 7	-	1 dead moth
Bread 8	-	Half of 1 dead housefly
Bread 9	-	1 dead housefly
Bread 10	-	1 dead moth larva
Bread 11	-	1 dead crane fly
Bread 12	-	1 dead crane fly
Bread 13	-	1 dead fruit fly
Pastry 1	-	1 dead spider beetle
Pastry 2	-	1 dead broad-horned flour beetle
Pastry 3	-	1 dead moth
Cake 1	-	1 dead spider beetle
Cake 2	-	1 dead housefly
Cake 3	-	1 dead wasp
Biscuits	-	27 dead spider beetles
Crispbread	-	19 live Mediterranean flour moth larvae, 1 moth pupa.
Poppadams	-	3 live moth larvae, 2 dead moth larvae, 92 live spider beetle larvae.
Baby milk food	-	1 dead psocid
Cheese 1	-	34 live bluebottle larvae
Cheese 2	-	5 live bluebottle larvae

Cheese 3	-	1 dead aphid
Cheese 4	-	1 dead housefly
Fried fish in batter 1	-	1 dead German Cockroach
Fried fish in batter 2	-	163 housefly larvae
Fried beefburger in batter	-	1 dead fly
Prawn salad	-	1 dead moth
Mixed vegetable salad	-	1 dead housefly
Meat curry and rice	-	1 dead moth
Prawn and rice meal	-	1 dead German Cockroach
Meat curry and chips	-	1 dead German Cockroach
Sandwich 1	-	1 dead lesser grain borer
Sandwich 2	-	2 dead greenfly, 1 other fly
Cooked cauliflower	-	Infested with dead aphids
Sliced cooked ham	-	5 dead scavenger fly larvae
Potato crisps	-	1 dead brown house moth larva
Rum and cola	-	Fragments of insect pupa in drink

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Meat and Dairy Products examined for antibiotic residues in 1984.

Samples		Satisfactory	Antibiotic residues present
Pasteurised milk	120	118	2
Low fat milk	13	13	0
Raw milk	5	5	0
Cream	6	6	0
Ice cream	9	9	0
Fresh meat	21	21	0
Totals	174	172	2

Methodology Used:

Milk products: Delvotest method

Meat : E.E.C. 4 plate method

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RESIGNATION OF MISS CASSIDY

The resignation of Miss Una Cassidy from the Public Analyst's Laboratory on the 30th March I984 brought to an end a practice of analytical chemistry extending over fifty years.

After completing her Masters Degree in Chemistry in University College, Dublin in I932, Miss Cassidy entered the Public Analyst's Laboratory of Miss Phyllis Ryan (who was later to become Mrs. Sean T. O'Ceallaigh, wife of President Sean T. O'Ceallaigh).

In I955 Miss Cassidy joined the Public Analyst's Laboratory of Dublin Corporation under Mr. B.G. Fagan, City Analyst. Miss Cassidy was an acknowledged expert in the analyses of dispensed medicines. During the I950's a large volume of the work in the Castle Street laboratory was concerned with the analyses of dispensed medicines from dispensaries. This type of analyses was very, very demanding, the tolerances allowed in the British Pharmacopeia being very small. The analyst had to be extremely accurate and painstaking.

When the City Laboratory moved to Cornmarket in I958 Miss Cassidy took charge of the Water Section and again became very renowned for her painstaking expertise and meticulous attention to accuracy.

During the I970's she served for a period as Deputy Public Analyst. She spent the last three years of her service as the 'Officer in Charge' of the new water laboratory at Lamb Alley.

The day before her resignation all of the laboratory staff and Miss Cassidy had a farewell lunch in the Old Dublin Restaurant in Francis Street and later that evening at 5.00 p.m. many old friends including several people who had worked under Miss Cassidy in the City Laboratory and representatives from the Health Inspectorate and the Veterinary Department came to Lamb Alley to bid farewell to Miss Cassidy. Some who could not, because of distance, come personally, sent telegrams and flowers.

For several years past, Miss Cassidy lived with the late Mrs. Sean T. O'Ceallaigh at the latter's home in Donnybrook. All of the laboratory staff are very grateful to Miss Cassidy for the help and advice which she gave them over the years. We wish her a very long and happy retirement at her home in Blacklion, Co. Cavan.

APPENDIX I

ADMINISTRATIVE DETAILS (I984)

Food and Drug samples submitted by Inspectors under the Sale of Food and Drugs Acts and the Health Regulations (made under the Health Acts) dealing with Food Additives and Contaminants are designated official samples. The total number of official food and drug samples submitted from the Dublin Public Analyst's Region was 2,708.

Public Analyst's Certificates issued in respect of food samples contravening the Sale of Food and Drugs Acts..... 7

Public Analyst's Certificates issued in respect of food samples contravening Regulations made under the Health Acts..... 38

Other official food samples excluding milk adversely reported on to the Health Inspectorates..... 4I

Total number of official food samples (excluding milks) contravening the Sale of Food and Drugs Acts and Additives and Contaminant Regulations 86

Total number of official milk samples contravening the Sale of Food and Drugs Acts..... 68

Total number of official samples contravening.....I54

Percentage of official samples contravening the Sale of Food and Drugs Acts and the Additives and Contaminant Regulations..... 5.6

Total number of food samples submitted by the Public (purchasers) in public interest 405

Number considered to be genuine complaints 265

Number of water samples from Private and Public Sectors 3,II2

APPENDIX II

LABORATORY STAFF (at 3Ist December, '84)

Public Analyst	F. Hill, B.Sc., M.S., Ph.D., M.F.C., F.I.F.S.T., C. Chem., M.R.S.C.		
SECTION	OFFICER IN CHARGE	OTHER GRADUATE STAFF	TECHNICAL SUPPORT STAFF
Food	K. Moyles B.Sc., F.I.C.I., Deputy Public Analyst	-	Miss Cullen, Technician. J. Duffy, Technician.
Microbiology	V. Young B.Sc., Executive Analytical Chemist (Microbiologist)	Vacancy I Being filled	Vacancy I
Heavy Metal	M. Murphy G.R.S.C., M.I.C.I. Executive Analytical Chemist	-	-
Water	M. O'Sullivan B.Sc., Ph.D. Executive Analytical Chemist	W. Harrington B.Sc., M.I.C.I. Technical Officer (Chemical) Miss K. Whyms B.Sc., Technician	Senior Technician Vacancy being filled Miss M. Shannon Laboratory Assistant
Analytical Instrumentation	T.McEvoy, B.Sc., Ph.D., Executive Analytical Chemist	-	E. Rock, Chief Technician

Clerical Staff: Miss Duggan, Miss Boyle

Laboratory Aides: Mrs. Tyrrell, Mrs. O'Flanagan