

**THE SENSUAL ASPECTS OF FOOD CONSUMPTION/EATING**

by

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A. INTRODUCTION

The two most compulsive urges of living beings are the preservation of the individual and the preservation of the species - in common parlance the neutralization of hunger and thirst in the first case and the neutralization of satisfaction of the sexual urge in the second. These three activities, namely eating, drinking and copulating are accompanied, probably in the entire animal kingdom by more or less pleasurable sensations, but it seems that it is only the human race that is given to enhancing these pleasures deliberately. This hedonistic attitude is not uniform in space and time. There have been, there probably will always be, ages and regions which would regard the satisfaction of these urges as purely utilitarian exercises and treat even the naturally occurring pleasures, let alone their deliberate enrichment, as objectionable, even sinful.

Much has been written about the roles of eating and of sexual habits in various societies and it is perhaps no coincidence that civilizations prominent in the culinary arts, such as China, are also rich in explicit erotic literature. One is tempted to say that cookery books and sex manuals go hand in hand. This paper is concerned with food, both solid and liquid.

\* Alternative title

## B. GENERAL OUTLINE

I shall assume, perhaps rather boldly, that the enhancement of the pleasures of the palate is a desirable and laudable aim. The object of this paper then is to examine how the various processes in the human food chain affect the palatability of what we finally eat. We shall look in turn at the various categories of food, namely: Fruit and vegetables, Cereals and cereal products, Sugar, Dairy Products and Eggs, Meat and Fish, Fats and Oils: It may seem that these categories are chosen arbitrarily, e.g. fats and oils should not form a separate group but should be subsumed into 3 other groups, i.e. vegetables, dairy products and meat. However, since we shall be considering diet, it is more convenient to treat them separately.

We shall consider, for each category, all or some of the following main links in the food chain: 1. Growing or gathering, 2. Processing for distribution and/or preservation, 3. Preparing for consumption which will partly be discussed together for all categories (see section I) since several classes of ingredients are usually included in the end-product, e.g. soups, stews, cakes etc. For each process we shall ask whether the constraints imposed by economic considerations, by health hazards or dietary demands and by religious or social taboos affect the palatability or acceptability of the final product. The origins and justifications of these constraints are assumed to have been discussed in previous papers.

This is by its very nature a controversial and provocative paper. Taste is very personal and subjective and many people are likely to disagree with me. But I hope that my idiosyncratic remarks will stimulate discussion

and that a sufficiently large proportion of the Committee's membership is sufficiently interested in the enjoyment of food that at the end of the day we may arrive at a reasonably representative consensus on at least some points.

There is another caveat. Most of what I want to say will refer to European, mainly UK, and to North American practices, especially when it comes to culinary matters. While I am fairly familiar with "Western" eating habits the marvels of Indian, Japanese, Chinese, African and South American cookery are for me mainly a source of enjoyment I have little practical experience with them.

### C. FRUIT AND VEGETABLES

1. Productivity in agriculture has increased enormously over the centuries: an average 20-fold increase in crop yield since the 16th century. The particularly rapid increase during the last few decades, mostly in the developed countries, can be ascribed to intense mechanization, increased use of fertilizers and the successful fight against pests, fungi etc. There is a growing concern about health hazards caused by pesticides entering the eco-system but this need not concern us here since we are discussing taste only. The following extreme example illustrates the point. The fall-out from the Chernobyl nuclear disaster contaminated much of the vegetation of Lapland with radioactive caesium. As a result the radioactivity of reindeer meat which provides the main livelihood of Lapland rose above the level permissible for human consumption and the economy of the region will suffer

for many years to come. There is however no evidence that the contaminated meat tastes different from the safe product.

"Organic" farming which has become very fashionable in recent years is good for health, good for the environment but I do not think that there is any evidence for "organically" grown fruit and vegetables tasting better than products helped on by artificial fertilizers, pesticides etc. except that because "organic" produce commands higher prices more care is taken about freshness etc.

Higher productivity, which is regarded as an essential ingredient of higher profitability can also be achieved in other ways than by the provision of more nutrients and better protection. Plant breeders can do wonders in growing apples which can be harvested by mechanical means. All sorts of fruit and vegetables can be bred for uniformity in size, attractive appearance, less spoilage in transport, longer shelf-life - but it seems that not much attention is being paid to the deterioration in taste and the disappearance of old favourites. My experience mainly relates to England and to France, but I have noticed the gradual disappearance of Victoria Plums, of Newton Wonder and Reinette Apples and the deterioration in the taste of greengages, to say nothing of today's tasteless tomatoes. This regrettable trend is set to continue unless there is a strong and practical consumer protest. One action is already taking place in the U.K., probably also in the U.S.A. and maybe in some other countries, namely the "Pick Your Own" (PYO) system. Many fruit and vegetable farmers invite their customers to pick what they want, and the price is usually about 2/3 of what shops and supermarkets charge. The advantages are obvious. On the one hand the

grower need not worry about transportability, shelf-life, etc. so that his criteria are taste and reasonable yield. On the other hand the customer picks what he likes, can choose the largest strawberries if he so wishes and need not be lumbered with flat pods containing a few microscopic peas.

When shopping in a supermarket or at a greengrocery customers should be able to expect to be sold fruit which is either ready to eat or which would ripen in a few days. It is becoming more and more common to be sold peaches or avocados which will not ripen at all, pears which, by the time they are ripe turn brown on the insides and cherries which are unripe and tasteless. Customers should be allowed, or even encouraged, to taste, against payment, any fruit they want to buy.

2. Some of the aspects of processing for distribution and preservation have already been touched upon when we discussed, in the above section, the plant breeders' aims. Identical shapes and sizes and thick skins, e.g. for tomatoes, are further desiderata.

Methods of preservation may be divided into two broad categories: long term (15 days to a year or more) and short term (up to 15 days). Perhaps the most widespread long term preservation of fruit and vegetables is canning. But it is also one which alters the taste most since it usually involves heating. Tinned peaches have little in common with fresh peaches and it is meaningless to compare the quality of the fresh and the tinned variety: they are two different sorts of food.

The situation is different for deep frozen fruit and vegetables. No important chemical changes take place during the freezing process - in fact the basis of preservation by this method is the dramatic slowing down of all chemical changes as the temperature falls. One might therefore expect that previously frozen fruit or vegetables when brought back to ordinary temperature should taste the same as the fresh variety. This, alas, is not so, mainly because, during the freezing, the cell walls are ruptured by the ice crystals - hence the mushy consistency of rewarmed deep frozen strawberries. There are various methods for mitigating this effect, e.g. by adding sugar or by freezing very rapidly. However the latter technique which may be useful for small soft fruit, e.g. red currants or black currants, is ineffective for strawberries because of the slow penetration of the cold.

It seems surprising that we cannot deep-freeze strawberries without virtually destroying them but that we can deep-freeze various biological materials, e.g. sperm, cartilage, skin, cornea etc. without damage. The main reason for this difference is that the walls of plant cells are on the whole weaker and are more liable to damage than those of animal cells. For instance bull sperm suspended in a 10% glycerol solution in water can be deep frozen without damage - yet when I recently tried the same method with strawberries it was a failure. Whoever finds a potent cryoprotective agent which does not impair the taste and texture of strawberries could become rich and earn the gratitude of those who, through the year, would then enjoy "fresh" strawberries grown in their own garden.

This happy situation exists to a large extent with certain deep frozen vegetables, in particular peas. They are not exactly the same as freshly picked and shelled peas but are a very acceptable alternative, so that we can have "fresh" peas at any time. However, as a result of the success of deep frozen peas it is becoming more and more difficult, at least in Britain, to get really fresh peas in season. [1] Vegetable growers find it more profitable to sell their best quality produce in bulk for deep freezing than to send it to the market.

The main cause for the difference between the fresh and the deep frozen vegetables is the blanching which usually precedes the freezing. This is done to destroy the enzymes which would cause gradual deterioration even at a temperature of  $-25^{\circ}\text{C}$ . [2] Blanching, because of its heating and leaching effect, can destroy or remove an appreciable fraction of nutrients, and losses of the order at 30% to 40% have been found for minerals, vitamins, sugar and proteins. It seems that blanching could be avoided, or at least its severity reduced, if  $-40^{\circ}\text{C}$  instead of  $-25^{\circ}\text{C}$  became the norm for XXX freezer temperatures. It would be interesting to know how and why  $-25^{\circ}\text{C}$  was chosen. Could it be that thermodynamic cycles and refrigerator hardware producing  $-25^{\circ}\text{C}$  were already well developed some 30 years ago when the deep freeze fashion took off and, in the short term, it was more advantageous to use what was available than to design something new. Perhaps the time has come to review the domestic and small-scale deep freeze situation.

Mention should be made of what is perhaps the oldest method of long term storage, namely drying. It is based on the fact that chemical or biochemical changes are much slower in a solid than in a liquid. But, as in



canning, the taste of the food changes appreciably: dried peas differ from fresh ones, the character and use of prunes or raisins is different from that of the fresh plums or grapes and even reconstituted dried apricots are a long way from fresh ones, especially if they have been treated with sulfites.

We now come to short-term storage where the aim is to retain the freshness of the produce, without changing its physical or chemical properties. This is the area where the economics of large scale and long distance distribution must be judged against the demands of the lover of fresh fruit and vegetables. Obviously speed is of paramount importance but it is seldom possible to reduce the time it takes for the freshly picked produce to reach the table to under a day or two. Such a delay would seem intolerable to the connoisseur of corn-on-the-cob who would regard 3 hours as the longest time tolerable. However great advances are being made in retaining the freshness of the produce during travel and on the shelf by strict temperature and humidity control, and by storing in a gas of carefully controlled composition - the ratio of oxygen to carbon dioxide being particularly important.

It is almost impossible to ascertain the age of a product obtained commercially. If only a reliable indication of the date and time of picking the produce were given many people would probably be willing to pay more for something that was truly fresh. After all we willingly pay many times the original price for stuff which has been stored for decades such as fine vintage wines!

Long distance transport and the retailer's wish to prolong shelf life have the unfortunate result of fruit arriving and being offered for sale before it is ripe. Some fruit, e.g. pears or melons, can be ripened satisfactorily at home but not apricots, peaches or plums and the fruiterer's assurance that the fruit is ready to eat is more often than not misleading. More-over he will often discourage the customer from touching the fruit.

Finally there is one new technique ensuring longer shelf life which is permitted and practiced in several countries, including the U.S.A. but not in the U.K., namely irradiation, mainly by  $\gamma$ -rays, the same sort of radiation which is used in cancer therapy. [2],[3] Unfortunately "radiation" has become a dirty word, just like "nuclear" and people instinctively object to any process described by these two words. Thus one of the most far-reaching and most widely applied discoveries in physics of the last 50 years, nuclear magnetic resonance, universally known by its initials, NMR, has had to shed the "N" from its name. Manufacturers of a benign diagnostic tool which can perform most of the functions of X-rays and, in addition many others, without any possible harmful effect, decided that an apparatus which has "nuclear" in its name would not sell. Therefore we now have Magnetic Resonance Imaging, MRI instead of NMRI, an incomplete term because it is not specific. But this is what happens when the salesman overrules the scientist.

Radiation because of its association with radioactivity is also an emotive word and, since this irrational gut objection to treating food by

radiation is still widespread, at least in the U.K., a few words of clarification are called for.

When  $\gamma$ -rays pass through a material they damage atoms or molecules by knocking out some of their electrons. This, however, is mostly a transient effect and the damage is rapidly healed. The end effect is a conversion into heat of the absorbed  $\gamma$ -ray energy. The resulting temperature rise is small and even with the maximum permissible dose of 10,000 Gy(Gray) it would come to only 2.5<sup>o</sup>C (the Gray is the unit of "ionizing radiation dose" and corresponds to the absorption of 1 Joule per kg.).

It may seem surprising that doses of irradiation which produce only small physical effects can help to preserve food and render it harmless. The explanation is that, when the  $\gamma$ -radiation is absorbed in large complex molecules, (which rely on their unperturbed, delicate structure to function properly), or in living organisms, the effect can be such that, for instance, enzymes become inactivated and bacteria get killed. It is at this point that fears are raised. There seems to be a widespread and persistent suspicion that bacteria killed by radiation coming from a radioactive substance, themselves become radioactive, so that, by eating irradiated food one runs the same risk as from eating lamb fed on radioactive grass, the legacy of Chernobyl. There is no experimental evidence for this, nor is there any theoretical possibility of radioactivity being produced by the  $\gamma$ -rays used in this technique. On the other hand it has been demonstrated that irradiation well below the permissible limit prolongs appreciably shelf life of soft fruits, vegetables etc by destroying moulds and yeasts which cause rotting, and reduces the risks of food poisoning by poultry, meat and

fish. In flour, cereals etc. the same effect reduced wastage and the risk of contamination by toxins and inhibits sprouting in potatoes, onions etc. [2]].

The possibility of subtle chemical changes, due to irradiation, producing noxious, e.g. carcinogenic, compounds in harmful quantities has been, and still is being investigated but so far no evidence has been found for it.

For the purpose of this paper the main question remains: does irradiation, in common with all the other food-preservation methods, alter the taste? Blind tasting comparisons between irradiated and "natural" products have so far revealed no statistically significant differences one way or another. [4]. It may well be that the adoption of food irradiation on a scale to cover a substantial fraction of the market will depend on economic conditions.

#### D. CEREALS AND CEREAL PRODUCTS

Strictly speaking this chapter should be a section of the previous one which deals with agricultural plant produce. However, as cereals contribute considerably more to our energy requirements than all the produce listed in C. taken together, one is justified in treating them separately. But, although it is a separate chapter, it will be a short one since developments and innovations in cereal production in recent years have made little impact on the enjoyment of food either in the positive or the negative sense.

Perhaps the most far-reaching development in cereal production is the application of biotechnology in agriculture, mainly in plant breeding resulting in increased yields and improved quality. [5] None of these has brought about any deterioration in the gustatory qualities of flour and one benefit resulting from it is the increasing availability of diverse varieties of flour for diverse purposes.

Equally beneficial is the use of biotechnology in the attempt to replace agrochemicals, e.g. pesticides, fungicides etc., by biological control. It is not likely however that biological control will replace chemical control, except in certain cases, e.g. when residues and their toxicity are causing difficulties or when resistance to chemicals has developed.

Let me however give some examples of dietary fads which could influence, or rather try to influence, our eating habits. Many people frown upon white, polished rice, deprived of its natural vitamin B1 content and advocate its replacement by brown rice. But these two are entirely different in character, and I hope that I will never be forced, because of lack of choice, to eat brown rice with a chicken fricassée. And let us not be told, as a warning, the tragic story of the besieged British garrison in Kut-el-Amara in Iraq in 1915 which was forced to capitulate, partly because their food supplies were getting low, but mainly because 1250 out of 9000 soldiers were suffering from scurvy or beri-beri. [6] The white complement had beri-beri because their white bread was deficient in vitamin B1 but their small ration of horse flesh provided at least some vitamin C. The Indian complement refused to eat meat, on religious grounds, and developed

scurvy but escaped beri-beri thanks to the vitamin B1 provided by their ration of whole barley. We now know enough about the vitamin contents of various foodstuffs to be able to enjoy a balanced diet without having to rely on some fashionable foodstuffs for any particular nutrient. Moreover, if need be, we can correct any imbalance by additional supplies of vitamins and certain essential chemical elements.

To finish this chapter on a cheerful note let it be acknowledged that there is a growing awareness in Britain and in several other countries of the many varieties of bread people can enjoy nowadays. Interestingly the effect of one of the most significant recent technological developments in bread-making on a large scale is on the wane. I refer to the Rapid Chorleywood Bread Process, [7] developed in the late 1950s by the Flour Milling and Bakery Research Association. It is based on the addition of small quantities of harmless oxidizing agents such as ascorbic acid, bromate etc., which reduce the time it takes the dough to rise 20-30 fold. The result was the snow-white, sliced English loaf, splendid for toasting and having no discernible taste. Its days seem to be numbered and the letter which appeared in the correspondence columns of the Times in London in the 1960s would now be read with incredulity. It was from a British family describing how they had been on a camping holiday to France, taking with them such British specialities as orange marmalade, baked beans and tea, commodities which do not exist or are expensive in foreign parts. They finished their letter with the proud announcement that they ate the last of their 14 day supply of sliced, wrapped, white bread on landing in Dover!

The two previous topics (Fruit and Vegetables, Cereals), while controversial in some aspects, could be treated dispassionately, but this is not true of the topics which follow. Emotions are raised by sugar because of its association with dental caries and obesity, and by milk, butter, eggs and fats on account of the threat, real or exaggerated or underrated, of excess cholesterol and heart disease. As for meat, concern with animal welfare, the ethics of killing animals for eating, the religious precepts as to the mode of killing - these are all rich sources of intransigence, invective and intemperate indignation. I shall not try to assess the validity or the wisdom of the plethora of advice offered by countless authorities. I shall simply discuss what their effect is on the enjoyment of food and will point out, where appropriate, the fallacy of using statistical results obtained for the whole population of a country to change the eating habits of small groups of individuals.

#### E. SUGAR

The fanciful title of a famous book "Pure, White and Deadly" [8] (it is perhaps significant that in the U.S.A. it was published under the title "Sweet and Dangerous") is bound to provoke violent emotions. And yet the difference between the views of the pro-sugar and anti-sugar lobbies is not at all that great. [9] Both agree that practically all humans (and many animals) like sweet things. Both agree that sweet things are eaten partly, or even predominantly, for pleasure and not for stilling one's hunger. As a consequence sugar can and often does lead to obesity and ultimately to heart disease. Both agree that sugar is conducive to dental caries, but they also

agree that it is not the total sugar intake but rather the frequency of eating which is harmful. In other words, cups of syrupy tea or coffee taken 5 times a day are practically harmless but the same amount of sugar taken by nibbling frequently at sweet biscuits, boiled sweets, chocolate etc. plays havoc with our teeth.

For many people there seems to be no need drastically to reduce their sugar consumption. If they estimate their actual sugar consumption and compare it with the average consumption of the population as a whole and with the recommended weekly dose (in the U.K. 730 g and 380g respectively) they will find that they are well within the recommended limit and will echo the remark of Molière's le Bourgeois Gentilhomme and say: "Fancy that, I have been dieting all my life without knowing it".\*

It is interesting how, as a result of dietary fads, certain expressions which were previously used as a term of praise, developed a pejorative meaning. "Refined" as applied to sugar, is one of these. One often comes across people who refuse with horror the offer of white sugar for their coffee, but accept with delight brown sugar. And the answer to the argument that brown sugar contains certain nutrients which are absent in white sugar is that those who expect to rely on brown sugar to satisfy their need for those nutrients are indeed endangering their health.

Finally, both the anti-sugar and the pro-sugar groups agree that sugar, unlike alcohol, smoking and various drugs, is not addictive and that serious withdrawal symptoms, even when drastically reducing sugar intake, occur rarely, if at all.

\* M. Jourdain, on learning the meaning of the word "prose" exclaims:  
"Good heavens! For more than forty years I have been speaking prose without knowing it".



In conclusion I hope that we shall not see the spread of aspartame zabaione, saccharine meringues, and cyclamate brandy snaps (brandy wafers) and that I shall continue to be able to enjoy the pure, brown and deadly caramel top of a Dobos Gateau.

#### F. DAIRY PRODUCTS AND EGGS

Dairy products have, on the whole, resulted in much less heated controversy than sugar but milk was certainly the cause and the symbol of an important revolution in American nutrition. Until the 1960s milk was regarded as an all-purpose drink for all ages, for all occasions. It could even be offered as a legitimate accompaniment to a succulent steak - much to the consternation of visiting Frenchmen. All this has changed, mainly because of the realization, in 1956, that milk contains somewhat above 0.01 weight % of cholesterol which, if present at excess levels in the body, could result in coronary heart disease. Milk has ceased to be a "general purpose" drink in the U.S.A. and its place has been taken by coke, fruit juices and even by wine.

As health regulations have become stricter, especially in the European Community, most milk sold for human consumption is heat-treated (pasteurized or ultra high temperature treated, UHT) and it is becoming increasingly difficult to obtain untreated milk. Fewer and fewer people know the taste of fresh milk and certain delicacies which rely on fresh milk can no longer be made at home or obtained commercially.

An example is Clotted Cream. To make it you pour fresh milk into a wide, shallow pan (diameter to height about 5 to 1), leave it standing for about 12 hours to allow the cream to rise. Then heat it slowly in 2-4 hours to about 75°C or until you see the surface of the cream becoming crinkly. Let it cool and, finally, remove the semi-hard layer of cream, chop it up, possibly mix it with a little milk or ordinary cream and use it either instead of butter - it is very nice on freshly made scones with strawberry jam - or on fruit, compotes, etc. Now, if this is made with pasteurized milk it does not taste right and I believe that most of the "Devonshire Cream" sold in the shops is just very thick, high fat-content cream, without the clotted cream's characteristic taste and texture. But, and this is significant, there is no EC (European Community) regulation forbidding a farmer to sell unpasteurized milk to individual customers.

Unfortunately there is a tendency among food producers to blame the disappearance of certain popular products on "EC regulations". A few years ago at an Oxford Food Symposium the participants learned with indignation that it was no longer possible to produce Caerphilly, a noted low-fat cheese from Wales, since EC regulations forbade the use of skimmed milk in cheese making. It was decided to send, on behalf of the 150 members of the symposium, a strongly worded protest to the Ministry of Agriculture, Food and Fisheries asking for immediate steps to be taken to revoke the offending regulation. As a wise precaution, before sending the telegram, enquiries were made which revealed that the claim about an EC prohibition was sheer fantasy.

## G. FATS AND OILS

Fats seem to raise fewer passions than sugar and, apart from the skirmishings of the butter and the margarine brigades, there seems to be broad agreement on most important points. One is that the total average fat intake of the population should be reduced and the other is the connection between coronary heart disease and the level of cholesterol of the body and/or high saturated fat intake. So, as far as gastronomy goes, once the daily or weekly ration has been decided upon, and how much of it should be lard (if any) and oil, the choice is between butter and margarine. Now butter is high in saturated fats and in cholesterol, while margarine comes in all sorts of compositions which are conscientiously indicated on the label in the U.S.A., but not in the U.K. Since several authorities believe [10] that the cholesterol level of blood depends more on the intake of saturated fats than on the intake of dietary cholesterol, the choice is between butter on the one hand and margarine, low in saturated fats, on the other; their cholesterol content is of less importance. (I hope that this remark will not be taken as an invitation to replace butter by eggs in the diet. Weight for weight eggs contain about twice as much cholesterol as butter; 1 large egg is equivalent to 100 g of butter!). So, if your only consideration is the reduction of real or imagined health hazards, you should change from butter to polyunsaturated margarine. However, if the quality of the food is to be considered then the choice is personal and must be based on experimentation. The following few examples show what I mean:

1. Two cheese soufflés, one made with butter, the other with margarine but otherwise identical, showed no difference in taste or in texture.
2. Two sets of "Ischl tartlets" (biscuits made of flour, sugar, ground almonds and butter or margarine, sandwiched with raspberry jam and covered with chocolate icing) were made, one with butter the other with margarine. In a blind tasting they were identified by 80% of the people. When, on another occasion, they were offered with their fat-ingredient indicated the preferred choice, even before tasting, was the butter variety.
3. I like fried bread which sops up a lot of fat - I now use margarine and find the result satisfactory.

I finish this chapter with a nostalgic remark. There used to be in England a biscuit, savoury not sweet, sometimes called the Rolls Royce of biscuits, which had a delicate but recognizable flavour of fresh butter. What happened to the Wheaten biscuits of Romary's of Tunbridge Wells?

#### H. MEAT

As mentioned earlier I shall not discuss the ethics of eating meat but shall concentrate on the effect of the practices involved in bringing the meat from the farm to the table.

1. The rearing of animals. It is obvious that the taste of meat will depend to some, or even to a large extent on what the animals are fed on. Thus in my native Hungary lamb and mutton had a strong and unpleasant taste and it was not till I came to England that I discovered the excellence of the meat of animals reared on pastures. It is likely, though it has not, to my knowledge, been clearly demonstrated that the physical condition in which the animal (or bird) has been reared, his "life-style", has an influence on the quality of the meat. On the assumption that it has, let us discuss briefly what is being done to ensure that the animal's life is reasonably happy. A French dairy company had for its advertising a laughing cow "La Vache qui Rit". It is true that a few years later a competitor came out with "La Vache Sérieuse", but it was a pensive, not a sad cow. Moreover some people will remember that Carnation brand evaporated milk came from "contented cows".

In the U.K. the treatment of livestock is governed by the Agriculture (Miscellaneous Provisions) Act 1968 and I quote from it two sections relevant to this discussion:

1(1) Any person who causes unnecessary pain or unnecessary distress to any livestock for the time being situated on agricultural land and under his control or permits any such livestock to suffer any such pain or distress of which he knows or may reasonably be expected to know shall be guilty of an offence under this section.

3(4) A failure on the part of any person to observe a provision of a code (of recommendations for the welfare of cattle) for the time being issued

under this section shall not of itself render that person liable to proceedings of any kind; but such a failure on the part of any person may, in proceedings against him for an offence under section 1 of this Act be relied upon by the prosecution as tending to establish the guilt of the accused unless it is shown that he cannot reasonably be expected to have observed the provision in question within the period which has elapsed since that provision was first included in a code issued under this section.

The following brief extracts from the code for Pigs gives an idea of the character of these codes:

"Good floor design and adequate maintenance are of paramount importance. The lying area should always be kept dry and pen floors, particularly the dunging area should be drained effectively".

"Given the opportunity, the pig eats fibrous material, also roots about and makes a nest and uses a separate dunging area. Bedding, and especially straw, contributes towards the needs of the pig for thermal and physical comfort and satisfies some of its behavioural requirements".

The Government has issued so far Codes for Cattle, Domestic Fowls, Pigs, Rabbits, Sheep and Turkeys and it seems that the recommendations are modest enough to be acceptable for profitable commercial production.

I have consulted a group of producers [12] who follow a code somewhat stricter than that of the Ministry and who moreover do not add growth promoters - hormones - to the feed. It appears that the premium one has to

pay at the retail butcher, above the price of the non-welfare, "factory-farmed" product is 10% for lamb, 15% for beef, 18% for pork and 30% for chicken.

2. The slaughter of livestock. There is definite biochemical evidence that if animals are under stress before being killed the quality of the meat may be considerably impaired. The working muscle draws its energy from glycogen [13], a carbohydrate constituent of the muscle, and the result of this reaction is lactic acid. When the animal is killed the muscles still continue to work for some time, producing lactic acid which is essential for the quality of the meat. If, however, the animal is under stress or is exhausted before slaughter the glycogen supply is depleted, no lactic acid is produced during rigour mortis and the result is Dark, Fibrous, Dry (DFD) meat of low quality and reduced shelf life. This simple biochemical explanation seems to be accepted by at least some law courts.[13a] Thus a Finnish slaughterhouse successfully sued a group of young musicians and secured their eviction from a nearby building when a correlation was proved between their hours of practice and the production of DFD meat. The report unfortunately did not mention what sort of music it was - I suppose it was rock rather than Mozart.

Similar explanations have been given for the method of slaughtering turkeys in the country districts of Hungary. The cook or the farmer's wife armed with a sabre-like knife, strolls into the farmyard where the unsuspecting turkey pecks about and with one swift blow severs the turkey's neck [14]. No pre-killing stress or exhaustion, hence perfect meat.

The effect of stress on the quality of meat brings us to the question of ritual slaughter and, as I have emphasized earlier on, I am not concerned here with the degree of pain, which may be higher or lower in ritual slaughter than in other methods, but which probably has no gastronomic consequences. I believe that, according to the rules, the animal (or bird) must be in full possession of its senses before being killed, which excludes stunning before slaughter. The question is whether rendering the animal inebriated before killing would be permissible. This method would probably greatly reduce stress - I believe that in the first world war troops were given rations of rum before going into battle. The animal can be rendered drunk by intravenous injection of ethyl alcohol and, by choosing the right mixture (whisky, brandy etc.,) the flavour of the meat could be influenced. I quote from a letter by a friend which proves that this method is practicable: "The only points at which my science ever related to cooking were in my youth, when I used to pluck, prepare and roast chickens previously used in acute physiological experiments (the Nembutal added a slight gamey flavour), and dreamt about doing a transvascular perfusion with a appropriate wine on an edible species".

3. Distribution and Preservation. Much of what has been said about fruit and vegetables in chapter C applies also to meat and need not be repeated here, except for the reminder that deep freezing has a less deleterious effect on meat than on fruit. Smoking is an additional method of preservation for meat products and irradiation by  $\gamma$ -rays should be seriously considered for poultry to reduce the incidence of salmonella poisoning.



## I. PREPARATION

Religious dietary laws have a great influence on the order of the courses of meals and on the variety of ingredients permitted; they can also have important consequences. Thus, until the reformation fish was a fairly important part of the English diet, largely because of the prohibition of eating meat on Fridays and during Lent. The reformation changed this and the decline of the fishing industry became so pronounced that, in the second half of the 16th century, Fridays were declared as fish days, and later Wednesdays were added [15].

Jewish dietary laws are well known and there is no hardship in having to observe them during visits to Israel. Some of the results of the observance of the Sabbath seem puzzling but there must be a good explanation for them. Thus I was always surprised at being able to get freshly made, boiling hot tea or coffee in hotels, while toast was forbidden.

Ostriches seem to represent another interesting anomaly. As the skin of these birds is very valuable ostrich farming on a large scale has been started in the Negev. It seems however that ostrich meat, which is apparently tasty, has been declared non-kosher and one wonders why. Could it be that the ritual killing of an ostrich may not be practicable?

Perhaps the most important part about modern technology and food preparation is that pre-cooked dishes and whole meals which need only warming up are becoming more and more widespread. But a similar change is also taking place in high class or "gourmet" catering thanks to the

development, mainly by the Roux brothers, of cooked, deep frozen, vacuum packed dishes. Will this mean that restaurants can in future dispense with the preparation of main dishes and serve Coq au Vin or Canard à l'Orange cooked centrally by some of the great chefs and their staff? Perhaps such restaurants will display - or will be compelled to display - notices saying "Nothing served in this restaurant has been prepared on the premises". And will this development have an influence on home cooking? Will hostesses or hosts, instead of trying to impress their guests with their culinary skills, delight them by offering Poulet Marengo by Albert or Michel Roux?

#### J. ADDITIVES

These are natural or synthetic substances which are added to food to make it safe or to make it look attractive or to improve its flavour. There are some 4000 permitted additives and, of these, about 3500 are flavour additives, and only about 50 are used for colouring. [16] In the U.K. the total amount of additives consumed per year is 150000 tonnes, i.e. about 3 kg. per person. Expressed as a fraction of the total food intake it is 0.04%. This seems to be unduly large, but one must remember that many of these additives are naturally occurring substances. Thus, out of 50000 tonnes of flavour additives only about 7000 are synthetic. Nevertheless, irrespective of whether they are natural or synthetic, they must be called additives if they are not naturally present in the food in question. Take a-carotene which gives milk and also butter its yellow colour. If you add a-carotene to, say margarine, it must be listed as an additive and its European Community number E160 must be stated.

Concentrated flavour additives (natural or synthetic) seem to be gradually replacing natural flavouring substances. Many people are apparently ignorant of the fact that vanilla flavour need not come out of a bottle but can be obtained from the vanilla pod. At a recent meeting attended by food technologists, nutritionists etc. I asked during the discussion on additives, why it is that the manufacturers of vanilla essence do not add small black granules to the liquid. Hardly anyone in the audience understood my point, since they did not know that custard prepared with a vanilla bean always contains vanilla seeds.

#### K. CONCLUSION

As the reader will have noticed this paper was prepared as a discussion document. I raised a number of questions but did not try to answer them. But to give the reader an idea of where I stand - if they have not already gleaned it from reading these pages - I finish with three quotations.

"I have been saying in my lectures that people should enjoy life, and in particular, should enjoy eating. I recommend that people eat what they like, except for cutting down on sugar, and in addition that supplementary vitamins be taken". [17]

"Nutrition by the numbers is no guarantee of the good life and probably precludes it by overriding the calls of appetite and pleasure". [18]

"There is a vein of puritanism in the British character. This leads to the invention of spurious reasons for stopping other people from enjoying themselves. Christianity used to be twisted to this end. But with the decline of organised religion, other pretexts have been needed. Where the good of the soul used to be argued, now the good of the body is advanced: thou shalt not smoke, thou shalt not drink, thou shalt not eat the wrong foods, indeed thou shalt frequently fast, or diet, to use the modern term. Practices which used to be commended in the name of Christ are today promoted in the name of the Health Education Council.<sup>U</sup> [19]

References [1] - [19] to follow.