

FOOD CONTROL IN ACTION

**Edited by
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FOOD CONTROL IN ACTION

*Institute of Food Science and Technology Summer Symposium, held at the
University of Surrey, Guildford, UK, on 25–27 July 1979.*

Preface

Early in 1974 Ralph Blanchfield, then Secretary of the Institute of Food Science and Technology of the UK, focused attention on the professional aspects and role of the Institute, particularly as a qualifying body. Towards the end of the same year a working party led by Professor Alan Ward drew up plans for a qualification which included examinations, the passing of which, combined with considerable and suitable practical experience in the food manufacturing industry at postgraduate level, conferred the title of Master in Food Control on successful candidates. It was an ambitious project and demanded ambitious candidates because nothing less than the complete activity of ensuring that wholesome food reached the consumer was the area covered. Since 1978, when the examination was introduced jointly by the Institute of Food Science and Technology of the UK, the Royal Institute of Chemistry, and the Institute of Biology, thirty-three Masterships have been awarded.

The control of the characteristics and quality of manufactured food is a topic of direct concern to agriculturalists, to all those involved in food production and distribution, to those who teach food science and technology, to Government Agencies and the Enforcement Authorities, and, finally, to informed consumers and those—nutritionists, dietitians, home economists, etc.—who advise or educate them about food. This volume, which is based on a symposium of the Institute held in July 1979, is the first to elaborate on the principles and practice of total food control as applied to food manufacture and distribution. It meets the needs especially of technologists in the food industry and in food distribution taking part in control operations. It is required reading for the Mastership in Food Control examination.

The reasons and a framework for overall control in food manufacturing

and distribution operations are elaborated from the food technologist's point of view in the first paper, entitled 'Philosophy of Food Control'. There follow a series of interlinked papers, for each of which the author was given a strict editorial brief delineating his subject. Nevertheless, the reader will find some repetition of subject matter and ideas but presented from different viewpoints. The Editors have deliberately allowed this overlap because it demonstrates the inter-relationships among the various parts and aspects of control and the integration necessary to produce the total control function. No attempt has been made to impose an arbitrary common nomenclature upon the authors, particularly with regard to the term 'quality' and industrial functions. The terms and definitions they use reflect no more than the practices within their own companies. As time passes we hope that as the term 'food control' becomes better known it will become more widely used, with a commonly accepted meaning.

My part in bringing about the collection of the papers was that of task-master for the briefs set, a role undertaken with some initial apprehension. I should not have feared: the authors' ability to control within the constraints of the market place was exemplary notwithstanding that their products were being given away. After each paper there appears a discussion. This was led and recorded by the person whose comments are given first in the text. For the cheerfulness and patience with which the authors and recorders endured the slings, arrows and mind-bending editorial activities of myself and my colleagues we are all very grateful.

P. O. DENNIS

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1

Philosophy of Food Control

J. RALPH BLANCHFIELD

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'Philosophy' may seem an unduly grandiose term to introduce, but I use it to indicate an intention to go beyond and behind the 'nuts and bolts' of food control, and to pose in relation to it the sort of age-old fundamental questions about meaning and purpose and rationale that philosophers pose.

What I am *not* going to do is indulge in sterile argument about semantics or the supposed meanings and alleged relative merits of terms like 'quality control' or 'quality assurance' as differently interpreted by different people. I intend to concern myself with the substance rather than with the terminology.

I am using the term 'food control', not because it is a whim of mine to do so, but because the term was adopted, after a very careful and lengthy consideration, by the Institute of Food Science and Technology of the UK, not only to describe a function and a field of activity wider and more comprehensive than is normally encompassed by terms such as 'quality control' or 'quality assurance', but also to designate a Mastership—the first and at present the only postgraduate, post-substantial-experience qualification signifying proven ability to accept top responsibility for this function in a manufacturing context, namely the Mastership in Food Control.

Let me start by indicating some of the things which 'food control' is not.

It is *not* the restricted area of food legislation and its enforcement, though I am well aware that the term is sometimes used in official and regulatory circles as a convenient verbal shorthand to refer to that area. For example, Alain Gerard, in his '*An outline of food law*',¹ written for the FAO, stated:

'In the broad sense food control is often understood as comprising all

those measures, of whatever kind, which the government sees fit to introduce with a view to protecting consumers of food. In the strict sense, however, food control consists of all those institutional and procedural arrangements whereby the effective observance of the food regulations by producers and tradesmen may be verified and enforced'.

Verbal shorthand can be useful provided everyone concerned understands and remembers that it is verbal shorthand. Even Dr. Gerard's broader definition is on a par with saying that the nature and character of your progress along a road is 'controlled' only by traffic laws and the actions of traffic police. They are certainly part of the picture, but how can one ignore the influence of such factors as the kind and condition of your car? Or your ability as a driver? Or the skill and assiduity with which you continually monitor and evaluate the complex of data being fed back to you through your instruments and your senses about your car's behaviour, about road conditions, about other traffic, and so on? Or the efficiency and promptness with which you continuously take appropriate consequent actions?

Certainly, the food controller has to know about food legislation and its enforcement, has to operate within legislative and other constraints, and has a professional responsibility to contribute to the proper development of legislation. But food control is concerned not merely with establishing whether what has been done and produced conforms or conflicts with legal requirements and dealing appropriately with infringements and transgressors, necessary as those activities undoubtedly are. Food control is also concerned—and I submit much more centrally concerned—with the technical measures taken before, during, and after production to ensure that the products comply, not only with all the legal requirements, but also with many other requirements which the law does not and often cannot specify. This primary task must rest squarely with responsible professional food scientists and technologists exercising the function in industry. The official inspection/sampling/testing is secondary and supplementary—which is not to deny its necessity and importance. So food control is not synonymous with legislative enforcement but is much wider in scope and with its centre of gravity elsewhere.

Nor does food control limit itself to the statistical, chemical, microbiological, physical, and sensory methodology and techniques which are essentially the tools which food control uses to do the job—and are thereby part of the job but not the job itself. It is, of course, desirable to have a wide range of likely tools at one's disposal; it is vital to know how to select

the most appropriate tool for a particular purpose and, having selected it, to know how to use it properly.

Again, food control is a much wider subject than that of the scientific and technological factors affecting food product quality. It would, of course, be impossible to carry out effective food control without thorough and extensive knowledge of the physical, chemical, biochemical, microbiological, nutritional, and other characteristics and behaviour of foods, and of the principles and practices involved in the conversion and stabilisation operations and processes comprising the technology of manufacture, storage, distribution, etc., of finished food products. Without it, how could one translate required product properties into raw material and packaging specifications, ingredients formulation, processing and storage procedures, conditions, and precautions? How could one establish the connections and relationships between properties required and parameters selected for specification and measurement? How could one establish what tolerances may be acceptable on particular parameters? How could one decide (other than by rule of thumb) what modifications and adjustments to formulation or to processing conditions will produce what qualitative and quantitative effects, when control results indicate that something should be done? How would one understand how to exercise control so as to produce consistent products from inherently variable biological materials? How could one possibly take on board products and processes with which one has had no previous experience?—and that is essential in these days of product diversification, mergers, takeovers, and technologist mobility among companies and even among sectors of the food industry.

No doubt some will have noticed the use, a few moments ago, of the naughty word 'quality'. I am not going to argue with anyone about what it means or ought to mean. It suffices if I tell you what *I* mean when *I* use it today, so that you will know what I intend to convey. The classical definition is:

'the composite of those characteristics which differentiate between individual units of product and which also have significance in determining the degree of acceptability of that unit to a buyer'.

That definition has been around a long time and may be sanctified if not fossilised by age. Provided that one understands cost as being one of the characteristics, one would not quarrel unduly with the definition except perhaps on grammatical grounds. I would, however, prefer to paraphrase and clarify it as:

'a multi-component measure of the extent to which the units of a

product, which a seller is willing and able to offer at a price, consistently meet the requirements and expectations of the group of buyers willing and able to buy that product at that price'.

I do not claim the above as an authoritative or superior definition, but I like it because it explicitly covers all such aspects as my friend's dissatisfaction with his Fiat 128 which admits water into the boot when it rains; my own complete satisfaction with my own well behaved Fiat 128, which, however, would not satisfy one of my neighbours because for him it's the wrong colour; or another neighbour who prefers a Ford at a similar price; or another who, at the same price, prefers a secondhand sports car; or another who likes a Fiat but needs the larger boot of a 132 model; or another whose price limit stops at a Mini; or another who prefers to travel by bus and spend his money on hi-fi stereo instead of on a car; or those of you whose tastes and incomes run to Rolls-Royces; or the unreasonable fanatic who will only buy a car if accompanied by a cast-iron 100% absolute lifetime guarantee against accident.

At any rate, my definition is given as my explanation of what the reader should understand me to mean when I use the shorthand term 'quality'. This definition also indicates, as indeed the reasons outlined for the essential importance of knowledge of the relevant scientific and technological factors equally indicate, why food control is not limited to monitoring what goes on in the production area, although that monitoring, with rapid feedback of data and advice on which appropriate action may be taken, is an essential constituent of food control. The totality of control must, however, be considered as extending much further in both chronological directions; from participation in all aspects of the design of the product and methods of ensuring that it is capable of being achieved in practice; through the monitoring/feedback process to ensure conformance with design, supplemented by checks on a representative proportion of product units to ensure compliance with legal and company standards; to the subsequent behaviour of the product, its quality characteristics when it reaches the consumer, and the consumer's reaction thereto.

Thus the scope of food control, as a function, is extremely wide, but nonetheless limited, not least by the four major constraints within which it has to be performed, as well as by the fact that it has to be performed in a real-life complex system in which other functions also operate and exert their intentional or fortuitous influence on product quality.

When reference is made to constraints, many people's hackles rise—but unjustifiably. A guard rail around a dangerous chasm is a constraint, but a

valuable safety aid. The lane markings on a road, intelligently used, will help you keep to your desired route instead of inadvertently being led astray, to say nothing of minimising the risk of head-on collisions. So a constraint is not necessarily a malevolent restriction on freedom of action. Nowhere is that better illustrated than in the first of the four constraints indicated, the quality requirements of the market.

What is the point of developing and manufacturing a supposedly 'better' product which people do not want to buy or consume? We can all think of products which have appeared and disappeared through failure to comply effectively with that constraint. Important considerations for our present purpose, however, are the steps taken to define the market aimed at, to obtain and evaluate information on its requirements, and to establish quality of design and practical methods of conformance, with participation of the food control function in so doing.

The second constraint is that of cost. This also springs clearly from the requirements of the market, for the cost allowable in the production of a product must be related to what amount can be sold at what price. In maintaining a balance between product quality and product cost it is important to keep costs down to standard as well as to keep quality up to standard. Many factors involved in cost are outside the direct influence of the food control function, but others can and should be influenced, directly or indirectly. The Study Guide for the Part III examination for the Mastership in Food Control sets out the main influences of food control on product costs on a continuing basis as follows:²

1. Raw materials—by specification and buying sample evaluation, assisting the purchasing function to obtain both the right raw materials and value for money; by evaluation of bulk deliveries ensuring that they conform to specification and/or buying sample.
2. Production—providing the effective means whereby production can consistently conform to product standards, thereby not only maintaining consumer satisfaction but also minimising costly rejection or reworking of sub-standard product.
3. Risk prevention—minimising the risk of defective products reaching the consumer or becoming the subject of a prosecution (the cost of which, in harm to the manufacturer's reputation, may far exceed any fine).
4. Incentive schemes—recommending that any incentive bonus scheme aimed at maximising quantity of production has an effective inbuilt quality factor which penalises any sacrifice of

quality below the agreed standard, coupled with being alert for bonus-earning unauthorised 'short-cuts' by operators causing otherwise inexplicable quality defects.

Elsewhere, the Study Guide refers to the need to bear in mind such factors as raw material prices, wage rates, and energy costs when choosing raw materials and process specifications, while recognising that subsequent inflation of such costs is entirely outside the influence of the food control function.

In addition to all these aspects of the interaction of food control with the cost constraint, there is of course the cost of the function itself. Whether a company treats that cost as a cross it has to bear, whether it regards it as an insurance premium, whether it regards it as an activity which probably more than repays its cost but unquantifiably so, or whether it attempts the somewhat dubious task of justifying the cost of control in terms of quantified savings it produces, the cost is still part of the overhead that the products will have to bear. This raises the question of how a company decides what scale of control function to mount and maintain. Too little is probably money and effort down the drain; beyond a certain level, the laws of diminishing returns and of Parkinson both come into play, plus the generation of unwarranted complacency. Somewhere in between those two extremes? But where, precisely? This also concerns the constraint of 'the organisation', which is discussed later. The manager of the food control function is the most competent person to advise the company on value for money in control effort, but even an established reputation for responsible professionalism may not entirely outweigh a maybe totally unjustified suspicion of empire building. In these circumstances both the manager and the company may prefer to seek an additional and independent opinion from a consultant. There is, however, no doubt that the efficiency and productivity with which the function is organised and carried out has a tremendous bearing on what can be achieved with a given amount of resources, and greatly depends on the skill and ability of the food control manager.

The third constraint, that of legislation, has already been mentioned. Both the design of products and their conformance with design must comply with the legislation of the country in which they are made or the country in which they are to be sold (in some instances, both) as regards vertical and horizontal legislation affecting composition and ingredients, in some instances nutritional characteristics, hygiene and environmental conditions under which they are manufactured, and the nature and form of

information which must be provided to the purchaser about them. Mention has also been made, however, of the responsibility of the food controller to contribute to the proper development of legislation. Food legislation has not been, and is not, a static immutable edifice; on the contrary, it is in a state of continuous development, reflecting the changing needs of society, technological developments, and newer knowledge in fields such as nutrition and toxicology. In many countries, and certainly in the UK, the legislation-making and modifying processes provide ample opportunities, at several stages, for the food controller to contribute. These opportunities have been made use of effectively in the past and present, where the food controller has acted as the technological spokesman for the company or for a group of companies comprising a trade association of a section of industry. Such contributions clearly cannot disregard the interests of the company or industry concerned, but from long personal experience I would say in general that they are made in a way that also reflects the personal integrity of the individuals concerned. Moreover, it can be claimed, without fear of contradiction, that food legislation has evolved over the years more effectively, less ambiguously, more realistically, and more workably, and indeed more in the public interest, through just such contributions; conversely, one can call to mind some of the nonsensical draft legislation documents (for example, some of those emanating from Brussels) prepared by worthy and well meaning drafters who had obviously never been involved in the manufacture of anything nor seen the inside of a factory. Nevertheless, valuable though contributions from the technological spokesmen of industry have long proved to be, and continue to be, they do tend to be regarded—and reasonably so—as ‘representations’ of sectional interests, along with representations by other sectional interests such as consumerist bodies and various enforcement bodies. In recent times, however, an entirely new feature has appeared on this scene, at any rate in the UK. This is the consequence of the emergence of a clearly defined profession of food science and technology, and of the Institute of Food Science and Technology as its incorporated professional qualifying body. Consisting as it does of members in industry, in teaching in higher and further education, in research establishments, in enforcement, and in government, all bound to adhere to its Code of Professional Conduct and its particular requirements concerning wholesomeness of food, when the Institute speaks in consensus it does so, and may be clearly seen to do so, grinding no sectional axe, and offering not ‘representations’ but objective advice and comment.

The fourth constraint affecting the food control function is that of ‘the