



Basic Principles Underlying a Legislative Framework for Vegetable Protein

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ABSTRACT

New food products appear on the market every day in one country or another. Provided they conform to the food laws currently in operation, there are no obstacles to the sale of such foods. The question is asked as to why special provisions are sought for or are needed to enable foods based on vegetable protein products to be marketed. The discussion given mainly centers on developed countries with "Western" type diets; developing countries and countries with traditional soy products are briefly mentioned. The four main viewpoints, of which account has to be taken, are outlined. These originate from the consumer, the manufacturer, the government regulatory and health authorities, and finally the enforcement authority where this is independent of the regulatory authority. Each of these contribute, in differing degree, to the questions of safety as regards health, nutritional adequacy, labeling and absence of deception, and the ability to enforce such regulations as may be needed. The extent to which a system of regulations formulated to meet the various safeguards asked for by one or other group still offers scope for commercially viable products is discussed. There may be conflict between the attitude of some manufacturers anxious for rapid commercial success linked with the measures which would satisfy their requirements and the long term development of vegetable protein products as an accepted sector of the food market. Indications are given of what might constitute a framework for legislation.

INTRODUCTION

At almost every meeting, seminar or symposium with the title "vegetable proteins" or "novel proteins" or "soy protein foods" in Europe or America, a paper or session is devoted to "legislative problems." The present session gives expression to the viewpoints which recur at these varied gatherings.

In most countries represented at this conference, there exists a stable framework of food law within which new foods, new ingredients for foods (other than new additives) and variants of existing foods can find their way into the market, without special legislation. They are required to conform to the provisions of the general food laws of the countries in which they are sold. These state that foods must not be harmful to the consumer, even if eaten on a number of occasions over a long period of time, and that they must not be deceptive in themselves nor be labeled inadequately or deceptively, nor must they be advertised in ways such as to mislead. They must be produced and marketed in accordance with the existing rules of hygiene. They must also not contravene any specific regulations, standards of identity or legally binding specifications which are in force for particular types of foods.

Why is it that for vegetable protein foods, in contrast to many other new foods, it seems necessary to change these

familiar provisions and safeguards to enable the products to be promoted? Why cannot vegetable protein foods find their way into the market place within existing legal frameworks? From which directions or interests does the impetus come to provide special or modified controls and legal provisions? Is it even possible, except by "bending" current attitudes to food law, to provide a framework in which current versions of these foods can succeed commercially on a substantial scale? These are questions which need to be answered during the present session and its associated Round Tables. A limited measure of commercial success has indeed already been achieved in launching vegetable protein products for general consumption, in conformity with existing laws, even in countries with "Western" diets. Why cannot such examples form a guide to future developments? Progress has also been made with products directed at the restricted vegetarian and health food markets. It must be said, however, that the latter market seems often to permit suppliers to make claims which, without attracting legal penalties, stretch credulity.

Despite these limited successes, it is claimed, mainly by manufacturers, that restrictive meat product regulations and labeling laws are an obstacle to the development of vegetable protein products.

Experience is notably different in countries in which soy beans and their fermented products are traditional foods. As the food industry has developed in these countries, so the normal transition which replaces cottage food production by factory processes has occurred. Fermented soy foods have become widely consumed factory made foods. No more arguments arise concerning their legal status and labeling than for any other foods. Japan is the leading source of such food products and exemplifies this development (1).

Yet a third state of affairs arises in those developing countries in which vegetable protein foods in the customary diet have been limited to simple uses of the indigenous pulses. Food law in these countries requires, in order to safeguard the rural population and the poorer urban dwellers, to be directed strictly to assisting satisfaction of basic food and nutritional needs. So, any steps to permit or encourage replacement of nutritionally valuable local foods by more expensive processed foods, unless the latter have overwhelming nutritional advantages, must be avoided. Foods intended to be consumed in such countries must be able to withstand the home hygiene conditions they will meet, without adding to existing health risks from this source.

This paper concentrates on legislation related to "Western" diets, because this is the area of major discussion with which the papers at the present session are almost entirely concerned. In terms of human nutritional importance, protein-rich vegetable foods have in the past and will in the future play their most important role in developing countries, but legal measures, as mentioned above, have a different part to play in these countries, a part that is much more dependent on general considerations of economic and nutritional policy. It is a very welcome development

that the wider implications of vegetable protein foods are to be looked at within the context of the Codex Alimentarius Commission (2).

My own experience of food law in relation to vegetable protein foods is based on two reviews (3,4), the content of which was entirely within Western dietary conditions. In the following sections, I shall comment briefly on the attitudes towards special legislation for vegetable protein foods taken up by the four main interested parties – the consumer, the manufacturer (including the distributor and caterer), the government and the enforcement agency (if separate from the government and the legislative function). I shall try to set out some of the points which require separate legislative provisions for the control of vegetable protein foods.

THE CONSUMER

Almost all organized consumer opinion is now firmly wedded to the concept that the consumer shall be informed as fully as possible of the nature and ingredients of all foods which are presented for retail sale. The transition to self-service sales has progressed so far that no reliance can be placed on the adequacy of verbal information to supplement the information on the label – indeed, words used by the shopkeeper were often an unreliable source in the past! Reactions to “novel” foods of whatever type vary from person to person as well as from country to country and even the context in which they are encountered is relevant. “Snack” or “fun” foods which are novel are not rejected for that reason and their successful introduction is an amalgam of their own intrinsic appeal and the marketing skill with which they are presented. Rarely, however, can they be classed as direct substitutes for established products, rather as alternatives, although the degree of novelty is not often great.

There is a much more skeptical and less responsive reaction to new basic foods intended to have a major dietary role. This skepticism is particularly well marked when substitutes for well liked basic foods are encountered. The normal assumption – regrettably often based on experience – is that newly developed substitute foods are inferior to foods they seek to replace. So either a sharp price differential is required as an inducement to purchase, or the source of difference or degree of substitution must not be sufficiently clearly presented to alert the consumer. For most consumers it is the main labeling panel that conveys any information sought, since it contains the product name, any illustration of the product and the brand or manufacturer's name. The list of ingredients is examined by very few consumers, and of these still fewer examine every purchase in this way. It could be argued that a sufficiently attractive product, which gives high customer satisfaction after sale, will in time succeed commercially, despite any handicap to initial sales arising from correct, informative labeling. But a slow build up of sales, largely by person to person recommendation, does not fit most approaches to marketing. So it is likely that even very good products will face marketing problems, arising from the label, needing compensation by a substantial price reduction in comparison with the original foodstuff.

Consumer organizations rightly demand reassurance on product safety. By the quirk of common misconceptions about chemicals in foods, this requirement is much more strongly directed at additives than at the wide variety of chemical substances, by no means all harmless toxicologically, in natural foods. Consumers also require that replacements for customary foods shall be nutritionally adequate. But this concept is not always sufficiently related to the real dietary needs of population groups. The acceptability of substitute or alternative foods may very often depend on initial reactions to the way in which the foods first become known to the consumer. So the earliest

widespread or widely publicized use of the foods may influence subsequent acceptability and uses. The institutional use of vegetable protein foods, which allows reductions in expensive meat and fish ingredients in main meals, is usually undertaken by governments or local authorities as part of an economy campaign. This has certainly been the stated reason of some local authorities in the U.K. when introducing textured soy products into school meals.

Advantages to the manufacturing industry of securing an opportunity to convince the next generation of the acceptability of soy products, as well as of acquiring some useful sales, must be weighed against the judgment of parents on the merits of products, the purpose of whose introduction is clearly to keep down the meal cost. It is a challenging thought as to the possible effect on the future marketing of extrusion textured soy flour if the public becomes aware of its current contribution to pet foods!

THE MANUFACTURER

Manufacturers of vegetable protein ingredients see their approach to legislation as falling into at least two areas. The first mainly concerns nontextured soy flour, concentrate and isolate, although it would apply equally to gluten or any other high protein vegetable products. These ingredients are widely used in a variety of foods, including meat products, with the stated aim of improving some property or properties of the product. Such uses parallel the employment of small percentage of casein, albumen, gelatin, etc., in foods. Manufacturers are usually content that such “functional” uses should be controlled either by general food laws or, if there are special provisions limiting the potential additional ingredients for some products, by being allowed to use the vegetable protein products under the same rules as other protein preparations, e.g., casein. The consumer only meets vegetable protein additions of this type in the list of ingredients. Indeed, in some instances (e.g., bread and flour in the U.K.) no such list is at present required, and the consumer would have no means of knowing that a vegetable protein ingredient (e.g., soy flour) was present. The arguments for application of the normal labeling rules to these vegetable protein additions are persuasive, especially if universal ingredient listing is accepted, provided that their applications is restricted to uses where the vegetable protein has a real function to serve in the product, such that even a small addition confers detectable benefit. It must, however, be noted that such additions, equally with casein and other proteins, increase the estimated nitrogen and protein contents of the product and also complicate the task of the analyst in enforcing any compositional regulations involving protein contents or contents of meat and fish. It must also be noted that added vegetable protein products normally appear in the list of ingredients in a position corresponding to their dry weight. They therefore appear of little significance compositionally, since the ingredients meat and fish are listed according to their weights in their normal state, which corresponds on a fat-free basis to 80% water.

The second use of vegetable protein products being developed by food manufacturers is one where the vegetable protein (e.g., textured flour or concentrate) is either the main texture-giving component in a food or shares this function with other ingredients, especially in practice with meat or fish. For some meat products, especially where the meat is chopped or comminuted, the change in properties produced by including a modest proportion of vegetable protein product can be represented as an improvement (e.g., reduced cooking loss and less change of shape on cooking as shown by beefburgers with partial beef replacement).

For others (e.g., pies from meat and vegetable protein products), it is more a question of trying to retain

acceptable quality, with an addition of vegetable protein product which is economically worthwhile. In many countries (4,5), the level of meat in meat products is either controlled directly, as a minimum percentage, or indirectly, by specifying the amounts of nonmeat ingredients the addition of which is permitted. Either form of regulation effectively prevents substitution of the main meat content by textured vegetable protein products. Addition of extra vegetable protein, where the regulations take the form of a minimum meat content, in order to convey an impression of enhanced meat content, increases cost over that of the normal product, so conferring only minimal benefits. Such use is unlikely to provide a wide market. It is from this situation that the stated need of manufacturers for relaxed meat or fish products regulations comes, in order to allow substitution to take place. But in practice the difficulty has then to be faced by manufacturers that such relaxation is likely to be linked by regulatory authorities with labeling requirements whose purpose is to make the consumers aware of the change! Consumer reaction may then require a substantial price reduction to encourage sales of the mixed product.

Additional to the picture which we have of a well organized manufacturer of food products, with his skilled technical staff and team of legal advisors, is that of the small butcher or charcutier with a few of his own "manufactured" products (sausages, patés, pies). These are often sold unwrapped and unlabeled. The butcher's wish is to add whatever ingredients are cheap and conveniently to hand and to sell the product on the basis of an experienced judgment of acceptability. Reliance is placed on suppliers for technical advice and often for knowledge of food law. Aid is also sought from trade journals and trade associations. In many countries less stringent requirements apply to "labeling" non-prepacked products, and attempts to change this situation are resisted by small manufacturers as impracticable. Indeed, enforcement of labeling, where this requires nearby notices or tickets, is not easy, in part owing to the very large number of small "manufacturers" involved. Even less controlled and less controllable are the caterers, whose products are in general fully subject to food law. For caterers, the variety of descriptive and fancy terms available and usable for naming dishes in menus offers great scope for variation of ingredients. But measures enacted which are regarded as appropriate for and accepted by large manufacturers may have consequences for sales by caterers which need to be foreseen. Otherwise, the law may be brought into disrepute by being inoperable in relation to catering, although catering is not excluded from its scope.

Perhaps, as has been implied above, the most important issue of principle for the manufacturer to decide in relation to product development and in seeking to influence legislation is the relative weight to be given to short term and long term considerations. There can be little doubt that vegetable protein products must in the long run gain acceptance on their own merits because of their desirable properties, and not depend on being bought because of public ignorance of their presence in products sold because of their association with meat and fish. Any concealment of the extent of the usage of vegetable protein in human foods tends to provide scope for an "exposure" by the media, which would harm the future for vegetable protein foods as well as the standing of the food industry. This is not only a theoretical possibility, as the recent press and television campaigns in the UK concerning the introduction of excessive water into traditional foods has shown. Indeed, an early experiment to test the acceptability of vegetable protein products in school meals in England ran into just such a front page journalistic campaign in the local papers. But against the need to seek a long term steady growth of public interest and of purchases of vegetable protein products, manufacturers will say that unless sufficient sales

arise reasonably quickly, the development and promotion costs of the products cannot be covered, and the future of vegetable protein products will then be nil. It is not my task to resolve this debate.

THE GOVERNMENT

Governments are involved with the development and marketing of foods containing vegetable protein products in four main ways. The first comes under the heading of health and public protection and encompasses nutritional aspects of their use and any safety and hygiene hazards which may arise from their consumption. Second, there is the continuing governmental concern with the identity, labeling and advertising of foods. Third, governments wish to encourage a vigorous food industry in all its branches and ramifications. This concern should include care for the catering industry as one sector of the food chain, but this aspect tends to be a neglected, though large corner of the whole. Fourth, there is the concern all governments feel for the agriculture of their own countries, which results in differences of attitude to indigenous foods, such as meat and milk, as against foods which have to be imported as raw materials or as processed products (e.g., for most European countries the soybean and its products).

Safety of food is a common interest for all and is not in principle a subject for debate. It is not, however, simple to devise measures suitable for controlling food safety, other than leaving it to the general principles of food law which make manufacturers responsible for the safety of the foods they supply and also to the regulations and codes of practice which require caterers and distributors, as well as manufacturers, to operate in a hygienic manner. The framework for additive safety testing is inapplicable to the testing of the safety of foods, the nutrient content of which has to be taken into account in planning trials. Indeed, it is doubtful if animal experiments can be regarded as reliable guides to human response to foods, in order to detect toxicity and the presence of antimetabolites and allergens.

Increasing attention has to be given today by governments to the cumulative effect of a growing mass of restrictive legislation on the ability and willingness of the food industry to continue a program of innovative research and development. So new measures need to be carefully scrutinized to make sure that they protect the public against real and not theoretical risks and that they are limited to specific, defined objectives. Many protein-rich vegetable products offer, as raw foods, potential risks - antimetabolites, toxins, contamination with aflatoxins. New processes applied to the raw materials may also release or produce chemical compounds with potential toxicity. As examples, the presence of toxic substances has delayed the development of the oil seed residues from cotton seed and from rapeseed as human food sources. A liberal view of these problems (3,4) makes use of the criterion of previous widespread consumption as human food as evidence of safety, together with a recognition that most physical processes applied to food raw materials do not produce hazards to health if hygienic rules are properly observed. The UK government is considering setting up machinery (6) to review the acceptability of novel foods or novel food processes which may have implications, not previously evaluated, for the nutrition or safety of humans consuming the foods produced. This approach covers a much wider area than just novel protein foods, although it arose in this context (3). These foods are likely to be an important element in the work, in particular if sources other than the soybean are exploited for human consumption.

Few governments maintain sufficiently complete surveys of the nutritional status and intake of the populations with which they are concerned to be able to forecast the real

consequences of any dietary changes on those populations. Mostly the tendency has been to overinsure against deficiency, especially in respect of minerals and vitamins, in part because of the minimal risks (if vitamin D and iron are excluded) from any excessive consumption of these nutrients. An easy but not always correct solution is to require matching of nutrient levels between substitute foods and the foods they are intended to replace.

So, for foods promoted as replacements for traditional foods, it is expected or required by many authorities that they will have at least the nutritional status of the foods they replace. This attitude is perhaps excessively stringent, when applied to nutrients which are already consumed in excess from other food sources. This point was taken into account in the nutritional advice given to the U.K. Food Standards' Committee and to the EEC Study Group (4).

Most contentious in this area is the question of protein quality and needs. There are divergences between nutritionists concerning human dietary requirements for protein and the extent to which the protein quality of each of the different foods which make up Western diets can be given separate significance. A majority of nutritionists would accept that almost all groups of the population in Europe and North America have an intake of protein in excess of their physiological needs, largely because protein foods are liked and enjoyed. In a mixed diet, vegetable protein foods, in common with other protein foods, contribute to protein nutrition, but there are few grounds for thinking that an increase in protein consumption is at all necessary. What should be the reaction of governments to foods promoted as "protein-rich" in these circumstances? Should the protein quality be required to exceed some arbitrary figure, based on animal or analytical tests, neither of which may have any relevance to the protein nutrition of the population concerned? On the other hand, there are good grounds for requiring evidence that the protein has not been unduly damaged during processing, since safeguards in this respect are likely to reduce the destruction of other nutrients which can be damaged by heat or oxidation.

The most important remaining legislative question facing governments in relation to vegetable protein foods is the prevention of deception of the public, in particular if replacement of meat, fish, egg, or milk in food products is to be permitted. It is doubtful if any measures which are fully successful in informing the public about the replacement of such prestigious ingredients as meat and fish by vegetable protein products will satisfy those wishing to market such mixed products. Manufacturers may well consider that comprehensive labeling provisions will, at least initially, act as a deterrent to public acceptance of the foods. Compromises are likely to lead to misinformation of the consumer, who is in any event not normally a gifted observer of the small print on labels.

One method of reducing potentially harmful reactions to mixed products containing vegetable protein is to limit the extent of substitution of meat, fish, etc. in the products with which these foods are traditionally associated. This reduces the extent of dietary change, in particular for any sectors of the population (e.g., in institutions) for whom there might be a more substantial dietary change than for the population as a whole. By monitoring the extent of changes in dietary patterns, the consequences of vegetable protein consumption can be followed over a period of time. If hazards arise, they should be detected before the consequences are serious.

By limiting the amount of replacement, it is also easier to devise labeling rules which give adequate information to the consumer. Confusion arising from a very wide range of products is minimized. Some reassurance is also given to the farming community that they will not face heavy inroads into the market for meat suitable for manufacturing purposes.

So quantitative limitation of substitution offers a number of attractions to governments, and such measures have appeal for consumers. The acceptability of such control to manufacturers rests on the commercial viability of mixed products with only limited substitution, in particular on the quality of such products and their costs. It is difficult to assess the importance of these points without a period of experience with limited replacement permitted, followed by a reexamination of the situation.

ENFORCEMENT AGENCIES

Enforcement agencies, whether run by central government, state authorities or local authorities, normally see themselves as representing and standing in for the consumer, but have less concern than the government itself for the welfare of agriculture or of manufacturing industry and the effects of legislation on that welfare. So proposals for regulation originating from the enforcement side tend to be stringent and sometimes unrealistic in relation to the industry's problems. At the same time, the real problems of small traders (e.g., butchers) are directly known to enforcement officers, so that they are well placed to comment on the probable consequences for such businesses of particular regulatory measures.

It is widely recognized that there are ready opportunities for the abuse of vegetable protein products by the illegal partial replacement of meat. The analytical difficulties of demonstrating such breaches of the law, to the satisfaction of a court, have deterred prosecution in instances where there has been little doubt that an offence has been committed. This is a serious situation which may in time reflect adversely on the whole vegetable protein industry, including manufacturers who have consistently emphasized the need to conform to current laws. It could make the proper introduction of the controlled use of vegetable protein products more difficult to achieve. It is to the credit of some industrial companies that they have directed research efforts to solving the analytical problems (7), so as to ensure effective quality control and enforcement.

This last year or two has seen such progress towards creating analytical and microscopic methods for detecting and quantifying protein mixtures (8) that it is likely that enforcement of compositional regulations will be fully reestablished for meat and fish products. Factory inspection provides a further powerful enforcement technique in detecting breaches of compositional limits. The extent to which inspection can be used in this way depends on the form and structure of food laws in particular countries.

OBSERVATIONS AND RECOMMENDATIONS

Two attempts (3,4) have been made to discuss the range of problems with which this paper deals, and to suggest solutions. It is perhaps simplest at this stage to list measures which have been put forward, starting with those which command the widest acceptance and moving on to those which are rather more controversial.

(a.) Where any source of vegetable protein products has not been used extensively for human food, evidence of its safety and broad nutritional suitability should be required. It is appropriate that the evidence should be referred to an expert committee or other authority for evaluation.

(b.) Where any chemical or other processes are used in preparing vegetable protein products which raise doubts about the safety of the products or their nutritional contribution, then again they should be referred to independent expert scrutiny.

(c.) For populations with "Western" diets, there is no point in requiring that vegetable proteins shall be fortified with amino acids to increase their apparent nutritional quality. It is reasonable, however, to ensure that the nutritional quality they possess shall not be seriously impaired

by adverse processing conditions.

(d.) No obstacles other than implied in (a,b,c) should be placed in the way of selling vegetable protein products marketed as such, which do not involve imitation or substitution, as long as they conform to existing food laws.

(e.) Where vegetable protein products are used as replacements or partial replacements for traditional foods or food ingredients such as meat or fish, prescribed levels of nutrients, which the latter would otherwise supply and which are significant in the diet of the countries concerned, should be required.

(f.) Use of small proportions of vegetable protein products in meat, fish and other products for "functional" reasons should only be subject to the generality of food laws. The term "small proportion" requires rigorous interpretation.

(g.) A limitation of the extent of substitution of vegetable protein product for meat, fish or other traditional food ingredient in the products which they characterize is desirable to protect consumers from rapid change and from confusion.

(h.) Quantitative declarations, in appropriately comparable terms for meat, fish etc., and for vegetable protein products, are essential for all mixed foods (except under (f.) above), either on the main panel of the label (prepacked foods) or as a notice or ticket (non-prepacked foods). No other measure is likely to allow the consumer freedom to make purchases on an adequately informed basis.

(i.) Except under (f.) above, all product names should be appropriately changed, when the foods are based on mixtures of meat, fish etc., and vegetable protein products. Either under (h.) or (i.) it needs to be made clear to the consumer what is the source of the vegetable protein (e.g., soybean, peanut) and an indication of its processing (e.g., textured). This is required even at present when, except for a little gluten, virtually all products are based on the soybean.

Much detailed development of these points is given in the two Reports (3,4), and they are illustrated in some existing regulations (5). Those who have been concerned with the problems discussed above for some years will welcome the impact of fresh views on them, but with some

skepticism that magic solutions are there to be divined.

For the food industry, the undoubted lesson is that the prime objective must be safe, nutritionally satisfactory products *which consumers wish to eat*, and for which they are prepared to pay an economic price when they are fully aware of the nature of the product being purchased. In view of the progress made so far, it is reasonable to expect that the industry's scientists, technologists and developers will in due course enable this to be achieved.

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REFERENCES

1. Watanabe, T., H. Ebine, and M. Okaola, in "New Protein Foods," Vol. 1A, Technology, Edited by A.A. Aitshul, Academic Press, New York and London, 1974.
2. Hutchinson, J., "The Status of FAO and Codex Alimentarius Developments on Vegetable Proteins," World Conference on Vegetable Food Proteins, Amsterdam, 1978, p. 227.
3. Food Standards' Committee, Report on Novel Protein Foods, HMSO London, 1974.
4. Report of the Study Group on Vegetable Proteins in Foodstuffs for Human Consumption, in Particular in Meat Products, Commission of the European Communities, Eur6026, Brussels, 1978.
5. Brincker, A., "Review of European Legislation on Vegetable Proteins in Meat Products," World Conference on Vegetable Food Proteins, Amsterdam, 1978, p. 000.
6. Proceedings, Institute of Food Science and Technology, 1978, 11:(2)104.
7. Llewellyn, J.W., A.C. Dean, R. Sawyer, F.J. Bailey, and O.H.S. Hitchcock, J. Food Tech. 13:249 (1978).
8. Olsman, W.J., and B. Krol, "Methods for Detection and Determination of Vegetable Proteins in Meat Products," Report of the Study Group on Vegetable Proteins in Foodstuffs for Human Consumption, in Particular in Meat Products, Appendix VII, 1978, Commission of the European Communities, EUR6026, Brussels.