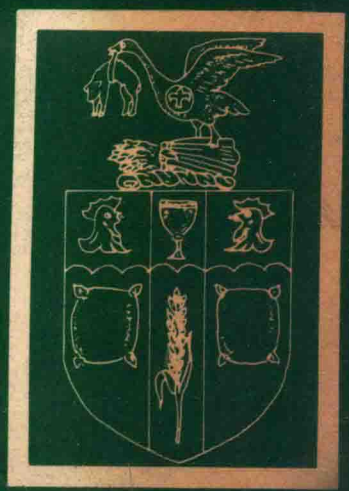
SYMPOSIUM

Foreign Bodies in Foods

19th June 1985

Joint Organisers: CFPRA, The Institution of Environmental Health Officers and the Department of Trading Standards

Campden Food Preservation Research Association



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FOREIGN BODIES IN FOODS

Proceedings of a symposium held
on Wednesday 19th June 1985,
at the Royal Garden Hotel, Kensington, LONDON

CHAIRMAN

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Director, AFRC Food Research Institute
Norwich

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P R O G R A M M E

FOREIGN BODIES IN FOODS - A REVIEW OF THE DATA

David Arthey and Alison Reynolds

First of all, may I, on behalf of the Campden Food Preservation Research Association, welcome you to this Symposium today, which has been organised in collaboration with the Institution of Environmental Health Officers and the Department of Trading Standards. I would like to take this opportunity of thanking the Members of the Working Party, who have been so very helpful to us in putting together the day's events, and we are all very encouraged by the support you have given us by the numbers present today. Thank you for coming.

The Symposium has been in preparation for a long while, and several R.A. Panels have indicated the need for such a meeting where the free exchange of discussion between the food industry and the Home Authorities can take place. I believe that the decision to hold the meeting at this time is very opportune because it comes when all relevant authorities are considering the Ministry of Agriculture, Fisheries and Foods Consultative Document of the Review of Food legislation.

The general purpose of this short paper is to set the scene regarding the hard facts, that is, the number and nature of foreign bodies found in our foods today and to compare this data with those for the past few years. This sort of information is not easy to come by but probably the best source is the British Food Journal which regularly records prosecutions and each spring publishes a summary paper for the preceding year. Much of the information presented in this paper is taken from that Journal but it is important to recognise from the outset that the information given in the British Food Journal is based on notified prosecutions; it is not therefore necessarily complete or comprehensive.

In an attempt to augment this data, we have received, in confidence and at our request, details of the individual experiences and trends from eighteen major food companies in the UK, and whilst this detailed information cannot be discussed or passed on, I am able to use it to support the information from the British Food Journal, to expand on it in certain areas, and to indicate general trends over the past five years.

Table 1 shows the total number of cases of food prosecutions reported to the British Food Journal for the past seven years. Although there are slight fluctuations from year to year, there is no general trend either upwards or downwards, and this basic information is supported by comments from the food industry. Some companies indicate a slight decrease in consumer complaints over foreign bodies, others find a slight increase, but many state that the level of complaints is stable. The conclusion must be that there is little if any trend in either direction.

TABLE 1

TOTAL NUMBER OF CASES REPORTED TO THE BRITISH FOOD JOURNAL

1978	1979	1980	1981	1982	1983	1984
982	912	968	1107	938	1052	1074

It is useful to be able to break these basic figures down into more detail and Table 2 shows in percentages the major causes of food prosecutions over the same seven years. Of the seven different categories listed, the first three - foreign bodies, mouldy food and food hygiene - account for approximately 90% of all prosecutions in each year. The category foreign bodies is by far the most important single item and in itself accounts for nearly 50% (sometimes more) of all food prosecutions. This figure of 50% is confirmed by comments we have received from the food industry and endorses the importance of addressing ourselves to this subject today.

TABLE 2

THE MAJOR CAUSE OF FOOD PROSECUTIONS 1978-1984

(percentage)

	1978	1979	1980	1981	1982	1983	1984
Foreign bodies	53.1	51.6	44.1	42.1	45.9	46.1	51.2
Mouldy food	14.5	11.7	14.8	15.6	13.6	13.9	14.0
Food hygiene	22.2	27.1	31.8	27.0	28.8	27.0	26.7
Compositional	1.8	1.4	1.6	1.9	2.2	2.3	2.3
Milk	1.3	1.1	1.4	1.1	0.7	0.7	0.7
Unfit food	2.6	3.0	2.8	4.8	5.1	7.1	5.1
False descriptions	1.6	1.4	1.3	4.3	3.2	2.9	1.7

Source : The British Food Journal

Food hygiene is the next most important category with mouldy food coming a distinct third. It would be true to say that if the major three groups are removed, then the remainder of the prosecutions are relatively insignificant (around 10% only) - except, of course, to those by whom they are caused. It is interesting to note that over the seven year period, the relative position of each category in terms of importance has changed little.

Of course, this information does not give any indication of the number of complains of foreign bodies in relation to the number of packs sold. This does differ according to the product, and in soft drinks in glass and manufactured dry foods it seems to be at its lowest with about one complaint per two million packs for the former, and about two complaints per million for the latter. Imported products contain rather more foreign bodies, and seventeen complaints per million packs have been quoted as the figures for imported canned fruits.

Recipe products differ according to ingredients and vary between ten and thirty complaints per million packs. In general, products such as fruits and vegetables suffer from a higher complaint rate than homogenous manufactured products. Another aspect of the statistics is, of course, the degree to which the product figures in the diet, and this aspect is examined later in this paper.

Table 3 shows the incidence of contaminants, and thirteen different groups are listed. Consistently over the seven year period, metal and insects have vied for first place in the table. Metal takes all forms and may be present in the raw material or have fallen from the high speed equipment so often used in our food plants today. Insects do not have to be whole to qualify, and legs, wings, wing cases and other portions of their anatomy, all qualify for inclusion in this category, as do larvae, slugs and snails. There is a general feeling in the industry that, whilst metal may originate from equipment used to manufacture or process the product, insects are more often introduced from the raw material, particularly when that raw material is imported from abroad.

TABLE 3

INCIDENCE OF CONTAMINANTS (NUMBERS)

	1978	1979	1980	1981	1982	1983	1984
Metal	108	101	105	145	105	115	109
Insects	121	115	99	132	101	110	117
Glass	52	43	31	52	48	36	48
Animal	33	36	25	37	24	24	28
Dirt/Debris	32	23	37	26	28	21	42
Fabrics	20	25	21	22	22	16	18
Rubber	7	4	6	-	16	5	-
Tobacco	37	15	14	18	12	20	21
Plastics	7	10	6	11	6	8	12
Wood (matchsticks)	10	10	9	7	8	9	15
Paper	10	5	6	10	6	19	16
Oil (rust)	12	6	-	5	4	5	3
Unassorted	73	70	58	55	39	42	115

Source : The British Food Journal

Glass is consistently the third most important group, and is particularly serious because it can lead to the need for surgery to repair the damage or to remove it from the unfortunate consumer. Animal matter and dirt/debris are fourth and fifth in the league table with the former being rightly described as the most repulsive by the British Food Journal because it includes faeces. Tobacco continues to be a problem and indicates that the regulations concerned with smoking and food handling are still being breached. This is supported by the presence of matchsticks in foods under the heading of 'wood'.

In the latest figures for 1984, the term 'rubber' is dropped and the term 'stones' appears for the first time. The importance of stones as foreign matter is often greatest in processed vegetables where stones are introduced with the raw material, particularly where that raw material is imported. It is interesting to note that some Government standards, even in highly developed countries, actually permit stones to be present in raw materials for export to the UK for processing.

Table 4 indicates that the position in the league table for the relative importance of each group has not changed significantly - certainly over the last seven years. At the same time, the numbers of prosecutions for individual groups of foreign bodies as reported to the British Food Journal has not changed much either, except for 1981 when there seemed to be a noticeable increase for that year, but only in the top four groups.

The final consideration to be made in this paper is the type of food in which foreign bodies occur. Judging from the list supplied by the British Food Journal there are few, if any, foods in which foreign bodies are not found. However, some groups seem more prone to foreign bodies than others. This could partly be due to the fact that some foods are consumed nationwide in far greater quantities than others. This must be true of bread which is the category at the top of the list for foreign body prosecutions. The major contaminants of bread are metal and insects, with fabrics, including string and hessian bag material, coming third. Milk also suffers from many contaminants but mainly glass and insects. Dr. Martin of the British Food Journal takes great delight in explaining surprisingly, that there are nearly always complaints about paper in milk and these generally are notes to tradesmen such as 'no milk today'! Cakes and biscuits and meat pies, together, form a third major category, again with metal being a major contaminant. Meat products tend to suffer from foreign matter derived from the animals used to produce them, and might therefore almost be called extraneous animal matter in much the same way as we use the term extraneous vegetable matter, except that sometimes such material can be harmful if it is composed of sharp bone.

TABLE 4

NUMBER OF FOREIGN MATTER PROSECUTIONS AMONG DIFFERENT FOODS (MAJOR CATEGORIES) 1978-1984

	1978	1979	1980	1981	1982	1983	1984
Bread	92	104	95	109	93	89	107
Cakes, biscuits	23	31	41	32	19	35	28
Meat pies	42	37	34	25	18	19	38
Fresh meat	13	8	15	9	14	18	27
Sausages	20	12	20	13	11	6	14
Milk	71	76	70	79	81	85	82
Sugar, confectionery and chocolate	15	19	5	37	25	21	18
Canned foods	16	14	11	22	15	10	6
Meals	21	21	22	9	15	28	28
Cereals	14	19	10	10	11	23	21
Others (see Table 5)	47	49	47	56	37	49	74

Source : The British Food Journal

Table 5 shows the products at the bottom end of the list, that is, those that are responsible for the least number of prosecutions. Figures for soft drinks are low as indicated earlier in this paper.

TABLE 5

NUMBER OF FOREIGN MATTER PROSECUTIONS AMONG DIFFERENT FOODS (MINOR CATEGORIES) 1978-1984

	1978	1979	1980	1981	1982	1983	1984
Fruit pies	7	3	-	-	-	-	7
Hamburgers	7	-	5	-	-	-	6
Fish products	9	5	7	7	4	17	18
Baby foods	7	-	-	-	5	7	5
Soft drinks	7	-	10	-	-	-	8
Chips	4	11	13	28	12	11	14
Flour	6	5	-	3	-	-	-
Ice cream	-	9	4	-	-	4	-
Sandwiches	-	6	4	6	7	-	16
Pastry	-	10	4	12	9	10	-

Source : British Food Journal

This is the current situation regarding foreign bodies in foods today as reported by manufacturers and as detailed in the press. Food manufacturers are not only concerned about them, but are constantly doing what they can to reduce the levels. Specifications and standards are constantly becoming more important and are being vigorously enforced by final product producers, especially where imported raw materials are used. Manufacturers now maintain close contact with their suppliers, both at home and abroad, to ensure that they are fully aware of what is required. New equipment and modification of existing equipment is constantly attended to, and finally, training of managers and factory floor operators plays a major role in stressing the importance of quality and reducing the level of foreign bodies in today's foods.

THE SYSTEMATIC APPROACH TO THE REDUCTION OF FOREIGN BODIES IN FOODS

Keith Anderson and Peter Dennis

DEFINITION OF A FOREIGN BODY FOR THE PURPOSES OF THIS PAPER

Never mind what the courts or even the House of Lords may say, it is an inevitable consequence of the process of manufacturing a food, with whatever reasonable precaution and due diligence, that sooner or later a foreign body will escape detection, and be present in the food offered to the consumer. A foreign body is anything in a food not of the nature or substance of the food expected by the consumer. Chemical and microbiological contaminants are deliberately being omitted from our consideration during this Symposium. We shall deal with the precautions and due diligence which can reasonably be taken to ensure that it is much later rather than sooner that the consumer receives a foreign body.

SOURCES OF FOREIGN BODIES

1. Raw Materials

Before setting up any reasonable system to detect foreign bodies, the sensible thing to do is to consider the incoming raw materials and the likely range of foreign bodies which may be associated with them. Three quick examples are meat, which might contain almost anything, but almost certainly meat tags, possibly metallic, but more likely to be plastic; tea with bits of tea chest wood or geckos, an almost domesticated house lizard; and glass bottles and jars containing chips and slivers of glass.

2. Process Plant and Building

Except for chemical contaminants it is certainly to be hoped that the process per se is unlikely to introduce foreign bodies. It might just be possible for raney nickel dust to be present in hydrogenated fats, or possibly filter aid to be present in, say, yeast extract, but generally speaking the process, as distinct from the plant used to carry out the process will not introduce solid matter which would be a contaminant. An exception is the relatively modern process of recovering meat from bones. Exactly the same material, say marrow bones, put into one process will yield mechanically recovered meat (MRM) containing more fine bone and marrow fat than the MRM obtained by an alternative process. The first method may grind the bone and selectively sieve out bone particles from the meat, whereas another process may effectively beat the meat off the bones without seriously damaging them. It may be left to the user of the MRM to determine whether or not any fine bone particles carried through a process are foreign materials so far as his own operations are concerned.

The processing plant, on the other hand, is an obvious source of foreign materials such as nuts, bolts, clips, springs, chips of cutting blades, etc. The list is quite frightening, and contributions from the plant are usually metallic, but can of course, be of plastic or rubber or even be grease and oil.

The building is not without its hazards. Sometimes it is not possible, except at unacceptable cost, to close down a production line while some maintenance or building work is going on, perhaps not all that far away. Electrical wiring might be being repaired or renewed and a snipped end might fall onto a conveyor belt. Water pipes used to be lagged with asbestos to prevent heat loss or condensation and lagging does not last for ever, it starts to flake. The first indication of this may

be a complaint that a piece of asbestos was found in a product. Birds are excellent penetrators of buildings, rodents are probably even better, and best of all perhaps, are the insects and other invertebrates from Pharaoh's Ants to cockroaches. The building serves to house not only the plant and its operators, it is a potential home, restaurant and playground for all kinds of creatures.

3. People

It is amazing what can drop off people, anything apparently from diamond earrings to chips of nail varnish. Writing instruments from supervisory staff can slip out of a pocket unnoticed. First Aid dressings are not always immediately missed by the shedders of them and the fact of the matter is, that cigarette ends and a whole variety of other items are not unknown in manufactured foods.

PREVENTION IS BETTER THAN DETECTION

General

However good detection methods may be, they are never perfect, nor for that matter do they exist for all materials in all circumstances. Similarly preventative methods are not completely effective, but every foreign body prevented from entering the production chain represents a 100% success and that cannot be bettered by any system of detection. Furthermore, detection can be difficult, expensive and even unacceptable to the work force, eg radiation methods can be safely used but could represent a hazard and may give rise to emotive reactions in those operating them or working near them. The first step therefore in a systematic approach is to prevent the ingress of foreign bodies into food.

What now follows is a rather fuller dissertation on the principles and philosophy of the prevention or discouragement of foreign body ingress into food. In considering matters of detail more fully, at this point we must emphasise that much of the success of any preventative measures will depend on people, their co-operation, awareness, training and skills. It is fundamental that all involved, from those who design the plant and machinery for manufacture to the unskilled workers employed by the supplier, have a commitment to the avoidance of foreign bodies in the final product. For these reasons all systems should be properly recorded, and be "live" with appropriate channels for rapid feedback and revision in light of new experience.

It is also appropriate at this point to state that views, opinions and procedures outlined in this paper are those of the authors and not necessarily those of Brooke Bond, or, of course, Unilever.

Raw Materials

Ingredients

It is essential to know and understand the nature of the materials and the environments in which they are produced. The anatomy of the fig, for example, is such that pollination can require an insect to enter deep into the fruit, and it may hence become trapped there, so that insects are a common contaminant of figs. Indeed, the wild fig is the natural habitat and breeding ground of the fig wasp with which it lives in symbiosis. While there is nothing that can be done to prevent this, at least a specification can set the limit of acceptable infestation. Caterpillars and peas developed a famous association many years ago, and part of the good earth inevitably comes with root crops. Flotation and sedimentation process have long been used to remove this sort of contamination. It is necessary to establish inspection systems for macro and micro contaminants. Reliance on warranty is simply not safe and therefore not

good enough.

A foreign body may be deliberately added as a necessary part of the packaging of a material, for example the identification tags previously mentioned. These used to be metal tags and easily detected when accidently included into butchered and cut meat. Now they are more usually plastic and not so readily detected. The incorporation of a metal strip in a plastic tab or use of metalised plastic would restore the ease of detection but we have yet to persuade the manufacturers to adopt the idea.

Tea is commonly packed in plywood chests lined with paper and aluminium. The chests can be inspected before filling but the final nailing on the lid can easily damage the wood and foil and cause splinters to fall into the tea. A drastic remedy is to abandon the chest and use another type of container, and for a whole variety of reasons the tea trade is in the process of doing just that. This will not remove the geckos, but a sieve will.

Wherever possible, close liaison should be maintained with suppliers of all raw materials with regard to possible foreign body sources. This should involve QC visits to suppliers where known risks are significantly high.

One cannot complete matters relating to ingredients without mention of fraud. In just the same way as the consumer, the producer and distributor can fall victim to malpractice, and as we have seen in the meat industry, foreign bodies can be literally foreign bodies - or at least the appropriate cuts from them! Such adulteration falls within our definition "foreign bodies", and a systematic approach should certainly not ignore such possibilities.

Packaging

Sometimes a packaging material is only just within specification, but is acceptable, glass jars or bottles for instance. When they are put on the filling lines, they may for all sorts of reasons, cause trouble and give rise to a higher risk, or even incidence, of breakage and hence the occurrence of glass fragments in the filled product. Other types of packaging may behave similarly and lead to bits entering the filled product.

In addition to the usual QA inspection procedures, the detailed appraisal of manufacturing scale samples (eg whole pallets) on the production line, is to be recommended before approval of the bulk for use is given, as this can evidence problems not to be found in normal sampling.

Warehouse storage conditions also need consideration. It is all too easy for closures or containers clean on arrival to be housing spiders a few weeks later.

IN NO CIRCUMSTANCES SHOULD PRIMARY FOOD PACKAGING BE USED FOR OTHER THAN ITS INTENDED PURPOSE.

Process, plant and buildings

The hazards associated with process, so far as foreign bodies are concerned, will be very specific to the process and should be obvious. It follows that the necessity for appropriate preventive methods is easily recognised.

Production plant with its nuts, bolts, springs and moving parts is so obvious a hazard that it will inevitably receive attention. However, it is the organisation and application of that attention which is important. Vulnerable plant and machinery must be inspected before every start-up and after every run. The plant operator must be trained to notice any change in the normal running of the plant or machine. For every piece of plant and machinery the operator must have clear instructions as to whether or not to close it down immediately before calling the maintenance services, or to divert the production and then call for help.

We used to have an interesting specific example which illustrated a number of principles of general applicability. One of our production lines involves a particular kind of machine, and in every line each is operated by a woman trained to observe the general appearance of the product so that if it started to alter she stopped the machine and examined a particular part. In any event, she always had a spare replacement part ready at hand. In times past she examined the part every hour and at the restart after every break. If the part looked worse for wear, she removed it, replaced it and informed a maintenance fitter. If the part was damaged and there was any possibility of a piece of metal having entered the product, the entire production, from the machine between the time of the previous check, to the discovery of the damaged part was isolated for subsequent examination through a metal detector and that was a tedious job. We have long since developed parts and used steels which do not fail and wear only very slowly, nevertheless, the machine is still examined at the end of each day. If material containing a hard foreign body goes through the machine, this particular part will almost certainly be badly damaged and the operator will notice a change in its performance immediately. Nowadays as a preventative measure all material is passed through a metal detector before it goes into the machine anyway. So what are the principles this example illustrated?

1) The operator understands the plant or machine to the extent of knowing what it should do and how it does it.

2) Training is given to recognise non-peak performance and to carry out a simple operation to restore the performance.

3) The consequences of plant or machine failure are made clear to the operatives.

4) Immediate action by the operative becomes an automatic routine.

5) The operator becomes involved with the plant or machine, and its performance and this quite simply leads to pride in how well it performs, and, in the case of machines, compared with all the other similar machines on the line.

6) Management knows the risk and takes preventative measures by supplying screened material for use and improving the machinery to reduce the chances of damage and foreign body contamination.

7) The plant or machine is inspected at regular intervals to ensure it is in good working order and has not shed anything into the product.

8) Defects are always reported and can be appropriately assessed by

maintenance and management staff.

The regular routine general examination of plant and machines by the maintenance engineering staff is so obvious it needs no further comment beyond that, when a nut goes missing it must be found if possible, and this cannot be done until someone tells the right person that it is missing.

It is evident that prevention cannot be separated from detection. Detection can be used for two purposes, firstly to discover something before it causes trouble, that is as a preventative measure, and secondly, to lay bare the crime after its commission. Our point is that the first use is rather more effective, especially in terms of cost, than the second.

People

All food manufacturers have rules of dress for people entering areas where food is produced or handled. Jewellery, except for wedding rings, is usually banned, overalls must have inside pockets, and blue wound dressings are used. These are well known examples of the preventative measures normally adopted to reduce the accidental introduction of foreign bodies into food by the people producing it.

A practice which is perhaps not so well adopted, but is very important indeed, is to inculcate the discipline of reporting immediately any personal incident that could lead to a foreign body entering the food. Sabotage, in spite of manufacturers' pleas in mitigation, should not be that common amongst a normal work force.

QUALITY ASSURANCE AND GOOD MANUFACTURING PRACTICE

The foregoing principles and practices are, of course, part of the overall QC system and Good Manufacturing Practice (GMP) have other contributions to make in the prevention of contamination by foreign bodies. The use of detection methods within GMP needs little elaboration nor, we hope, does any expansion on Standard Practice Instructions and maintenance procedures. Suffice it to mention that as well as codes of practice and guides, including those originated by Campden, the Institute of Food Science and Technology (IFST) is currently engaged in producing consolidated guidelines to GMP in which detail and references will be included. Similarly the sampling and physical examinations, which are part of quality control, are well known in relation to many raw materials. Nevertheless, remember if contamination by foreign bodies in a product is a rare, even though systematic event, any practical sampling is unlikely to pick it up. If the contamination is rare and random, you are looking for a needle in a haystack. Of course, the QC has its part to play but it is the QA system which must design its role.

The QA system must be based on the past and continually renewed knowledge of the raw materials, plant, process and performance of the final product. Given an understanding of the nature, origin, production and purpose of a raw material, the QC examination of it can be designed. Similarly, all the aspects of the plant, process and building can be taken into account for QC purposes. The performance of the final product can only be measured in the market place where, if it is satisfactory and gives little or no cause for complaint, it will sell well, indifferently if it is not reliable, and badly if it is poor value for money. While a foreign body can cause a consumer to abandon the use of a product, consumer psychology in this area is not without interest, and it behoves the manufacturer to know how such complaints about his own products are regarded. A 'foreign body' to the consumer may not be such to the producer, or to the Enforcement Officer and vice versa.

Products and raw materials therefore build up records through the QC system, the sales department and the consumer complaints department. All

consumer complaints must be notified to the QA function. QC records will indicate the nature and the frequency of foreign bodies which occur and indicate the methods to be used by the QA system to prevent their occurrence. Consumer complaints demonstrate the poor probability of ever detecting a given type of foreign body, either because it is a rare needle in a haystack and any sampling scheme will almost certainly miss it, or, if the complaint is common, the detection methods are inappropriate or inefficient.

With the now common-place availability of computer processing facility, trend analysis of consumer complaint data can be a valuable tool in identifying real problem areas. Comparisons of this type largely avoid the difficulties associated with variable product uptake rates, seasonal effects and promotional activities, and allow positive responses to real effects. Nevertheless, a direct line of communication must be established, between those receiving complaint and the QC Department, that can be used where sudden influxes or new types of foreign body complaint arise.

PRACTICALITIES

There are just three considerations:

Tools for the Job

With some exceptions, adequate equipment exists (albeit sometimes expensive) to meet normal GMP, monitor quality levels and ensure reasonable QA levels are maintained.

Techniques can be used, similar to the trend analysis of complaints mentioned above, during production to analyse line by line or machine by machine, defects arising which may contribute to complaint levels. Such techniques may identify particular sources of trouble such as raw material supplier, production line staff or shift, packaging material defect, or maintenance or line inadequacy.

Staff

Most large or medium sized food manufacturers, and all reputable ones, are adequately staffed to run a satisfactory QA department and to maintain and improve their systems in the light of advancing knowledge and technology.

Cost

The guiding principle for estimating the cost of any system to reduce foreign body contamination is for the company to determine and adhere to the quality levels at which it wishes to trade, and then accept the cost of the QA system necessary to achieve and maintain those levels. This is not to beg the question by involving quality standards. They can be a positive decision arrived at by considering hard economic facts. This approach is still relatively rare, and effort or investment tends to be the result of immediate and emotive reaction to specific problems, and to maintain or improve upon past achievements however realistic or unrealistic those may be.

CONSIDERATIONS AND DECISIONS

Benefits

There is only one and it is that a manufacturer profitably satisfies the requirements of the consumers of his product. He will then stay successfully in business.

Penalties

The only penalty of consequence is that a manufacturer loses his good name and reputation and his business declines.

We are, of course, right back to square one labelled cost. Competitive forces, which are ever changing in the High Street War, militate against the manufacturer increasing his costs to reduce his risks and staying in business. He must, therefore, assess the quality level, i.e. the level of defects, which represents the minimum level of commercial acceptability. This might be a cheap and nasty level for a small unstable market, if so, it will have a cheap and nasty selling price and yield a small unstable profit, but it is a starting point. From this point he may move upwards balancing the extra costs against the profits until his product creates a stable market. The difficulties are obvious, firstly the starting point will change according to the economic climate, and secondly, his product may simply go out of fashion or be replaced by another similar one. These are difficult factors to assess. There are, however, others which he may be foolish enough to consider. He may wonder if the penalties of legal costs and fines are such that little or nothing extra is worth spending on reducing foreign bodies in his products; or he may think that his number of consumer complaints does not justify any expenditure on reducing them and will rely on his complaints department to send pacifying answers. If his appearances in court are very rare, his name and reputation will be good and very valuable, all the more foolish would he be to put it at risk.

Furthermore, probably only one in four of the occurrences of foreign bodies is ever brought to the manufacturer's attention but all four damage his reputation. Penny for penny, money spent on reducing complaints inevitably yields a better return than money spent on answering them.

LAW ENFORCEMENT

We shall shortly be hearing about legislation and enforcement from Geoff Fish, and he is far better experienced to deal with the nuts and bolts of this. Certainly, we shall agree with the vast majority of what he will say, and we sympathise with all the problems of split responsibilities for enforcement occasioned by the legislation.

Foreign bodies in food are normally dealt with pretty severely by the Enforcement Authorities, between 40% and 50% of all prosecutions relating to foodstuffs involve foreign bodies. Convictions are recorded and rehearsed at each new hearing, and a manufacturer's reputation can rapidly become a bad one. If, as seems possible in the future, a defence of due diligence is made available, metal in a meat product made on a line with no metal detector in it will be a sure way to conviction.

The Enforcement Authorities are there to help the reputable producer as well as the consumer and much can be achieved by maintaining good working relationships with them. For the producer of nationally branded goods, it should be obvious that there is most unlikely to be deliberate degradation of