

**KENYA STORAGE PROJECTS**

**EVALUATION STUDY**

**BY**

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**AUGUST 1979**

**MINISTRY OF OVERSEAS DEVELOPMENT  
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**E1 KENYA STORAGE PROJECTS EVALUATION STUDY**  
**A Study of the Effectiveness and Impact of TPI**  
**Inputs in the Durable Crops Storage Sector in**  
**Kenya 1965-1976.**

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## PREFACE

Each year the Overseas Development Administration (ODA) commissions a number of ex-post evaluation studies with two aims in mind; firstly, to assess the effectiveness of its aid activities and secondly, to learn lessons for improving the effectiveness of future aid activities.

This evaluation is one such study.

Evaluation studies are undertaken by individuals or by teams especially recruited for their particular knowledge with regard to the subject under study. Sometimes these teams will include personnel from ODA (increasingly teams are a mix of ODA and external personnel).

In all cases the reports and conclusions are attributable to the authors, who are finally responsible for their contents, and not to ODA.

Evaluation Unit  
Manpower and Evaluation Department

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## Acknowledgements

A considerable amount of generous help has been provided by a large number of people in Kenya and in the U.K. I am particularly grateful for the help and encouragement of Dr. Francis de Lima the Senior Entomologist at the National Agricultural Laboratories in Nairobi and also to James Kwanzu and Simon Muhihu of the same institution. Tim Aldington and George Hunt of the Planning Division of the Ministry of Agriculture made special efforts to assist me and I also benefited greatly from the help of members of the British High Commission, East Africa Development Division and British Council. In many parts of Kenya, officials of the Maize and Produce Board, Wheat Board, Kenya Farmers Association and the Ministry of Agriculture gave freely of their time often at short notice and considerable inconvenience. To all these and many others I am extremely grateful.

Members of TPI staff have assisted me in a number of ways. David Calverley, Tony McFarlane and others have discussed their work freely and constructively and David Palmer and Brian Grimwood have most ably administered the programme of work. I have welcomed the opportunity presented to me by the TPI, Kenya Government and the Project Planning Centre for Developing Countries at the University of Bradford. I hope that the benefits exceed the costs involved.

Frank A. Wilson

Bradford, May 1979.

## CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

1. As the introduction indicates, this report was prepared as an aid to improving the quality of project and programme design and management. The focus is on technical assistance programmes in a specific area of durable crops storage in one country - Kenya. The objective of the study has been to evaluate the planning and management of technical assistance inputs and to make specific recommendations which will assist the Ministry of Overseas Development, the Tropical Products Institute and the Kenya Government.
2. The methodology of ex-post evaluation is ad hoc and does not have the refinement of appraisal (ex-ante) techniques. This study concentrates to a considerable extent on the distinction between the effectiveness with which planned programmes were implemented and the impact of those programmes within the institutional frameworks. The study was facilitated by access to reports, files, working papers and, most importantly, to individuals involved in the programmes.
3. In a chronological sense the scope of the work extends from 1965 to 1976 with a concentration on the Stored Products Team and its operations from 1972 to 1976. It covers almost 30 man-years of technical assistance inputs and within the stored products field reflects well the range of expertise available within the Tropical Stored Products Centre of TPI. It also reflects the continuing need for research, advice and training in durable crops storage and related areas in Kenya. This being so, specific recommendations are made which relate to the current situation as well as more broadly based recommendations which may be seen to be also applicable outside the field of stored products research, advice and training.

4. Overall the technical assistance inputs over the period have been found to be valuable and to have made a significant contribution to a necessarily long-term and continuing programme of work in Kenya. In a general sense it is possible to conclude that needs have been correctly identified, programmes adequately designed on the whole and implemented with commendable professional efficiency. Lasting contributions have been made in research and training areas and significant design and advisory inputs have been satisfactorily completed. As an 'aid programme' much has been done to support and develop Kenyan institutions and the professional competence of individuals within these institutions. In a period when much 'aid' is open to criticism for developing dependence rather than self-reliance, the underlying philosophy and the approach adopted by the TPI programmes has to be commended.
5. The main recommendations are contained in Sections 6, 7 and 8 of the report. Section 6 concentrates on the implications for the Kenya Government in relation to current practice and requirements for durable crop storage and the organization and management of policies, programmes and projects. In brief the following recommendations are made:-
- (i) The coverage and effectiveness of the Storage and Infestation Control Survey should be maintained and strengthened (para 6.4).
  - (ii) Research Division of the Ministry of Agriculture should continue to exercise a training role, but this should be phased out in an agreed and pre-arranged manner (para 6.5).
  - (iii) There is an urgent need to strengthen the training/extension capability within the Stored Products Unit of Research Division (para 6.5).
  - (iv) Although effective liaison with the Stored Products Unit is essential, storage engineering design work

on centralised structures should be located in the Planning Division of the Ministry of Agriculture and in the appropriate Marketing Boards (para 6.7).

- (v) The current review of pricing and storage policy on cereals should take into account the view of those professionally involved in the storage of cereal grains (para 6.9).
- (vi) The Kenya Government should be concerned to establish that bi-lateral and multi-lateral assistance in durable crops storage work should build up the capability of local institutions on a permanent rather than temporary basis and also that
- (vii) it should avoid wasteful duplication of effort and complement the work of local and external institutions (para 6.10).
- (viii) In view of the existing and planned aid programmes in the crops storage field it is essential that the Ministry of Agriculture should urgently develop a coordinated programme (para 6.14).

6. Section 7 concentrates on the implications for TPI/ODM in relation to the crop storage loss reduction programmes in Kenya. It is recommended that:-

- (i) The valuable continuity achieved over recent years and the succession of technical assistance inputs into Kenya should continue to be of benefit to the Kenya Government through the easy access to TSPC as a resource centre (para 7.1).
- (ii) In particular, likely areas of need in which TPI could assist are in loss assessment survey methodology, fumigation monitoring and the evaluation of farm and centralised storage structures and procedures (para 7.2).
- (iii) It would be appropriate for much of this type of assistance, if requested, to be of a short-term rather than long-term nature (para 7.2).



- (iv) TPI should react positively to opportunities to assist in training programmes in Kenya. Given an appropriate expression of interest from the Kenya Government it would be advantageous to look for regional training programmes in collaboration with Kenyan Institutions (para 7.4).
- (v) Further Storage Engineering technical assistance inputs should be concentrated on cereals rather than on a broad range of crops as is currently the case (para 7.4).
- (vi) TPI should be prepared (if requested) to take on a special advisory role to assist the Kenya Government to manage the diverse strands of research, training, extension and design work in collaboration with bi-lateral and multi-lateral donors. An appropriate length of time for such an assignment would be not less than 6 months and not more than 1 year (para 7.5).

7. Section 8 consists of the implications - derived from the study - for the design and management of technical assistance programmes. The main conclusions/recommendations are as follows:-

- (i) There is a requirement for those planning technical assistance inputs to identify not only a general area of need, but also an agreed work programme in collaboration with the receiving government department (para 8.2).
- (ii) This seems likely to require a greater measure of commitment by recipient governments to the means by which programmes are to be implemented (para 8.2).
- (iii) Particular emphasis should be placed on those programmes which permanently develop local institutions (para 8.2).
- (iv) It will often be necessary for donor agencies to take the initiative at an early planning stage

- and broaden the basis of support for the programme within and outside government agencies (para 8.2).
- (v) It appears necessary for donors to spell out more rigourously the priorities within projects and programme planning documents as a basis for management of the ongoing programme and not only as an ex-ante appraisal requirement (para 8.3).
  - (vi) Complex and potentially overlapping areas of responsibility for the management of technical assistance programmes and projects can give rise to confusion and also unnecessary and frustrating delays in decision making (para 8.4).
  - (vii) In particular the administration of the personnel side of technical assistance contracts can be improved - especially by increasing the speed of communication with field officers (para 8.4).
  - (viii) Terminal reports can be extremely valuable especially if they include opinions on the related management, institutional and implementation issues. Their prime aim should be to inform and advise the recipient government (para 8.6).

## SECTION 1. INTRODUCTION

In recent years there has been an increasing interest in ex-post evaluation studies of ongoing or recently completed development schemes or projects. The main purpose of ex-post evaluations is to feed useful information to those responsible for planning and management. In some cases this will improve the project, programme or scheme directly, in other cases it will hopefully improve the quality of the planning of future initiatives.

The evaluation of aid commitments adds a further dimension to such work. It is increasingly necessary to be able to show the value of development aid, to guide those who make aid allocations and also to assist those in recipient countries who have to determine the best way to utilise available assistance. This study is intended to be a contribution towards improving the planning and management of those particular types of aid programme which concentrate on the provision of technical expertise.

Evaluating technical assistance is an extremely difficult task as the output of the assistance is often long term, diffuse and unquantifiable. The inputs evaluated here range from specific pieces of scientific research to the establishment of training programmes and modifications to storage structures design. The background to the period studied and a brief description of the methodology adopted is included in the next section of this report.

The work on which this report is based has been carried out as time and opportunity has permitted over a period approximately six months. The Kenya visit was made during January and early February 1979.

## SECTION 2. BACKGROUND

2.1 Stored products entomology can be said to have begun in a recognised form in Kenya with the formation of the Pest Infestation of Stored Products Committee in 1949. For almost 30 years since that date there has been a succession of long and short-term inputs of personnel from the United Kingdom and from the early 1960's almost all the staff concerned were seconded from the Tropical Stored Products at Slough under British Technical Assistance agreements.

Most of the personnel have been attached to the National Agricultural Laboratories which is administered under the Research Division of the Ministry of Agriculture. The location of staff is shown in the table below which also gives an indication of the time period covered by this evaluation.

<u>Name</u>	<u>Location</u>	<u>Period of Assignment</u>
M. T. Locke <sup>1)</sup>	Mombasa	9/65 - 1/71
A. A. Baker	Nairobi	6/67 - 4/72
R. W. D. Taylor	Nairobi	11/68 - 10/70
J. A. McFarlane	Mombasa	4/70 - 4/72
H. G. Stirling <sup>2)</sup>	Nairobi	10/71 - 1/75
D. J. B. Calverley	Nairobi	6/72 - 12/73
M. T. Locke	Nairobi	10/72 - 3/76
J. A. McFarlane	Nairobi	12/72 - 12/75
A. Barber <sup>3)</sup>	Nairobi	12/73 - 5/76

### Notes

- 1) Locke initially on secondment from Ministry of Agriculture (U.K.) joined TSPC staff in 1969.
- 2) Commissioned and supported by Coffee Board and Kenya Planters and Cooperative Union
- 3) Not TSPC staff but attached to the 'Storage Team' on ODM contract terms.

Further details of the specific designations of the officers concerned is included in the discussion of their work programme in later sections of this report.

- 2.2 In addition to the long-term assignments indicated above, there have been a number of specialised short-term advisory visits, the most recent of which (within the period 1968 - mid-1976) are indicated below.

J. S. Read	11/73 and 1/74
C. P. Haines	11/73 to 2/74
M. C. Gough	2/75 to 4/75
D. J. Webley	10/75
M. C. Gough	4/76

These inputs were extremely specific, short-term but undoubtedly valuable. They are good examples of the benefits from short-term specialist assignments. No further direct discussion of these inputs is made in the report.

- 2.3 From the viewpoint of the Kenya Government and in particular, that of the Ministry of Agriculture, there would appear to have been a continuing recognition of the importance of stored products entomology and - in more recent years - storage engineering. In as far as much of the work reviewed here has been concentrated upon cereals, especially maize and wheat, this reflects a concern to maintain and improve the quantity and quality of the most important cereal components in the diet and to extend the commercialisation of agricultural producers. Section 6 includes a detailed analysis of the necessary policy framework within which the requirements for further improvements in durable crops storage can be best estimated. At this stage it is sufficient to state that this is an appropriate point to review policy and practice for crop storage as the country moves into a new (1979-83) Development Plan period.

2.4 From the viewpoint of the UK Ministry of Overseas Development and in particular, the Tropical Products Institute, this is also an opportune time to evaluate the past as an aid to planning for the future. TPI is a 'resource centre', an institution which has, through the ability and experience of its staff, a well established international role and reputation within the post-harvest field. Much of the work carried out by TPI is in the provision of technical assistance personnel. As demands for long and short-term research, advice and training expand, against a limited growth of resources, the need to appraise alternatives and effectively manage those chosen, becomes ever more apparent. In mid-1976 a long period of continuous ODM/TPI staff attachments to Kenya came to an end. It presented an opportunity to evaluate a programme of work extending over a number of years and make recommendations that were partly specific to Kenya and partly of a more general nature in as far as they might influence TPI and ODM policy elsewhere.

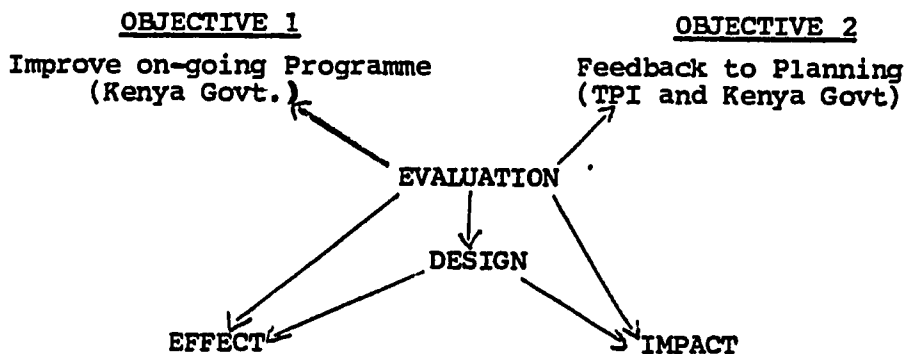
The approach to the evaluation as described below is determined by an overall objective to meet the needs of the Kenya Government and the UK Ministry of Overseas Development. In so far as this study is timely it may serve better as a means of influencing future decisions in an important area of planning and implementation.

## 2.5 The Approach

An Evaluation Study may serve two main objectives. It may be a means by which an on-going programme or project can be assessed and recommendations made for its improvement. It may also be seen as a method of objectively analysing the role of the programme or project in achieving its objectives so as to provide 'feedback' into further planning and implementation. This study may be seen as concentrating mainly on the second objective as far as TPI work in Kenya is

concerned and on both objectives when looked at from the viewpoint of the Kenya Government.

A distinction is made between the evaluation of the extent to which planned outputs are achieved (effectiveness) and the evaluation of the impact of the programme in a broader developmental context. Both aspects are equally important and in both areas of analysis it is necessary to distinguish between the programme as designed and the programme as implemented. This evaluation is not therefore restricted to examining the effectiveness and impact of the TPI inputs in the implementation stages but also to examining the way in which the inputs were planned. These distinctions are indicated on the diagram below:



It may be argued that in the specific context of aid programmes there is also a third objective of evaluation as carried out by the donor agency; that is, to justify the use of revenue derived from taxes in one country to pay for development in another. It would appear to be outside the scope of this study to seek to justify British Government expenditures on Kenya Aid on some kind of comparative basis as the alternative uses of funds are almost infinite. The extent to which one particular use of funds - in this case on Durable Crops Storage improvements in Kenya - can be justified but only in evaluations of this type, in isolation from alternatives,

is capable of assessment from a study of effect and impact. In examining the design of the programmes comprised within the chosen time period it will prove possible to consider planning and implementation options which may have been available at an early stage. This should at least provide a basis for an answer to the question as to whether the programme as implemented represented a good use of funds within the defined area of work. Whether resources from the UK and Kenya were 'better' employed in durable crop storage work during the 1968/76 period, than in some other activities is not the kind of question that can be answered directly from this study. The evaluations may however throw some light on an area of work which has in the past been assessed only within a relatively narrow range of technical criteria and in doing so may assist in any kind of comparative assessment.

## 2.6 The Methodology

It is important to recognise that evaluation studies should in themselves be cost-effective. This correctly limits the time which can be expended on them and therefore the methodological options available. In this case the study covers over 20 'man years' of direct aid inputs and many more man/woman years of associated and support staff. The work extends over 6 (linked) programmes with the 'outputs' ranging from specific pieces of research to training courses and structural designs. In no case was an ex-ante appraisal of benefits and costs carried out. This is not surprising given the nature of the work programmes, although some suggestions are made in Section 8 as to the basis of a more formalised procedure which may aid planning, management and evaluation.

As far as method is concerned it is possible to distinguish between two main sources of information - as



shown below (with examples).

<u>Written</u>	<u>Oral</u>
TPI Reports	TPI/ODM Staff
Kenya Govt. Reports	Kenya Govt. Staff (including those attached to Marketing Boards)
Independent Studies	Staff of non-British Aid Agencies
Scientific Papers	Commercial Organisations
Government Files (UK)	University/College staff in Kenya

2.7 A considerable volume of written material was available on file within the Ministry of Overseas Development. The study necessitated a survey of all material on file in order to gain factual information but equally importantly to assess the attitudes and gauge the opinions of those involved at the time. To some extent this approach was supported by interviews with the individuals concerned particularly in the later stage of the total time period covered. The main source of other written material was the Terminal Report Series of the TPI and Departmental Reports of Kenya Government. A list of all reference sources other than Government files is shown in Appendix 4.

As an important part of this evaluation is centred on the planned interaction between the donor and recipient agencies and the way in which this is managed, the importance of access to individuals cannot be over-emphasised. Individual interviews have, in the main, been used to analyse more deeply opinions which are not always made explicit in the structured framework of 'official' reports. A complete list of persons interviewed is shown in Appendix 2.

2.8 In one important respect the approach to this survey

differed from the Terms of Reference as originally agreed. It did not appear valuable to attempt to quantify costs or express any kind of ex-post relationship between costs and benefits. Although some cost data are available on personnel emoluments and supporting, technical assistance funded expenditures, it was not possible to adequately supplement this by cost and benefit data from the Kenya Government and other associated agencies in Kenya. Therefore any kind of quantification would have been incomplete and unsatisfactory.

More importantly, it was felt that it might deflect attention from the more important issues which have been investigated. The study is primarily of programme and project design and its relationships to management and implementation in the particular context of a technical assistance programme. There can be little doubt that taken overall a very favourable benefit - cost ratio could be calculated even on conservative long-term assumptions about the level of loss reduction. The important questions to investigate appeared to relate to the management of the work by both the donor and recipient agencies. In concentrating the work in this area it has been possible to come to useful conclusions and make viable recommendations which relate to a particular sphere of activity, and also to extend these to broader based conclusions about the management of technical assistance programmes.

There is of course a need for ex-post studies which concentrate on calculating the extent to which projected benefits were achieved in relation to the costs incurred. Ideally such studies would be very specific and would be carried out on projects for which ex-ante quantified projections were made.

## SECTION 3. EVALUATION OF INPUTS, 1965-72.

### 3.1 Introduction

This Section of the report covers the inputs of Locke, Taylor, McFarlane and Baker between 1965 and 1972. Reference is also made to the ODM supported Freedom from Hunger Campaign project carried out by Coyne and Henley between 1968 and 1970 - but further discussion of this work is reserved for Appendix 3. The analysis below is made on a chronological basis (although there is considerable overlap). For each input the analysis begins with some discussion of the programme as designed and then continues to examine the extent to which it was effectively carried out - within the terms of the study as explained in Section 1. Further discussion of the impact of the work in relation to the operations of the Kenya Ministry of Agriculture and associated para-statal agencies is to be found in Section 5.

### 3.2 M. T. Locke, Mombasa, 1965-71

The stated aims of the assignment were:-

"to assist in improving the quality of Kenya's agricultural exports by reducing the incidence of insect infestation" and

"to train necessary staff required to initiate and maintain improvements in this field".

The reduction in the incidence of infestation was considered necessary to:-

"prevent losses in weight and export acceptability, prevent the export of live infestation, prevent cross-infestation of valuable cash crops such as coffee and tea".

It is clear that as conceived in broad outline the overall programme of work was to be concentrated

on:-

- (a) Reducing the effects on infestation on crop exports.
- (b) Training staff to develop and maintain this facility.

The initiative for the work appears to have arisen partly from the fact that traders had received complaints from overseas buyers about infestation and damage and were looking to the Department of Agriculture to take the lead in developing new control procedures. It was a particular concern of Maize exporters as buyers were experiencing difficulties with processed quality due to insect damage and were seeking appropriate compensation. There are also references on file of deleterious effects on exports of cotton seed cake and groundnut cake and suggestions of evidence of cross-infestation of tea and coffee by Tribolium castaneum. Even without these specific indicators, the infestation problems of Kenya's humid coastal strip, where conditions are highly favourable for insect multiplication, had long been recognised. Mombasa, Kenya's main port also servicing Uganda and (to a less extent) Tanzania, had persistent infestation and re-infestation problems. There was an urgent need to analyse the nature of these and develop an ongoing programme which would reduce and control the incidence as far as possible.

- 1.3 Locke's work, although requiring a research and investigational element, especially in the early stages, was distinctly operational throughout his Mombasa assignment. With the support of the Senior Entomologist and the collaboration of the Chief Grader he correctly identified the need to carry out a preliminary survey of store infestation prior to turning his attention to methodological and training implications. The findings of the preliminary survey coupled with the concern with

which the trade regarded persistent outbreaks of Tribolium castaneum spreading from stored maize from upcountry, resulted in the Planning Division of the Ministry of Agriculture accepting the recommendations that a Storage and Infestation Control Survey (SICS) should be established, under the programme, at Mombasa.

3.4 In evaluating the programme of work as it was designed the main component to examine is, therefore, the planning of the establishment and operation of the SICS. In this regard the objectives of the SICS are clearly stated in Locke's terminal report. The report also includes a chart (page 3) which illustrates the course of the project and the work carried out over the full period of the assignment. This is instructive, but is, in isolation, only a record of what progress was made. It is not clear how far this relates to the planned rate of progress - or whether such a time phased plan was initially developed. Although there are no indications in the terminal report it is unlikely that a comparatively complex programme of work such as the establishment of the SICS was carried out without any deviation from the assumed rate of progress. It would have been valuable to see evidence in the terminal report of:-

- (a) The planned (and agreed) rate of progress and time phasing for the establishment of the SICS.
- (b) The extent to which planned targets were (effectively from Locke's viewpoint) achieved.

This introduces the whole question of the scope, function and procedure of terminal reporting which is discussed in detail in Section 8 of this report.

3.5 Within the self-imposed limits described above, some indications of the effectiveness of the execution of the programme can, however, be found in the terminal report.

These indicators have been supported by investigations in Kenya in connection with this study and also by the planning papers which were prepared by TSPC staff prior to the later establishment of what came to be known as the 'Storage Team'. Locke's work as the leader of an expanded team of staff in Mombasa operating from the Chief Grader's office was effective in creating the basis for the required survey and control operations. This was done successfully in three main respects:-

- (i) Initial surveys revealed the extent of the infestation problem.
- (ii) Appropriate recruitment and training of survey staff was organised.
- (iii) Procedures for survey, reporting and treatment of infested produce were established and tested.

3.6 In other respects the work was less directly effective - although this applies predominantly to areas of operation where action by some agency other than the Mombasa based SICS was necessary. Examples in this category are:-

- (i) Lack of significant headway in the reduction of live infestation in export maize.
- (ii) Limited success in developing a totally effective procedure for disinfection of ship cargo holds.
- (iii) Difficulties in making adequately early provision for the post graduate and in-service training of the officer in charge of the SICS.

The first area of reservation (i) is related to a mixture of necessary action. At the time of the completion of Locke's work in Mombasa the Ministry of Agriculture did not have adequate legal backing to prevent serious infestation reaching Mombasa. Despite the work of Baker and Taylor on fumigation of transit maize the standards of fumigation as practised were seen by Locke to be inadequate, and in need of a

greater measure of control and advice. The need for further investigational work in area (ii) was recognised in the terms of reference agreed for McFarlane's Mombasa work (1970-72). Improvements in the capacity of the Chief Grader's office to inspect and control shipboard infestation had clearly been made but the establishment of a totally effective procedure required the backing of more detailed investigational work, extra facilities (and staff) within SICS and more developed cooperation by neighbouring countries and major shipping lines.

- 3.7 The completion of Locke's period of attachment to Mombasa coincided well with the availability of a qualified Kenyan to take over responsibility for SICS. However, the post graduate and post experience training of the individual concerned (C. Warui) became scheduled (and included in Locke's recommendations) for the period after Locke's departure. There was no time for him to work seriously with Locke prior to this time. This undesirable aspect was also noted in McFarlane's terminal report as follows:-

"the programme (McFarlane's).....would have benefited from the earlier appointment of a local graduate to act as a counterpart to Locke before the end of his assignment!"

This criticism has to be seen against the background of inadequate supply of trained entomologists suitable for appointment as officer in charge of SICS. At the same time the individual concerned even with the initial support of McFarlane, must have had considerable difficulty in taking over responsibility without the advantage of working directly with the previous 'manager'. Locke makes no direct mention of this in his terminal report and it is not therefore clear how far the eventuality departed from the plan. If the programme as designed did not include the earlier provision of an

appropriate counterpart/successor then the design was inadequate. If it did have such a provision then the implementation, for whatever reason - and it is not possible to apportion responsibility - was not effective.

3.8 On a general level it can be said that the need for a programme such as that effectively built around Locke was correctly identified. The longer term impact of the work will be discussed further in Section 5 and it is sufficient to point here only to the extent to which adequate facilities and back-up were provided from the Ministry of Agriculture. On this aspect - as on a number of others - the terminal report is not helpful. Locke did however attempt to persuade the Ministry to put up a specific proposal for the provision of improved and extended facilities for the SICS work in Mombasa. With hindsight this appears to be the sort of project which could have been financed under a bi-lateral project aid agreement. Perhaps it was unattractive because it was a comparatively small proposition with a limited import content. It also appears however that the project was not 'pushed' by Research Division at that time. The overcrowded and unsuitable facilities of the Chief Grader's office remain, to this day, a real constraint on the efficiency of the SICS in Mombasa. This is regrettable as some of the success achieved in staff training and the establishment of effective procedures was negated by the insufficient attention paid (by planners and 'managers') to the provision of the necessary facilities.

3.9 R. W. Taylor, Nairobi, 1968-1970.

The stated aims of the two year secondment (originally for one year only) were:-

- (i) To carry out tests on the Maize and Produce Board stores constructed in 1968 and designed for effective in store fumigation with the aim of



establishing a correct and workable technique.

- (ii) To investigate gas concentrations and methods of intransit railway truck fumigation.

It should be noted that the programme described above was seen as being carried out in the original one year secondment. The extension for an extra year was arranged to facilitate the further development of the investigational programme in these areas but also to:-

- (iii) Investigate gas concentrations and alternative fumigation methods for maize on behalf of the Maize and Produce Board.
- (iv) Carry out similar investigations on cotton seed cake and maize germ meal.
- (v) Test phosphine as an alternative bulk storage maize fumigant.

3.10 The work benefited from being designed with the aim of meeting specific requirements as far as it concerned (i) and (ii) above. The work described under (iii) was commissioned by the Board and (iv) developed directly from observations made by Locke and the SICS team. The work on phosphine levels and exposure periods (v) demonstrates the continuing links with Slough based research - in this case at the Pest Investigation Laboratory. Research had indicated that at the more resistant stages (especially pupae) of the maize weevil (Sitophilus zeamais) it could not be killed using phosphine, unless an extended exposure time was used. Taylor's results, succinctly described in his terminal report, were not totally conclusive but effectively pointed the way towards the further investigation of an alternative fumigant which was significant as it avoided excessive build up of bromide

residues in maize fumigated with methyl bromide. Within the areas of prime responsibility, that is (i) and (ii), the programme of work as designed appears to have been more discrete and well defined in terms of objectives than some of the areas of work covered by Locke and Baker within the same period. This was clearly an advantage to Taylor who was able to concentrate on a particular area of applied research. His terms of reference do not appear to have extended to making recommendations about the organisation and inspection of fumigation services. Given the need for basic investigational work this concentration on technical recommendations can be fully justified - although it would have been dangerous to assume that the operational implications were fully recognised by those taking up the recommendations.

- 3.11 The programme of work appears to have been realistically designed and effectively implemented. A marked degree of collaboration was necessary and the work on the Maize and Produce Board Stores is a good example of this, requiring as it did the active participation of specialists within the Board as well as depot managers and their staff. There is less evidence of the direct involvement of responsible staff in the Railways as far as the in-truck fumigation tests are concerned. On a strictly technical level there was limited possibility of this as the main collaborating agents were the Maize and Produce Board and the commercial fumigation companies. In terms of the operational implications the cooperation of the Railways Corporation is essential especially in so far as it relates to the availability, condition and upkeep of rolling stock and the timeliness of despatch. This is discussed further in Section 5 of this report, as there is some evidence that in this regard current performance is less than satisfactory. The in-truck fumigation work was greatly helped by the productive links with TSPC/PIL at Slough. The chemical analysis of fumigants used on in-transit maize began with trials carried out in

conjunction with A. Harris of TSPC who made a short specialist advisory visit to Kenya in November and December 1968. Harris (1969) reported separately on this work but the main benefits to Kenya lay in the initial impetus given to Taylor's programme. It would appear to be a good example of the value of specific, short-term technical inputs. At another level the same part of the programme included the introduction of a means by which rail trucks containing produce for export could be tested for the effectiveness of fumigation without the breaking open of cargo. Mercuric chloride and bromophenol blue 'indicator' sachets had been developed at the Pest Infestation Control Laboratory at Slough. These were introduced into trials in Kenya with satisfactory results. Taylor described the testing of the sachets in his terminal report (p.12 and 13) and recommended that further tests were necessary 'in order to establish whether indicators are suitable for use on a routine basis'.

- 3.12 Although a training input was not specifically written in to Taylor's programme there was nevertheless a valuable contribution to in-service training in the Maize and Produce Board and the Kenya Farmers Association (KFA). In addition, the association with the Board in the organising and monitoring of fumigation trials had a significant potential for useful spin-off as the scientific officers became increasingly acquainted with the methodology.

Taylor appears to have received adequate administrative and professional encouragement from the staff of the National Agricultural Laboratories (NAL) throughout his stay in Kenya. This has been mainly reflected in his collaborative work with Locke, Baker and to the extent that their assignment periods overlapped, McFarlane, which was a feature of the programme. It is clear that a number

of Taylor's recommendations on fumigation practice were later formalised into codes of practice for Maize and Produce Board fumigation teams and incorporated into the Training and Extension programme of what came to be called the 'Storage Team'.

3.13 At the end of Taylor's assignment there was a considerable and unnecessary degree of uncertainty about the continuation of the work and his return to Kenya on a second tour. Although it is not within the competence of this writer to assess the further technical research and investigational requirements for the fumigation of durable crops in Kenya, Taylor's terminal report recommendations clearly indicated that testing on a wider basis was a necessary next step. The extent to which this work was incorporated within the framework of later work is discussed in Section 5. It is instructive however to catalogue the sequence of events at the end of Taylor's tour which was due to be completed at the end of October 1970. One month prior to that date (28th September) there was still no official indication from the Ministry of Overseas Development (ODM) as to his possible return to Kenya for the further tour which it appears the Kenya Government were expecting. At this time the idea of a 'Storage Team' was under discussion with the Ministry and this appears to have clouded the issue as far as specific fumigation and related work was concerned. Taylor had tabled a proposal for further work - particularly those aspects which related to the fumigation of cereals in bulk storage - at the August 1970 Pest Investigation of Stored Products Committee. At about the same time Locke and McFarlane made some specific suggestions about the need to test some of Taylor's recommendations on a field scale. In the event no decision was made until after Taylor left Kenya - still with no clear indication as to whether he would be returning. On 23rd October (7 days before Taylor's agreed departure) the British High Commission

was informed that a decision on future fumigation work in Kenya would be made after the visit of the then head of TSPC in January 1971. It was, however, announced to the December 1970 Pest Infestation of Stored Products Committee meeting that Taylor would not be returning to Kenya. As this is not an isolated example it will be discussed in a more general context in Section 8. It is sufficient to say at this stage that whatever the wisdom or otherwise of the final decision, the manner of its making was counter-productive coming as it did at the end of a well designed and implemented technical assistance input.

### 3.14 J. A. McFarlane, Mombasa, 1970-72.

An evaluation of any of the work with which McFarlane was involved from 1970 onwards, must include a recognition of the influence his previous experience in Kenya had on the design and the implementation of the programmes. McFarlane's attachment in Mombasa from 1970-72 was his third tour in Kenya and of all the TSPC staff working in the country over the period 1965-75 he almost certainly had the most developed acquaintance with the policy and administrative framework within which storage/entomology work was carried out.

The main objective of McFarlane's work at Mombasa was seen as assisting the programme of the SICS 'by providing basic information relevant to insect pest control in the port, on ships and in export produce godowns in Mombasa'. It was also understood from the outset that additional - not directly related - investigations would be carried out and to these were subsequently added other studies which were suggested to, or identified by, McFarlane after the beginning of his contracted tour. As originally designed, the assignment had the following components in order of priority:-

- (1) The planning and organisation of one or more ship-board studies of cross-infestation hazards and hold climatic conditions. This was intended to lead to direct recommendations on appropriate standards of infestation control.
- (ii) A study of copra infestation problems in Coast Province leading to recommendations on the appropriate control measures.
- (iii) A study of the effectiveness of dichlorvos for the control of Tropical Warehouse Moth (Ephestia cautella) under coastal conditions.
- (iv) Studies of Bruchid infestation problems in pulses in Coast Province.

To these were later added:-

- (v) Insecticide testing for the treatment of sheep and goat skins.
- (vi) A preliminary investigation of small farm grain drying procedures.
- (vii) An investigation of insect infestation of green coffee (with Locke).

3.15 In terms of the priority given to it and the potential operational implications of its findings, (i) above would appear to be the most significant area of work during the two year assignment. It is also in this area where the most direct links with the SICS work are to be found and where McFarlane's investigations were a deliberate extension of the Survey's field of operation. Shortly after his arrival in Mombasa, McFarlane reviewed the proposed programme and made necessary clarifications of emphasis. He confirmed the priority

of (i) but indicated that the main emphasis would be placed upon shipboard studies of cross-infestation hazards. In addition to (ii), (iii) and (iv), he also indicated an area of collaborative work with Locke and SICS staff not previously mentioned in planning papers. In a general sense this can be referred to as infestation control in port transit-sheds. More specifically it consisted of (a) the development of known trap-bag sampling techniques for testing the efficacy of pest-control measures in the main port transit sheds and (b) disinfestation techniques for comparatively small lots of infested excess, rejected or unclaimed cargo. No reference is made in the review paper to small farm level grain drying studies (see (iv) above) and it is clear from McFarlane's terminal report that this work developed out of requests and observations made during the assignment period rather than being written in to an agreed work programme from the outset.

3.16 The value of an initial written review of objectives and proposed methods as carried out in June 1970 cannot be over-emphasised. It was particularly valuable and necessary on this assignment where a 'shopping list' of subjects for investigation had been prepared and where there was a clear need to assign priorities and work out methodologies at an early stage. Not the least important reason for this was the need - as McFarlane clearly demonstrated in his Provisional Programme paper of June 1970 - to establish the necessary liaison with sections and individuals in TSPC/PIL with whom he wished to collaborate and make the earliest possible requests for the supply of equipment. The value of this procedure is discussed further in a more general context in Section 8 of this report.

3.17 As designed, McFarlane's programme did, as he states in the general summary of his terminal report, coherently follow a number of research lines indicated by previous

research in Kenya'. The initial generalised terms of reference could have been a disadvantage had they not been written with McFarlane in view. As it was, he, as an experienced officer and with the advantage of the back-up of a current 3-man TSPC input through Locke, Baker and Taylor, was able to identify priorities within the overall programme and apportion his time accordingly. It is also important to bear in mind with individual assignments that the personal interests and analytical strengths of the individual concerned will understandably become reflected in the direction and emphasis of the programme. It would appear that McFarlane's recognition of the importance of shipboard studies and investigation of cross-infestation problems happily coincided with a preference for the sort of analysis and collaborative work with the SICS which was an integral part of the exercise. As designed, the assignment of McFarlane appears to have been seen primarily in terms of scientific research areas. There is no evidence of a planned and agreed local staff input from Research Division - although possibly it was assumed that the collaborative work with the SICS would ensure that some kind of in-service training in research methodology would be forthcoming. If this was the assumption then it would appear to have been a fair one and one that was justified. This being acknowledged, it would have been advantageous to more deliberately incorporate a staff training input into the programme as planned. The advantage would have been seen at two levels:-

- (a) It would have helped to maintain the relevance of that stored products entomology research which had the most direct operational connections with the SICS.
- (b) It may have allowed for a more effective direct continuation of the research in particular areas given that it was likely that some work would be uncompleted at the end of two years and/or that new areas of relevant investigation would have been opened up.



Even this limited criticism of the programme as designed should at least from the donor agencies' point of view be kept in perspective. At the time of the official request for research assistance at Mombasa, the idea of a Storage Team based at NAL was already the subject of prolonged discussions between Kenya Government and ODM. These were to continue from some time, with McFarlane and Baker having significant roles. As it was assumed from a very early stage that staff training at postgraduate and post experience levels would be an important part of the overall (proposed) schedule of work for the Team, it could well be argued that this consideration was effectively taken care of in the later programme. Such are the uncertainties of aid relationships however, that it would have been prudent to include a more recognisable research counterpart provision in the original plan.

3.18 In the event, one of the most immediately effective achievements of McFarlane's assignment in Mombasa was the extent of the productive direct contact with staff of the Ministry of Agriculture, the Harbour Corporation and commercial companies including shippers and pest control operators. As already noted above, SICS staff participated in much of the research and benefited accordingly from developing a better understanding of the nature of the problems, the techniques of investigation and the bases of the solutions. Additionally much of the research resulted in direct feedback to those who had prime responsibility for effecting action. In this way those closest to the problem be they District Agricultural Officers or operators of private businesses were, in a real sense, collaborators in the production of an intermediate product which they would have to take a stage further into testing, regulation, extension or commercial application. One good example of this is the copra drying research project which was summarised in the

terminal report but which also produced a detailed analysis at the request of the Coast Provincial Director of Agriculture. McFarlane's recommendations were fed directly into a then current review of the grading and differential pricing structure. A second example is the work on insecticidal treatment of sheepskins where a storage trial demonstrated the feasibility of using carbaryl-based insecticide spray treatments as an alternative to arsenical dipping. The trial was carried out with the active collaboration of a local trader and a special report prepared for the trade and the Veterinary Department (with the usual copy to the Senior Entomologist).

3.19 It is possible to agree with McFarlane who comments in his terminal report that 'overall, the programme was successful'. As evaluated at this stage, the extent to which the programme was effectively implemented, it can be said that McFarlane was able to carry out all that was originally planned and also to extend into other areas of work as they became identified. It has already been noted above that the way in which much of the investigatory work was carried out produced direct benefits to those collaborating through the association of staff and that the communication of research findings was refreshingly direct so as to precipitate further action. The reservations made below are, against this background, somewhat tentative as they are inspired more by the nature of such a specific technical assistance input than by the particular features of the input itself.

3.20 It is inevitable that there will be 'loose ends' at the end of a two year assignment. Where that assignment extends over seven not necessarily related topics, carry over is even more likely. It was unfortunate that the data from the Mombasa - UK hold-climate studies could not be fully analysed and presented until after the terminal report was prepared. Given the timings of the

voyages of the cargo vessels concerned and the collaboration of the shipping lines and TSPC some earlier results could, it would appear, have been possible. This is not to suggest that the eventual analysis was not fully communicated and interpreted - the later assignment of McFarlane to NAL made this almost inevitable - rather it is a question of any delay inhibiting further development of the work. If, as may be the case, the conclusions of hold-climate studies were inconclusive or at least did not require any direct action from the Kenya Government, then it would have been advantageous for such knowledge to be communicated as quickly as possible.

The same criticism cannot be applied to the cross-infestation studies which were speedily reported on and extended into improved procedures by the SICS staff. In the same sense the results of the copra infestation study were, as already described above, made available at provincial level as an aid to reviewing the grading structure for the trade. The copra study is a good example of a discrete exercise with clear results and straight forward recommendations. Much applied research is not so straight forward as this but where it is the communication of the findings should not present a problem to the analyst.

3.21 The research on the use of dichlorvos on the warehouse moth attracted some commercial interest in Mombasa as it had not been tested previously under coastal conditions. Some useful results were produced but these appeared to be limited in their application until further research had been carried out. It was, however, shown from chemical analyses and taste tests, that the application to coffee beans (at the levels tested) had no significant deleterious effects. Further research in the application to coffee would also appear to require the support of financial analysis to determine the break-even point between fumigation and dichlorvos as used to suppress infestation. In the terminal report little direct

indication was given on the justification for future research in this area. Even though a more detailed report was to be made at a later stage it would have been helpful to expand on the statement (under the principal recommendations) that 'further work to develop integrated control practices is necessary'.

The series of well conducted trials on Bruchid infestation of pulses produced some relevant recommendations for storage practice under coastal conditions. McFarlane's previous research work in this subject area no doubt formed a valuable basis for the investigations which were essentially practical in emphasis. Some direct recommendations were made for further research on the incidence and control of other pests of cowpeas and grams. No further comment is necessary on the well conducted and communicated work on the treatment of sheep and goat skins.

An investigation of maize storage on small farms was carried out as an additional project at the request of the Provincial Agricultural Officer. Bearing in mind the limited time available to spend on this work McFarlane appears to have been able to usefully describe established storage practice at the small farm level and to conduct some interesting purposive analysis of infestation incidence at Matuga. This is a good example of work which concentrated on first understanding and then analysing the effects of what is sometimes called 'traditional practice'. It is perhaps surprising that only a limited amount of similar studies had been carried out at that time in Kenya - and as will be discussed elsewhere in this report, there remains a dangerous tendency to prescribe solutions for grain storage at farm level without adequately understanding existing production, consumption and storage patterns.

3.22 One particular activity is worthy of brief mention,

because it reveals some of the periodic problems of management which can beset any technical assistance project. McFarlane and Locke were asked to assist in a mid-1970 short study of insect infestation of green coffee for export from Uganda via Mombasa. As there were relevant implications for the export trade in coffee from Kenya and Tanzania the two officers concerned were well inclined towards the work. The Kenya Government was not prepared to sanction the work which was expected to include a visit to Uganda, unless there was an official request. Partly as a result of this there was a disproportionate amount of time spent on attempting to set up the study which was eventually successfully carried out. In such situations the ODM attitude is often understandably cautious and McFarlane in particular may have considered that as an experienced officer he was capable of exercising more personal discretion than the situation allowed. The official ODM and Kenya Government position was probably correct at the time. In such situations however the unaccountable and unexplained delays in decision making at some 'higher level' are often a source of considerable frustration to the man in the field. This is an issue which affects local and expatriate staff alike and which will be discussed further in later sections.

3.23 Looked at overall it is necessary to re-emphasise that McFarlane's work at Mombasa was realistic in design and effective in implementation. Such deficiencies as have been identified, when looked at from this distance were primarily determined by overambitious work scheduling. Most, perhaps all of them, were minor in comparison to the stimulation which energetically pursued applied research provided. McFarlane's presence in Kenya during the formulation stages of the Storage Team proposal was a great advantage to the Kenya Government and ODM. It will be seen that this continuity has been a marked feature of TSPC work in Kenya over much of the period considered here.

3.24 A. A. Baker, Nairobi, 1967-72.

As a Nairobi based (but well travelled) officer over a period of 4½ years, Baker provided valuable continuity for the TSPC inputs in Kenya throughout the period. This was of direct benefit to McFarlane and Taylor and also to Locke, who although of longer term experience than Baker, was Mombasa based.

Baker's post was an established one of Stored Products Entomologist within the Research Division of the Ministry of Agriculture. This being so the original terms of reference were necessarily broad and non-specific. Baker describes them in his terminal report as

"to study the development of improved techniques for the control of pests, the overall storage of maize and all types of famine reserve"

Without the guidance and advice of the then Senior Entomologist T. J. Crowe, Baker could, as a young officer with no previous overseas experience, have had some difficulty in ordering his priorities. As it was, little time appears to have been wasted in identifying areas of useful work. It may also be noted that the Pest Infestation of Stored Products Committee (PISC) appears to have played a useful role at an early stage in discussing Baker's work programme and constituting a forum for regular reporting of progress.

Three main areas of work were identified:-

- (i) Monitoring the storage performance of the Cyprus (Waller) Bins.
- (ii) Investigating alternative silo types - mainly at the large farm level
- (iii) Insecticide testing and monitoring.

3.25 (1) Monitoring the performance of the Cyprus Bins and advising on structural modifications

During the full period of Baker's stay in Kenya, and especially his second tour, he was involved on a continuing basis with work connected with the Cyprus Bin sites. The same can be said about the later work of the storage engineers Calverley and Barber, in the period late 1972 to early 1976. There can be no doubt that important as this type of strategic storage was, it provided sufficient operational problems to require a succession of technical and scientific inputs with high opportunity costs in terms of alternative activities elsewhere in the storage field in Kenya. This has necessarily restricted the availability of local and expatriate staff to work in other potentially important areas.

Much of Baker's early work on the Cyprus Bins supported by specific technical inputs from TSPC was recognised from the outset as providing the necessary monitoring and testing procedure which would not only investigate the technical efficiency of the storage method in the short term but also establish a workable methodology for the continuing effective management of the Bins. All the indications are that this was effectively carried out and although later amendments to the Code of Practice for Cyprus Bin operators were made by Calverley these were primarily in the form of refinements and improvements introduced after testing the recommended procedures.

Comprehensive storage trials on maize and wheat were successfully completed and the results effectively disseminated. Baker's conclusion in the Appendix 1 of his terminal report was that:-

"Trials have shown that these silos can be successfully used for the long-term storage of maize and wheat providing dust is extracted from the grain before filling

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and providing the grain moisture contents of the trial are not exceeded. Maize has been stored very successfully for three years at approximately 12% moisture content and wheat for 18-24 months at approximately 13%."

These conclusions are still accepted today and are supported by continuing NAL monitoring and observations by the Maize and Produce Board. As well as producing the results Baker was able to test specifically designed monitoring equipment and also train site operators in the collection of regular scientific data.

3.26 It was also inevitable that Baker, although not a structural or mechanical engineer, should become involved with the assessment of design and/or constructional deficiencies and operational inadequacies on site. These are catalogued in a succession of terminal reports - and still not entirely solved - and it is clear that the technical and organisational planning of the original projects was not adequately carried out. The problems were found partly in structural weaknesses - primarily leakage around the 'ring beam' and leakage and condensation adjacent to the top hatches. Given the non-availability of engineers within the Ministry or the Produce Boards at the time, Baker had, almost unavoidably, to extend his work into areas which were not entirely within his technical competence. As far as the structural renovations were concerned he was able to do this with considerable success and coordinate both the action immediately necessary and the longer term maintenance procedures.

As to the operational inadequacies on site, particularly the inappropriate handling and drying facilities, this was an equally serious limitation and one which was not so easily solved. Almost inevitably Baker was not able to resolve these problems in the time available to him given his other commitments. He was however directly

involved in the commissioning of a report by Gasston and Barbour which proposed steps for further action. At this stage Baker 'handed over' his storage engineering responsibilities to his successor - who, as will be discussed below, was by training and experience well suited to advise on the outstanding problems.

### 3.27 (ii) Large Farm Silo Studies

There are two parts to this programme. The first consisted of collaboration with the Kenya Farmers Association (KFA) to test butyl rubber bag-type silos. Here the NAL input was mainly in the establishment of testing procedures - particularly the use of thermocouples to monitor grain temperatures.

The second area of collaboration was in a related technology. The British National Research and Development Corporation (NRDC) collaborated with Kenmore Grain Storage Limited to test butyl-lined weld-mesh silos in tropical conditions. Once again Baker's contribution was that of a technical advisor on monitoring equipment and the siting and erection of test silos.

Whereas the KFA sponsored trials were a qualified technical success the Kenmore/NRDC project was a failure and did not proceed on its planned second phase. In neither case could the investigations be labelled as high priority from the viewpoint of the Government, especially as both involved a considerable amount of what would normally be recognised as commercial research and development. Although it is not clear what proportion of Baker's total time was spent on this work, sixteen separate silos or storage structures were tested on 3 different sites (Mombasa, Nakuru and Kitale) in Kenya and 1 (for coffee) at Moshi in Tanzania. It was therefore possible (although not necessarily the case) that a disproportionate amount of effort could have been

expended by NAL through the work of Baker with only very limited direct benefit. It should be noted that Baker appears to recognise this in his terminal report and recommends that further work in this area should not be a priority. Recent evidence suggests that he correctly identified the hessian-lined weld mesh silo as having the most potential for a farm level structure holding 40-60 tons of grain.

### 3.28 (iii) Insecticide Testing and Monitoring

In this type of work Baker's activities were much closer to the recognised work of a storage entomologist in the NAL and he was able to continue and apply the results of previous research and testing. In particular he concentrated upon arriving at firm recommendations for insecticides to be used against the most common insect pests. Statistical analysis of a comparatively large scale trial verified the previously assumed suitability of malathion/pyrethrum 'cocktail' for use on shelled maize. This commercially marketed Blue Cross Mixture was thereafter recommended for use by the Maize and Produce Board. Further testing of malathion for cob-storage also produced a recommendation that this should replace lindane - although this recommendation was not taken up at the time.

Baker was also at least partially responsible for initiating a new series of investigations into new dust insecticides. This led to specific recommendations for further work, in particular on lindane resistance by Sitophilus species.

### 3.29 (iv) Other Activities

It is possible to produce a long list of other work with which Baker was associated. Perhaps the most significant was his collaboration with Locke and Taylor on the

testing of fumigation procedures for in-transit cereals, his assistance to de Lima in the standardisation of methods of grain moisture testing and preliminary work on the application of liquid insecticides to bulk grain. In a less specific sense as a member of the Committee on the Bulk Handling of Maize and Wheat he chaired two sub-committees; one on the modifications to the Cyprus Bins and the other on the bulk movement of grain by rail. Limited success was achieved by the second committee although this was almost certainly entirely outside the committee's control.

3.30 In an overall sense it appears that Baker was able to effectively carry out a programme of work which he was increasingly responsible for not only implementing but also identifying and planning. Operating across such a wide range of crop storage work he was able to develop a clear knowledge of the practical implications within the produce boards and the KFA. Due to other commitments which were at the time regarded as priorities he had only a very limited opportunity to work at the small farm level. This was regrettable, although as Baker left Kenya the planning of the Storage Team input which included an Extension/Training specialist was at an advanced stage. Baker's limited involvement at farm level should also be seen within its proper NAL context where by April 1972 very little investigatory work had been done on small farm storage. In a similar way his work demonstrated the need for a more developed inter-action between the storage engineer and the stored products entomologist. As someone who had extended himself into structural work with some success Baker was well placed to support the suggestion that any 'Storage Team' should include a storage engineer.

3.31 Finally, it can be said there is little indication that the administrative and financial support for Baker's work created any difficulties. The one exception is the initial confusion over a car loan when although the British High

Commission confirmed before Baker arrived that Kenya Government would make such a loan available, it later transpired that this was not possible, even though Baker was filling an established post, and the loan had departmental support. This would appear to be a regrettable example of meaningless bureaucracy compounded by lack of effective communication. Baker was able to embark on his work programme without much hindrance and fortunately, although a young and inexperienced officer, did not allow a totally unnecessary hiatus to deter him.

### 3.32 Freedom from Hunger Campaign Farm Storage Project 1968-70

TPI involvement with the work of the 2 man FFHC team is noted in a number of terminal (and other) reports. In a formal sense it was restricted to the initial preparatory training contact at TSPC but there was clearly considerable opportunity for professional contact and collaboration during the programme.

That this did not occur to a very developed extent is probably attributable to the way in which the work was organised by the officer in charge, F. P. Coyne, and also to its comparatively short duration. In his terminal report, Coyne makes early reference to the work at Mombasa and at central storage level as:-

"being dealt with by other expatriates on loan to Kenya";

but no other direct reference is made to the work of Locke, Baker or Taylor.

In a broader and more important context the FFHC programme did however afford the opportunity for NAL staff, especially Francis de Lima, to do work at the farm level which had previously not been attempted. This was particularly valuable as a meaningful commitment by de Lima to research which focussed on 'field', as well as laboratory, conditions and which has been carried

through into more recent research culminating in his PhD thesis of 1978.

The FFHC work also formed a partial basis for the formulation of the extension and training input into the Storage Team over the period 1972-76. It may well have been influential in a negative way in demonstrating that without effective follow-up action a relatively short term selective approach to improving storage practice on the farm was likely to have limited success. The extension oriented work within the NAL in the 1973-76 period was concentrated mainly one stage back from direct farmer contact by seeking to better train and advise instructors and extension agents. As will be discussed in the next section a limited amount of investigational work was carried on at the farm level in this period and there was certainly no direct continuation or extension of the FFHC project approach.

Further discussion of this programme is to be found in Appendix 3.

## SECTION 4. Evaluation of Inputs, 1972-76

### 4.1 Introduction

This Section is made up mainly of the analysis of the work of the TPI Storage Team at NAL. As such, in terms of personnel it covers the work of Calverley, McFarlane, Locke and Barber. Before discussing the programme and implementation of the 'Team' it is also necessary to look at one other area of work which began in 1971 but extended well into this period. This is the work of Hugh Stirling on coffee storage.

### 4.2 H. G. Stirling, Nairobi, 10.71 to 1.75

It should be recognised from the outset that opinion on Stirling's coffee storage work has been unanimous in regarding it as a considerable success. It is therefore instructive to analyse the reasons for this apparently totally satisfactory outcome.

The Coffee Storage Research Project was initiated in October 1971 as a technical assistance input through the provision of Stirling initially to the East African Industrial Research Organisation. Logistical and other support was provided by the Coffee Board of Kenya, the the Kenya Planters' Cooperative Union and the NAL. The results of Stirling's work were supplied directly to the Board and KPCU for whom he prepared a two-part final report in January 1975. A series of technical papers was published in the journal Kenya Coffee during 1974 and 1975.

The requirement for the work stemmed from the increased need to store coffee during periods of oversupply and lower prices on the world market. It had also long been recognised by the Coffee Board, the KPCU and traders that a significant and costly deterioration in liquoring

quality and therefore prices was likely to occur if conventional, unimproved storage methods were used over extended periods. Stirling's work programme therefore concentrated upon researching the optimum conditions for successful extended storage of parchment, pre-hulled and clean coffee. The project was therefore concerned primarily with experimental research to produce findings and recommendations which were directly usable by the agencies concerned. Specifically this meant that the work included an overall appraisal of the available storage and handling facilities and recommendations for future planning by the industry.

- 1.3 The project appears to have had the advantage of clear objectives which were not unduly complicated by macro-level policy decisions. The coffee trade is not simple, its storage, processing and trading can be complex but the technical area within which Stirling and his associates worked was very clearly defined when compared to other parts of the storage field. Stirling appears to have had a very clear idea of his investigatory programme and to have been able, within the period available, to bring the work to the point of definite results and recommendations. The programme appears to have been well managed, not only by the researcher himself but also by the agencies with whom he was directly involved. At the NAL the work programme was distinct from other investigatory areas and adequate facilities and staff support were available. At the Coffee Board and KPCU premises, where extended periods of micro-climate monitoring of bag stores were carried out, full collaboration was forthcoming.

Another notable feature of this work is the clarity of the reports and papers produced. Parts A and B of the final report are made up of a summary of the research findings (A) and general recommendations on the improvement of storage facilities in Nairobi (B). This



is a model of the kind of report which is directed at those involved in decision-making and therefore deliberately presented in such a way as to precipitate action.

- 4.4 It is also encouraging to note that Stirling's local associate and assistant, G. K. Muriithi has provided a valuable contribution to the further development of the work. Where so often local associated staff and counterparts have moved on to other non-related work, the coffee storage project has provided a good example of the benefits of continuity. Muriithi's own involvement has made it much more possible for the recommendations emanating from Stirling's work to be incorporated into the planning of new facilities and structures. This applies particularly to the new extension storage at Kahawa House where the specific recommendations on ventilation practice have been followed through. Another good example is the continued modifications to parchment coffee stores at Dandora where double skin roofing and forced ventilation appears to have provided the kind of improved storage environment which early experiments had indicated.

It can finally be noted that there is much to commend in Stirling's approach to this particular type of applied research. Although much of the work involved was of a respectable scientific nature, his concentration throughout was on the operational level. His communication of the results of his investigations was also commendably direct and timely. The results of applied research should be presented in such a way that they can be applied. Stirling provided a very good example of how this can be done when working in a well defined problem area.

#### 4.5 The Storage Team, 1972-76

At a regular meeting of the Pest Infestation of Stored

Products Committee in May 1968 the chairman and Senior Entomologist (T. J. Crowe) noted that

"the application for the Stored Products Team was progressing well."

In the event the first member of the Team did not take up his position in Kenya until June 1972 and the three-man 'Team' did not come together until the very end of that year. Although it is not appropriate (and also very tedious) to chart the erratic progress of the technical assistance team proposal over the intervening years, it is nevertheless instructive to make some comments on the way in which the team approach evolved.

The first application for technical assistance to provide a team of storage specialists was contained in a Ministry of Agriculture proposal of April 1968 and based on a paper submitted to the Senior Entomologist by McFarlane in September 1967. At that time (1968) Locke had already made considerable progress in Mombasa and Baker was based at NAL. The proposed team was as follows:-

1. Project Leader - general coordination and research.
2. Ecologist - to carry out research 'related to warehouse ecology'.
3. Large Scale Farm Storage Specialist.
4. Insecticide Specialist (Baker suggested to fill this post).
5. Storage Specialist for small farms.
6. Storage Specialist for Coast Province (McFarlane suggested).

With regard to (5) above it may be noted that particular reference was made to the fact that the officer concerned would be required to take over the work of the FFHC team in mid-1970.

Even with the incorporation of staff on existing assignments this proposal was, it appears, too large for ODM to seriously consider. There was also a clear

difference of opinion between ODM and the Kenya Government about the basis of the terms of service. The ODM was initially only prepared to consider the proposal on OSAS terms which were almost entirely unacceptable to Kenya Government.

In early 1970 a much more limited proposal was submitted for consideration. This accepted that a team did in a sense already exist in the form of Locke, Baker and Taylor and that what was needed was a project leader to coordinate activities and help to establish a Storage Unit in the Research Division of the Ministry of Agriculture. The application indicated that the Project Leader would:-

"form the nucleus for the Stored Products Team and as the contracts of the staff seconded from ODM and those supported by the UK FFHC grant came to an end, he would advise on how best various members can be replaced."

Associated with the provision of a team leader was funding for the training of a 'counterpart' at post graduate level in the UK.

- 4.6 At about the same time the planning of further technical assistance inputs had been complicated by the recommendations of the Working Party on the Storage and Handling of Wheat and Maize headed by D. W. Hall and G. G. Corbett (then both of TPI). The Hall/Corbett report had recommended that a Stored Products Extension Section (or Branch) should be established within the Ministry of Agriculture. An organisational structure for the section was sketched out (based largely on the 1968 proposal) and the point was made that a number of the staff recommended for inclusion were already in post in the Ministry, the Produce Boards or the Kenya Farmers Association. The proposal was adventurous in approach but unrealistic and vague in definition. It was for example not clear how the section would fit into the Ministry and in particular what

its links would be with the existing extension service. Neither were the implications for storage work at NAL adequately specified. The report does say that:-

"the functions of this (Storage) branch would serve to alleviate the National Agricultural Laboratories of the need to allocate staff to study post-harvest extension problems on an ad hoc basis, at the expense of the research effort".

This appears to be a reflection of a dilemma which still exists within the Ministry of Agriculture in Kenya and which revolves round the means by which research findings are extended to the field and also the extent to which in crop storage (as in many other fields) it is possible to combine research and investigation with other regulatory, inspectorate and trading activities. This is an issue which is discussed further in Section 6, but whatever the rationale of the Hall/Corbett recommendations they were clearly too far reaching for Kenya Government to accept.

In the meantime McFarlane had joined Locke at Mombasa and was able to develop ideas not only on his own programme of work, as discussed in Section 3, but also on the longer term development of storage work in the Ministry and the related role of technical assistance personnel. With the support of Locke and Baker, McFarlane put forward a proposal to cover the period 1971-75 in a paper to the Senior Entomologist in March 1971. This later formed the basis of the formal request to ODM in mid-1971 when the framework of a three-man technical assistance input was first spelled out.

- 7 In his terminal report Baker noted that he was responsible for the proposals contained in the Hall/Corbett report referred to above, but added that these were presented as a very long-term objective. He went on to outline proposals for the ultimate form of the Crop Storage

Section (or Stored Products Unit) within the NAL and specified the responsibilities of each member of the three-man technical assistance team. Baker emphasises that:-

"the principal role of the team would be to set up the unit during the project period and ensure as far as possible an efficient permanent service within the Ministry of Agriculture".

This general approach related to ODM's favourable inclinations towards the financing of a three-man (albeit initially on OSAS terms) team, lead to eventual agreement on the objectives. It should be noted that despite the previous experience of McFarlane and the inclusion of Locke on the Team, it was not possible to formulate the objectives until February 1973. To some extent this may appear a sensible approach as it was only done after McFarlane took up his responsibilities as team leader, but bearing in mind the long gestation period for the project it should have been possible to agree overall objectives and specific terms of reference at an earlier stage. It would certainly have made Calverley's assignment easier in the initial stages if he had been able to see his storage engineering input more clearly within an already agreed team project framework.

4.8 The overall objectives as finally agreed were as follows:-

1. To advise on all technical aspects of the problems associated with the storage of durable commodities in Kenya, with particular attention to:-
  - (i) current and future developments in cereal grain storage and handling both on the farm and centrally;
  - (ii) the training of personnel concerned, at all levels, with the storage and handling of durable commodities and with the extension of improved storage practices both to farmers and others so concerned;

- (iii) current and future research relating to pest control on durable commodities in storage and handling, including all related biological and physical aspects.
2. To promote the early establishment, within the framework of the National Agricultural Laboratories, of a Stored Products Research and Extension Unit staffed, as soon as possible, by Kenyans and responsible for:-
- (i) the direction and execution of its own research and extension programmes based upon and developed from previous stored products research in Kenya and elsewhere;
  - (ii) the coordination of all stored products research and extension effort in Kenya and the technical supervision of all aspects of stored products quality control.

The specific terms of reference for the Team are listed below in chronological sequence according to the date at which the individual concerned took up his appointment. This will also be the order in which the work is discussed below.

- 9 Storage Engineer : D. J. B. Calverley, June 1972 - December 1973

Terms of Reference

- (a) To further and develop the Ministry's declared intention of converting where practical to bulk storage and handling of cereal grains.
- (b) To assist in the necessary improvements to the Cyprus Bin sites.
- (c) To provide assistance to the produce boards as required.
- (d) To assist in the formulation of a training and extension programme for farmers and extension workers.
- (e) To assist in the preparation and carrying out of training programmes for counterparts, associate staff and others.

As designed the terms of reference were almost naively overambitious and it was quickly apparent to Calverley that he could not hope to cover all the work areas indicated above. The initial specifications did not, in common with those of other earlier commitments of TPI personnel, give any clear indication of priorities. As it was, (b) above took up a major portion of the Storage Engineer's time just as it had done with Baker previously. Areas (d) and (e) although not totally neglected were certainly not given the attention which a simple reading of the initial terms of reference might suggest.

4.10 Calverley (in his terminal report) very adequately indicates the extent of his responsibilities and underlines the administrative and managerial role - especially in connection with Cyprus Bin modifications. This role although necessary, prevented Calverley making what was in his view, an appropriate technical input across the range of defined responsibilities. Those drawing up the job description for the Storage Engineer made an all too common mistake; that of overestimating the extent to which the day to day management could be divorced from 'technical advisory' functions. This has to be seen against the background of the extremely limited availability of storage engineers in the public sector in Kenya. In this situation the expatriate adviser is inevitably involved in not only carrying out technical planning functions but also in liaising with government departments and commercial companies, chasing up progress and putting across, often from a very isolated position, the 'storage engineering viewpoint' in broader based policy discussions. It should also be recognised that this type of appointment was comparatively 'new' to TPI. In Kenya for example, despite many man-years of inputs, Calverley's appointment was the first specifically aimed at meeting an 'engineering' requirement. As such the terms of reference

reflected not only lack of guidance from the client but also an unfamiliarity with situations where it was necessary to define the role of a storage engineer.

.11 Against this background, Calverley's eighteen months assignment should be regarded as a success. Much useful work was done and an important basis established for a continuing storage engineering input. It has to be remembered that at the time of his appointment to Kenya, Calverley, although an experienced agricultural/structural engineer, had no first hand experience of tropical agriculture and the related storage environment. Perhaps more importantly he also had to adjust to a very different government department administrative style and method from that with which he was familiar. In particular he had to extend himself into areas of planning and administration which were new to him in every respect. It is unfortunate and regrettable that Calverley had to deal with these kind of adjustment problems almost single handed. Although a member of the TPI team he was very much the advance guard working in a new environment seven months ahead of an experienced colleague. These limiting conditions were aggravated by uncertainties as to the duration of his assignment. Although it was eventually extended to a year and a half it was planned initially for little more than six months (see further discussion below). It would appear however that whatever Calverley may have lacked in terms of personal experience of durable crop storage in Kenya, was very much compensated for by the energy and directness of approach he was able to bring to what he saw primarily as technical advisory (as opposed to research) input. Calverley's terminal report reflects well his approach to the assignment. It is extremely clear in its description of the work done and straight forward in its recommendations. These will be considered in Section 5 and what follows below is an examination of the extent to which the work programme was achieved.



4.12 As already noted above, much of Calverley's time, particularly in the first part of the assignment period, was spent on the Cyprus Bin modification programme. The report of Gasston and Barbour (consultants) on improvements to the sites was published in July 1972. Calverley became directly involved in follow-up action as Chairman of a Working Party which studied the recommendations. The work programme was split into three phases and phase 1 improvements were agreed to and carried out before Calverley left Kenya. Specific technical advice was given to the Maize and Produce Board on maize handling facilities at both Cyprus Bin sites. Part of this was concentrated on revisions to the consultants' recommendations on loading and unloading machinery. Modifications were made to prototypes and detailed recommendations on further trials were spelled out in Calverley's handing over report. The working party also considered the need for maize drying facilities at Nakuru and Kitale and Calverley also provided individual support to the recommendations that the second phase improvements - which included important modifications to grain reception and despatch facilities - should be implemented as quickly as possible. It is apparent that much time was spent in putting up proposals and supporting them in the working party and other meetings with the consultants. At the time of Calverley's departure much remained to be resolved in the light of further proposals from Gasston and Barbour dated January and August 1973.

4.13 As far as assisting in the conversion from bag to bulk handling was concerned, Calverley found that the policy was by no means as well understood and accepted as he might have expected. His role was clearly not solely concerned with the technical design areas which would best facilitate the changeover. The Maize and Produce Board had been:-

"reluctant to accept that bulk storage has advantages

over bag storage";

and neither the Board nor the Ministry of Agriculture had anything approaching an agreed plan for the conversion process. In his terminal report Calverley was, however, able to comment that the Board had revised its plans and was now anxious to convert from bag to bulk handling where this was 'convenient and economical'. Experience has shown this to be an optimistic view which has not been borne out by more recent events. An important question is whether TPI personnel have been instrumental in backing a policy on conversion to bulk handling which may be of questionable justification. This is a subject which is discussed further in Section 5.

.14 A third distinct area in the Terms of Reference concerned the provision of assistance to the produce boards. Much of the advice to the Maize and Produce Board was concerned with the implication of modifications to the Cyprus Bins (see above) and with the modifications to the Code of Practice for operatives on the sites. This was originally developed by Baker and modified by Calverley to incorporate site modifications and suggestions from the Board and the KFA. Calverley also noted the need to have more comprehensive data on the movement of grain within the Cyprus Bin sites. This does not appear to have been regularised in any way and there is no example of how it would work contained in the terminal report. The same criticism can be applied to Calverley's recommendations on the need for a separate record book for each bin. One other specific area of work with the Maize and Produce Board concerned the advice on small driers at selected depots. Calverley prepared a design and costings paper as an aid to the Board in considering a proposed DANIDA loan and carried out further work relating to particular locations at Bungoma and Webuye. This direct advisory role was continued and developed by Calverley's successor and has extended to the current ODM

supported technical advisor in the Ministry.

4.15 Regular contact was maintained and specific commissions carried out for the Wheat Board. These included a design and costings analysis for a bulk handling railhead terminal at Nanyuki. This was not immediately followed through but the reasons for this were clearly outside Calverley's direct control. Baker's work with the Board and the KFA on the testing of butyl silos was continued, although little in the way of firm conclusions came from the trials in the time available.

On completion of his assignment Calverley expressed regret that he had not been able - because of the pressure of other commitments - to pay more attention to farmer-level storage issues. He correctly identified that the greatest need was for:-

"the adoption and adaption of techniques and practices that are well known and established elsewhere".

Although 'field' activities were extremely limited he was able to look broadly at the main issues and make recommendations for further work. Some of these were, as will be discussed below, taken up by Barber and/or Locke and his Kenyan associates in that part of their Training and Extension work which concerned the design of farm-level structures.

As far as the last category of work (e) above, is concerned, very little was done to assist in the preparation and carrying out of training programmes for counterparts and associate staff. Calverley did not have a counterpart within the NAL nor was it possible within the duration of his stay in Kenya to identify an appropriate individual who could work with his successor. This is only a criticism in a limited sense - and not directly of the way in which the programme was

implemented. The situation reflects the over-ambitious terms of reference referred to above and also the fact that staff with an engineering background were simply not available within the NAL and only to a very limited extent in the Ministry of Agriculture and parastatals. The problem remains and recommendations are made at a later stage in this report as to how it might be resolved.

4.16 In examining the administration of Calverley's programme, the major constraint was the marked degree of uncertainty at critical points. His initial appointment was extremely badly handled. Much responsibility for this must ultimately rest with the Kenya Government, although ODM officials were not sufficiently conscious of the need to have an effective handover period with both Baker and Calverley in Kenya. A number of errors were made and the compound effect was to the detriment of the work programme as well as unnecessarily disrupting the personal lives of those directly involved. It should, first of all, have been possible to devise some way of enabling an effective period of time at the end of Baker's tour for him to travel the country with Calverley, visit sites and be introduced to those directly involved. In the circumstances of a new appointment for an officer with no overseas experience and at a time when the TPI staff input in the country was temporarily at its lowest level for some years it would have been well worthwhile to either fly out Calverley for two weeks in advance of his official commencement but before Baker left, or to fly Baker back to Kenya for two weeks at a later date once Calverley had arrived there. The expenditure involved would have been relatively small when compared to the cost of the whole programme, but the benefits would have been considerable. As a substitute, a two-day briefing in Slough was totally inadequate. Calverley's arrival in Kenya was eventually delayed even further by the Kenya Government's inability or refusal to meet local costs of

transport and accommodation until the beginning of July. His projected May (1972) departure was postponed at four days notice and he did not travel to Kenya until 6th June. Once again it is difficult to imagine how such a situation could be allowed to develop. The ODM's refusal to meet (even temporarily) the Kenya Government's share of local costs is understandable - although at the time it would have been advantageous (to the programme) to have done so and then sought for reimbursement later.

4.17 After the difficulties on first appointment referred to above it is not surprising to find that Calverley was most anxious to have an effective handover to his successor. The main problem was in determining when this handover might be as the plans for him to be replaced early in 1973 did not materialise. The man identified for the post was unfortunately not available at very short notice. This appears to have been unavoidable but the resultant delay from the end of February to the middle of May when the post was advertised was overlong and illustrates an unfortunately characteristic hesitancy on the part of those responsible for taking action.

In the meantime McFarlane and Calverley prepared a joint paper for the Chief Research officer (with copies to TPI and the Development Division of ODM in Nairobi), suggesting that not only should a replacement engineer be recruited for the Storage Team but also that there was need for a specialist storage adviser within the Planning Division of the Ministry of Agriculture. As a short term measure it was recommended that Calverley should, after he left Kenya, be available on a consultancy basis for short-term visits as necessary. This suggestion was not immediately taken up although - as is recommended in section 8 - the value of short-term consultancy assignments other than for very specific scientific work has been underestimated.

Calverley left Kenya in December 1973 after an apparently satisfactory hand-over period with Barber. A broader based view of the impact of his work is combined with an assessment of the work of other members of the team in Section 5 below.

#### 4.18 Training Officer : M. T. Locke, October 1972 - March 1976

##### Terms of Reference

To train Kenyan staff in crop storage survey and extension duties, and to train a counterpart.

This brief statement is contained in the introduction to the terminal report of the Storage Team but a more comprehensive indication of the planned responsibilities is given in the appendix to the original formal request for a three man team in 1971. Here the duties of the proposed Training Officer were stated as:-

To carry out a training programme for stored products surveyors for whom posts are being created....and to run courses for extension staff concerned with farm storage and for storage staff in quasi-government crop boards and other organisations.

As designed the assignment clearly involved from the outset the extension of relevant information on crop storage as the training of staff within NAL and the marketing agencies. The effective implementation of the extension related training required rather more planning than appears to have been carried out when the programme was drawn up. It necessitated a commitment by those responsible for extension staff at district level to associate themselves with the training programmes of NAL and to plan their own staff assignments accordingly. The same applies to all training institutions from the Farmers Training Centres to the Faculty of Agriculture in the University. Although the organisation would not have been an easy task it would have been most advantageous, to have convened a meeting or workshop of

senior representatives of all such interested parties at the outset of the programme in order to communicate its provisional objectives, allow early representation on the needs and resources and exchange ideas on priorities and methods. This could have had a two-fold advantage. It would, first of all, have presented an opportunity to communicate the aims of the programme to a dispersed group of individuals who otherwise would not be adequately informed of work in NAL in this area. Secondly it would have opened up the planning of the work to incorporate commitments of resources by all the main parties involved. One development from this approach may have been the establishment of some kind of standing committee or advisory body on Crop Storage Extension and Training which could have met twice each year during (and after) Locke's assignment period.

In considering the effectiveness of the implementation of this programme it should first of all be recognised that the continuity brought to the work by the re-assignment of Locke following his earlier work at Mombasa, was a great advantage. It is extremely unlikely that so much would have been achieved had not this continuation been possible. At the same time an assessment of the effectiveness of the implementation can realistically be based on the expectation that more would be achieved on the basis already established by Locke within the NAL.

The four main components of the work are considered separately. These are:-

- (i) In-service training of NAL staff.
- (ii) Training of staff of marketing agencies.
- (iii) Extension training and related work.
- (iv) Training of a counterpart.

#### 4.19 In Service Training of NAL Staff

This programme appears to have been well implemented at all levels. Overall the training facilities as arranged for graduate, agricultural diplomate and technical assistant grade personnel were well chosen and effective. The details of the personnel and their involvement with training courses was extremely well documented in Annexe 9 of the terminal report. As expected the shortage of established posts and the mobility of staff within the Ministry of Agriculture imposed some constraints on the overall programme. These conditions appear to have been correctly accepted as outside the direct control of the officer concerned - and they are not of course confined to the Crop Storage area. Probably the most significant area of training was that arranged at the Kenya Polytechnic to enable surveyors recruited for infestation control work to obtain laboratory technicians' qualifications. This not only raised the applied scientific knowledge of the members of staff at this level but also established the opportunity for a more recognisable career structure for those qualifying.

#### 4.20 Training of Marketing Agencies Staff

The needs of Maize and Produce Board and Wheat Board staff were first assessed with the help of officers of the Board. In the case of the Maize and Produce Board the in-service training was carried out in direct collaboration with James Migunda, the Board's Scientific Officer. During 1973 and 1974 35 Store Keepers/Supervisors from 29 depots attended one-week broadly based storage courses. In addition a re-orientation workshop was organised for staff of the Board's fumigation units. The immediate needs of the Wheat Board were found to be similar to those of the Maize and Produce Board and during the same period 16 Wheat Board/KFA store keepers from 10 depots attended one week courses. A special intensive



re-orientation course for Cyprus Bin technicians was organised for the KFA with the main aim of familiarising staff with the modified Codes of Practice.

#### 4.21 Extension Training and Related Work

Locke and associated staff appear to have recognised that there was insufficient information on existing storage practice on farms to enable a clearly specified training programme to be introduced. Although an interesting attempt at surveying small farm storage problems was carried out on Ndaragwa Settlement Scheme in 1973 the Storage Team did not have the resources to carry out comprehensive surveys over a range of geographical areas and production/consumption regimes. Francis de Lima's follow up work on the FFHC 'hygienic areas' referred to earlier had provided some valuable information and more was to come from his ongoing research, but Locke wisely decided that there was still much that could be done to improve the capacity of extension staff to offer relevant advice even without the advantage of further information on the existing practices. He therefore initiated a survey of the extent of extension workers' existing knowledge. The analysis of the results of this survey and the less specifically based growing recognition of the needs of the extension service led eventually to the setting up of a working party to consider the plans for staff training. This produced useful recommendations on the direction of the training and was followed by a district level course for Crops Officers, Agricultural Officers, and Senior Settlement Officer from the Rift Valley Province at Eldoret. A further course was held for staff of Farmers Training Centres in February 1976 and this was preceded by the first course for Western and Nyanza provinces. Locke's assignment was extended to allow him to participate personally in the arrangement and execution of these later courses.

Related work in the extension area included collaboration with the Agricultural Information Centre of the Ministry of Agriculture to establish a series of radio broadcasts on storage topics. This had the significant benefit of introducing Kenyan members of staff to the use and techniques of broadcasting. Another area of collaboration with AIC was in the production of a number of advisory leaflets for direct farmer distribution. Locke was also involved in the early discussions with the Canadian International Development Research Centre which eventually resulted in the production of a storage film.

#### 1.22 The Training of a Counterpart (James Kwanzu)

As this objective was written in to the terms of reference for Locke's assignment it is satisfying to note that James Kwanzu was satisfactorily introduced to the training and extension work even though no counterpart was identified at an early stage. His own background and experience made him particularly suitable and although he did not effectively begin to work with Locke until November 1975 the extension of Locke's assignment made it possible for there to be a realistic handover of responsibilities. It is worth commenting here that Kwanzu has commented very favourably on the way in which he was introduced to the work and the effectiveness of the counterpart training.

Overall Locke's programme was effectively planned to the extent that this was possible and well implemented by someone who had the real advantage of his previous experience. Other than an overprolonged difference of opinion about the suitability of housing arrangements the administrative and support services appear to have been satisfactorily discharged.

There was however a further example of unnecessary uncertainty in the finalising of the arrangements for Locke's first extension of assignment. He was due to

leave Kenya in April 1975 and the situation was still under discussion within ODM in the first week of March.

As the returns to training and extension effort are only apparent in the longer term further discussion of the impact of the work is reserved to the next section.

4.23 Team Leader/Biologist : J. A. McFarlane, December 1972 - December 1975

Terms of Reference

To coordinate the work of the team and to organise and carry out research on stored products and to advise on all aspects of the change from bag to bulk handling.

As far as the last part of the terms of reference is concerned it was apparent to McFarlane (and incorporated in his terminal report) that neither he nor the Team overall were competent to 'advise on all aspects of the change from bag to bulk handling'. In particular the economics/management aspects were outside their fields and it is perhaps surprising that after a prolonged gestation period such ambiguities should remain. The other feature of the terms of reference for McFarlane is the continued emphasis on the change from bag to bulk handling. This emphasis was clearly built in to the job description for both McFarlane and Calverley in order to focus their attention. It is perhaps understandable in the case of the storage engineer but less so for the biologist who could with advantage have been directed much more to farm-level than centralised storage problems. In the event McFarlane's knowledge of the storage situation in Kenya and his awareness of the extent of the problem areas prevented any limited interpretation which could otherwise have resulted in a less valuable outcome. As far as the overall coordination of the work of the Team was concerned McFarlane saw the prime objective as being

the development of a crop storage group within the NAL and coupled this with the strengthening of liaison between NAL and allied organisations responsible for grain storage. The institution building significance could, with advantage, have been made more explicit in the planning of the Team's work as it may have helped to strengthen the case for increased resources to be given to storage work within NAL after the end of the technical assistance programme.

- 4.24 McFarlane's overall coordination of the work of the Team involved him in a considerable amount of liaison work with a number of bodies. These included importantly TSPC, the Development Division of ODM in Nairobi and the Ministry of Agriculture (through the Senior Entomologist).

He had the advantage of a greatly superior knowledge of crop storage in Kenya than almost all of those with whom he had to deal but appears in the main to have been able to accept the validity of opinions of others which were not necessarily in line with his own. He appears to have been able to establish and maintain good professional working relationships with all the members of the Team, with Francis de Lima his counterpart and with other members of staff of NAL and associated agencies. As leader of the Team he was prepared to become involved across the whole range of activities but at the same time did not, as far as can be ascertained, overimpose his own opinions. In as far as coordination between the different activities was necessary he was able to apply it effectively. One important professional area of coordination was via the Training and Extension activities. McFarlane participated in a number of training activities and appears to have been successful in assisting Locke to establish common ground between the technical advisory work of the storage engineers and the applied research of the storage entomologists.

almost perennial discussion about a Mombasa grain terminal. One difficulty with this type of evaluation is that this may have been done but not to any degree in written form in the documentation surveyed.

Overall the leadership of the Team and the carrying out of specific research and advisory commissions was most effectively carried out by McFarlane. The extent to which he was at the same time able to have an impact on the longer term development of crop storage work is discussed in Section 5.

#### 4.26 Storage Engineer : A. Barber, December 1973 - May 1976

##### Terms of Reference

Although Barber's work is a direct continuation of that of Calverley discussed earlier in this section it is perhaps significant that the terms of reference as spelled out in the terminal report of the overall Team are less all-embracing than those accepted by Calverley when he took up the initial appointment. This is a reflection of the way the work of the Storage Engineers was finally concentrated mainly on engineering and structural aspects of centralised storage.

The 'revised' terms of reference were:-

To form part of the Stored Products Team and to assist the Government and Produce Boards on all engineering and physical problems associated with storage, handling and transport, particularly bulk handling at large farm and central depot level. To investigate grain quality throughout the entire bulk handling system and to train junior staff.

This concentration was realistic, when considered in relation to the requirements of the marketing boards and

almost perennial discussion about a Mombasa grain terminal. One difficulty with this type of evaluation is that this may have been done but not to any degree in written form in the documentation surveyed.

Overall the leadership of the Team and the carrying out of specific research and advisory commissions was most effectively carried out by McFarlane. The extent to which he was at the same time able to have an impact on the longer term development of crop storage work is discussed in Section 5.

#### 4.26 Storage Engineer : A. Barber, December 1973 - May 1976

##### Terms of Reference

Although Barber's work is a direct continuation of that of Calverley discussed earlier in this section it is perhaps significant that the terms of reference as spelled out in the terminal report of the overall Team are less all-embracing than those accepted by Calverley when he took up the initial appointment. This is a reflection of the way the work of the Storage Engineers was finally concentrated mainly on engineering and structural aspects of centralised storage.

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This concentration was realistic, when considered in relation to the requirements of the marketing boards and

the remaining technical problems associated with centralised storage installations. At the end of 1973 when Calverley handed over to Barber there was a clear indication that at least a further two years' work was required to assist the Ministry of Agriculture and the boards not only in solving existing technical problems but also in planning ahead. Therefore, although it is regrettable that little significant small farm level structures work was carried out by the 'Team' this could only have been accomplished within the overall time period through the provision of an additional member of staff. This was never seriously considered, although McFarlane's suggestion on short-term consultancy inputs from Calverley - referred to above - could have gone some way towards meeting the need.

- 4.27 In reviewing the effectiveness of Barber's implementation of the agreed programme, it has been possible to use as basic material not only the appropriate section of the Team terminal report but also an unpublished individual report prepared by Barber at the end of his assignment in May 1976. This extends over the last six months of his work which was not incorporated into the TPI terminal report. It is an extremely comprehensive and, in places, detailed review of the work on storage facilities at centralised level and very adequately conveys the extent of Barber's close collaboration with the Maize and Produce Board in particular.

It should be noted that Barber's work extended some way beyond the application of his technical expertise to particular storage engineering problems. This part of the work did take up a major portion of his time - particularly in the necessary modifications and improvements to the Cyprus Bins - but he was also, in collaboration with Hesselmark, the economist attached to Maize and Produce Board, able to make a significant contribution to the preparation of planning material for the next five year

period. This did not in itself solve the continuing problem of the policy vacuum within the Planning Division of the Ministry of Agriculture, first referred to directly by Calverley in his terminal report, but it did provide a consistent and well prepared plan which would form the basis of new storage investment projects. The fact that the Ministry was not, as will be discussed further below, able to make an early response to this work is no criticism of Barber or his associates.

4.28 As far as the Cyprus Bin sites are concerned Barber continued where Baker and Calverley left off and was able to bring a number of distinct pieces of work to a satisfactory conclusion. This applies particularly to the ring beam repairs, the modifications to the hatch covers, the grain spinners and the loading, unloading and on-site transportation arrangements. He continued to emphasise that the handling plants for maize reception and despatch were the weak links in the system and actively supported the phase 2 modifications as proposed originally in the Gasston and Barbour report. In this matter he was not successful but once again it is difficult to see how he could have done more to influence a decision which because of the financial implications had to be made at high level in the responsible ministries.

In August 1974, he submitted a joint report (with O. Hesselmark) on the Bulk Handling of Maize. This report looked at production, storage and consumption as a system, identified the main flows and suggested new bulk handling facilities in specific locations. It was accepted in principle by the Maize and Produce Board but by the end of Barber's assignment no response had been received from the Ministry of Agriculture. The Ministry nevertheless commissioned a Study of Maize and Wheat Storage Investments for the period 1976-81. In addition to Barber and Hesselmark an economist from the Planning Division (Eriksson) was also assigned to the work which



This attitude has probably contributed to the regrettable lack of any counterpart within the Ministry of Agriculture and the consequent absence of any continuation of storage engineering, investigatory and advisory work after Barber's departure. More could probably have been done before the 'Team' broke up to either integrate storage engineering effectively into Research Division or to find an adequate placement for the required expertise elsewhere in the Ministry. As it was, over two years elapsed before Hunt was recruited to take up a more general storage role in the Planning Division of the Ministry.

4.30 The administration of Barber's programme appears to have been adequate particularly during the main period of his assignment when he was directly associated with the team. There is evidence of considerable uncertainty and indecision as to the extension of his assignment after December 1975. This appears to have been mainly at the Kenya end where an official request for an extension was very slow to emerge. As it was, it was only on 18th November that confirmation of the extension was received at NAL. Slightly earlier (August 1975) McFarlane in his own 'appraisal' of the work of the team had recommended the maintenance of a storage engineer at NAL to provide assistance and technical guidance on farm level structures and handling. This was to be in addition to the provision of a special storage adviser within the Planning Division of the Ministry. Despite this kind of recommendation - and the Kenyan request of November 1975 for a further adviser on grain storage extension after the departure of Locke, it did not prove possible to provide any further technical assistance input after Barber left.

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## SECTION 5. The Impact of the TPI Assisted Programmes

### 5.1 Introduction

Sections 3 and 4 have been concerned with an assessment of operating efficiency; with analysing how far the personnel involved were able to effectively implement the programmes. This Section seeks to analyse the impact of the work from a broader, less specific point of view and in relation to the policy objectives of the Kenya Government.

Government policy on the production and marketing of durable crops - with particular reference to maize and wheat - has, throughout the period examined, been mainly concentrated on ensuring that production kept pace with effective demand. This has been less successful for wheat than for maize and Kenya is likely to be an importer of wheat for the foreseeable future, and certainly over the next Five Year Plan period when the annual increase in output is projected at 1% with demand increasing at between 5% and 7%. Maize remains the dominant staple throughout the country and as with wheat, the pattern of production has changed markedly over the past twelve years in line with the structural changes of the agricultural economy. At the same time, against a background of high rates of population increase and declining terms of trade for food crop producers, the Government is increasingly concerned to ensure that adequate reserves of maize are available in the event of adverse climatic conditions. Thus Government policy can be said to be one of self-reliance in maize production with the maintenance of a strategic 'famine' reserve after which export becomes a possibility. The possibility of regular exportable surpluses was projected in the late 1960's but this has not been achievable. Current policy is based on an assumed annual rate of increase in maize production of 3.5% during the next plan period which almost entirely

matches the projected increase in overall demand. An increasing proportion of production is projected to enter the commercial market therefore providing a small surplus over human consumption needs for animal feed, industrial use and export. It is unlikely that a sizeable export surplus will be forthcoming at prices at or near to world market prices. Throughout the period the Government has been seeking to encourage increased productivity through higher yields and lower unit costs. There has been a general recognition of the importance of effective and adequate centralised storage as a means of reducing waste. As indicated above there has not been a particularly clear storage policy and those responsible for project level planning of storage facilities within Government departments have been working within a very undeveloped policy framework.

## 5.2 The Individual Technical Assistance Inputs

Of the technical assistance personnel involved in the period 1965-72, Locke's work at Mombasa with the later support from McFarlane, was probably the most significant in terms of its contribution towards creating and developing an institution. In this case the establishment of the SICS with the associated in-service and related training programmes has had a valuable long-term and continuing impact. One of Locke's main recommendations on completing his work in Mombasa, was that the SICS should be extended to Nairobi, Nakuru and Kitale. To some extent this was done, although the impact of the survey team's work has not been so great up-country as it was within the port area. One reason for this is that it has not proved possible to allocate sufficient resources to this work in major producing and consuming areas. This applied not only to surveyor-level staffing and appropriate levels of recurrent expenditure, but also to the 'management' of the work programme which is a responsibility carried by members of the storage section within the NAL along with other more directly research oriented work.

5.3 Baker's impact on the development of an effective storage policy was restricted by the same constraint of a non-effective overall cereals policy which has already been referred to. In contrast to Locke however, Baker's work extended over a much wider area, from the testing of insecticides and fumigation practice to the monitoring of stores and assistance with the planning and management of installations operated by the produce marketing agencies. Any longer term impact created by the direct training of associates was of less significance than that derived from the establishment of codes of practice (as subsequently amended and improved by Calverley and Barber) for the operatives at the Cyprus Bin sites. When considering longer term impact in relation to the declared objectives of the Kenya Government it is also important to recognise the contribution made by Baker to the early planning of the storage section within NAL. The extent to which a continuing impact has been created by the operations of the 'Storage Team' which was set up to help establish such a section, will be considered further below.

In common with the majority of those working on the assignments reviewed here, Baker was not able to work with any designated individual operating on a counterpart basis. This was particularly unfortunate as far as storage installation work was concerned although it must be borne in mind that the need for Baker to extend himself across a number of related areas of work did not lend itself to the successful association of any one individual. In this as in other aspects of his work the longer term impact was clearly dependant upon a continuing technical assistance input over the next 3 or 4 years. The potential for this became realisable when the 'Team' was established.

5.4 Taylor's work, as was indicated in Section 3, was shorter term and more discrete in terms of its programme. It appears likely that some of the longer term impact of

the work was lost when no direct continuation of the programme was possible. This would have involved the systematic testing of fumigation methods in operational conditions and almost certainly with advantage have concentrated on improving fumigation practice and monitoring performance in conventional bag stores. There appears to have been only a limited training input and no effective counterpart arrangement proved possible. Much relevant research work was done on in-truck rail fumigation but in the light of current transportation practice this had only a limited direct beneficial impact as a significant aid to the reduction of valuable losses.

- 5.5 McFarlane's work at Mombasa, although more broadly based than that of Taylor - and less than that of Baker - was a valuable research oriented complement to that of Locke which concentrated on the establishment of the SICS. As such, much of the impact, although not immediately apparent - was related to the success that the SICS might achieve in more effectively controlling infestation and re-infestation within the port area. Its ultimate impact is therefore determined not only by the extent to which the work programme was effectively planned and adequately carried out (see Section 3) but also by the financial, legislative and administrative support from the Ministry of Agriculture. McFarlane's recommendations included the advice that there should be a review of the legislation applying to export produce within 2 years of the completion of his work. There is no evidence of this being carried out and so it is not possible to adequately assess how far further benefits - particularly from the shipboard studies - have been achieved as a direct result of the work. As far as can be ascertained no recent enabling legislation has been passed which would increase the effective authority of the Chief Grader's office as far as it relates to control standards for export produce or on ships. It should, however, be noted that the opinion of the Chief Grader

is that there is adequate legislation and that such constraints as he has are mainly those of numbers of staff and facilities.

- .6 There is limited evidence of direct beneficial impact from some of the other work carried out by McFarlane and reviewed in Section 3. Bruchid infestation work has continued rather spasmodically at Mtwapa and the full recommendations of the Pieris report were not taken up and modified into a revised grading system for copra as McFarlane had recommended. Little appears to have been done to follow up his recommendations on small farm-level grain driers. It is likely that district level extension staff have with justification, found more pressing calls upon their time.

McFarlane's strongest general recommendation was for more adequate funding for the SICS. This seems to have been achieved - although more work could always be done if more staff were available. Locke and McFarlane also recommended that an exchange of young SICS staff with members of the U.K. Ministry of Agriculture Infestation Control Inspectorate should be actively explored. It is unfortunate that this was not carried through as the impact from such a programme particularly in recent years could have been very real.

- 7 The significant positive impact of Stirling's coffee storage work has already been indicated. It is sufficient only to emphasise that not the least beneficial aspect of this work was the associated training of a Kenyan counterpart. It is ironic that some of the most effective in-service counterpart training appears to have been achieved in a programme which did not have the planned provision for such an arrangement.

## 5.8 The Storage Team

The impact of the Storage Team comprising McFarlane, Calverley, Locke and Barber over the period mid-1972 to almost mid-1976 is assessed here in two ways. The first basis of assessment is to look at the main terminal recommendations of the team and see how far the Kenya Government has gone in actively taking up the advice. The second basis is to investigate the particular contribution made by means of the establishment of the storage section within the NAL and the associated development of a cadre of expertise in the Ministry and associated marketing agencies.

5.9 In examining the extent to which the recommendations of the Team were taken up by those responsible for action, the assumption is not necessarily made that all such recommendations were justified when seen within the broader context of resource allocation in the Research Division and more widely in the Ministry of Agriculture and marketing boards. Consideration of the specific recommendations does, however, provide an opportunity for the closer examination of the longer term impact of the work and its relationship to the operations of the storage section and associated agencies at the present time. Four sets of recommendations were aimed at storage engineering and structural aspects. A firm recommendation was made that the type of advisory work carried out by the storage engineers in the Team should continue for a further 2 or 3 years and that the individual concerned should be attached to Ministry Headquarters (possibly within the Planning Division) rather than at NAL. This was undoubtedly a necessary continuation of this type of technical assistance but unfortunately it did not prove possible to agree the placement and responsibilities of such an individual, neither was it easy for ODM to recruit a suitable person until over 2 years after Barber left Kenya. As a result some of the impact and much of the impetus of this



activity was lost as there was limited locally available storage engineering expertise to take up the work. This applies particularly at the level of the Ministry of Agriculture but also within the marketing boards.

The recommendation that definite arrangements should be made for the provision and administration of funds for routine regular maintenance work at the Cyprus Bin sites was one based firmly on the experience of the storage engineers who had filled a vital linking and organising function which had extended well beyond technical advice. A further recommendation was made that the Maize and Produce Board should increasingly take over more and more responsibility for the sites with the NAL maintaining overall surveillance of the monitoring of maize in store. Both these recommendations illustrate the inherent limitations of this type of technical assistance in conditions where the 'advisor' becomes directly involved in activities which are not continued after the completion of the assignment. It was assumed that some continuing technical assistance provision would be made and this being so, bearing in mind the extent of the other responsibilities of the storage engineer, it is not surprising that little progress was made towards developing improved arrangements for continuing the work within the Maize and Produce Board and/or the Ministry. Had the completion of Barber's contracted work been seen as the end of this type of technical assistance then more would - or at least should - have been done by both TPI and the Ministry of Agriculture to ensure that a reasonable and workable division of ongoing responsibilities was made.

- 5.10 The other main recommendation in this sphere of activity was that the Ministry should develop 'a positive policy for future bulk storage developments in Kenya'. This is a reflection of the apparent inconsistencies in policy referred to earlier but also indicates the extent to which the Storage Team's engineering input, and, in a

sense the overall programme, was instituted in part to assist directly with the change over from bag to bulk handling of cereals. The Team's impact in this area of work was negligible because of the fact that Government was not in a position to carry through its earlier declared intentions. Only Barber in his own limited circulation terminal report and his study for the 1976-81 period (with Eriksson and Hesselmark) appears to question the economic rationale of such a policy as applied to all locations. With the benefit of experience it can now be seen that great advantage might have been gained from the early involvement of the Storage Team, supplemented by an applied economist, in an objective study to prepare some kind of masterplan for bulk and bag storage. An initial acceptance that the Kenya Government wished to 'go bulk' was probably not only an over simplification but also instrumental in lessening the impact that the Team's work had on helping to formulate a storage policy.<sup>1</sup>

5.11 The recommendations on farm storage advice and the training of extension staff and produce board operatives reflect an understanding on the part of McFarlane and Locke that benefits of this type are likely to be long term. In this respect it is very different from a specific piece of research which produces a solution to a recognised problem which is then passed on for commercial development. The extension and training work more than all the work of the Team - including that of the storage engineers - necessitated a continuing programme in order to make its promised impact on the reduction of storage losses wherever they might occur. The work of the Team was only the beginning - especially in improving the

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1. Editors note: TPI did in fact propose in 1972 that a study of the strategy of grain storage at national level be carried out, but this was not accepted by the Kenyan Authorities.

capacity of the extension staff to make their own impact at the level of the small farm. The longer term impact of the efforts of the Team in this area of work appear to be severely limited at the current time by the staff and other resources available to continue training/extension work from within the NAL. Much valuable work has been done but one repeated and strong impression gained from discussions with extension staff and trainers at all levels in many parts of Kenya is that recognised and requested training needs currently far exceed the capacity of NAL to service them.

- 5.12 One area where, as might be expected, the Team's terminal report recommendations have been considered and either acted upon or discarded is that of storage entomology research investigations. Here there is much evidence of valuable continuity and even where the direction of research has changed it has done so for what appear to be rational reasons. The impact of McFarlane's encouragement of research has thus been considerable - not only with regard to particular fields of investigation but also in fostering a professional interest amongst the staff at NAL.

In assessing the overall impact of the Team in the development of expertise within the NAL and the marketing boards, it has to be remembered that staff establishments are incomplete and inexperienced across a whole range of the specialised scientific and technical areas within the public sector. Thus although it is easy to regret that staffing is not adequate to effectively continue the Team's work in some respects, there has been a valuable continuation within the staffing constraints which obtain. There was a significant development of staff expertise almost at all levels other than storage engineering and even here it is possible to point to individuals especially in the Maize and Produce Board, who benefited from working with Calverley and Barber.

It is still possible to agree (with reservations about Extension and Training) that, as McFarlane said in the terminal report :-

"a viable and competent crop storage research organisation exists at NAL".

Some suggestions are made in the next two sections about the way in which this viability and competence may be strengthened and supported. Within the recognised constraints the Storage Team was probably as successful as it could be in developing a crop storage section within the NAL. In this sense it had an undeniable impact in the sense that without it much less would have been achieved in terms of the establishment of a base from which further progress could be made. The next section contains some specific recommendations to the Kenya Government about the ways in which the impetus might be maintained.

SECTION 6. Implications for the Kenya Government in Relation to Current Practice and Requirements for Durable Crop Storage and the Organisation and Management of Policies, Programmes and Projects.

6.1 Introduction

The implications discussed here derive directly from the evaluation of effectiveness and impact which have been described in the preceding sections and from the opportunity which presented itself for the analysis of policy and practice on the storage of durable crops. This section is in three parts; the first part is concerned with implications for the maintenance and development of stored products work within the research division of the Ministry of Agriculture. The second part concentrates on the need to determine a recognisable and consistent policy for the storage of cereals and the third part includes some discussion of the main implications for the Kenya Government in its dealings with those bi-lateral and multi-lateral agencies which can offer assistance with stored products research, training and project finance.

6.2 Implications for the Maintenance and Development of Stored Products Work within the Research Division of the Ministry of Agriculture.

The new Development Plan for the 1979-83 period has provided a welcome opportunity for the Kenya Government to review the diverse activities of the Ministry of Agriculture. In the draft version of the Agricultural/Rural Development section of the Plan attention is drawn to the fact that:-

"the targets of the plan will have to be based on the wider application of known technologies";

and that:-

"this underlines the need for a substantial increase of efforts in agricultural research to achieve long-term sustained development".

The plan also states that as far as possible research and extension services will be oriented towards removing constraints on the development of small-holder production and that:-

"in the allocation of research resources preference will be given to those lines of work which are directed to increase employment and productivity at the same time."

6.3 Against this background the resources available for stored products work within the Research Division are limited, but the direction of the research and investigational work carried out appears most appropriate. There is no doubt that the impact of the NAL storage section's work could be much greater if additional staff were available at the senior and middle level. It has to be recognised in saying this that the same could probably be said of almost any section of the research division. Storage work is however something of a special case in that the scope of the activity has been necessarily large in terms of the areas of specialisation but also as a result of the added responsibilities of survey, training and extension which are outside what would often be regarded as the 'normal' work of research scientists. A very good indication of the extent of the work is to be found in recent annual reports of the Senior Entomologist. In the 1977 report the following eight activities were reported on:-

- (i) Field trials with insecticidal dusts on cob maize.
- (ii) Insecticide dust trials on shelled maize.
- (iii) Insecticidal dust protection trials for beans.
- (iv) Persistence trials for malathion on wheat.

- (v) Monitoring surveys of loss assessment in central storage.
- (vi) Cyprus Bin monitoring.
- (vii) Infestation control survey work at Mombasa and upcountry.
- (viii) Training and extension.

The research programme for the following year included three 'new' areas. These were:-

- (ix) Estimation of losses caused to legumes, sorghum and millet by storage pests - and their control.
- (x) After-harvest losses to macadamia nuts.
- (xi) Laboratory studies of the biology of Sitotroga cerealella and Sitophilus zeamais and their parasites.

Other work specified in the research programme, as indicated in the draft document submitted to the Head of Research Division by the Senior Entomologist, appears to be a continuation and extension of that indicated in items (i) to (viii) above. Much of this work including the new investigations is clearly of ultimate benefit to storage at all levels but especially at the level of the individual producer. Although it will be necessary to continue the monitoring and survey work at centralised storage level (Maize and Flouduce Board stores and millers in particular) an increasing proportion of basic entomological research is being directed at subjects which will ultimately improve storage practice on the individual farm.

- 6.4 It is important that those concerned with broad allocations of resources within Research Division should recognise the vital importance of maintaining the coverage and effectiveness of the investigations of the SICS. There is a need for permanent survey backed by legislation to ensure that standards are maintained

wherever durable crops are stored. This is a labour intensive operation which can be effectively managed on a day to day basis by experienced diploma-level officers but which also requires the regular overall surveillance of graduate-level staff. This has been possible so far and has enabled the SICS to carry out its work programme effectively in Mombasa and, as far as can be ascertained, in a more limited way elsewhere. It is important to maintain the link between the survey work and field research which McFarlane encouraged in Mombasa in 1970-72 and which de Lima's applied research has also potentially strengthened. If the survey work is to be extended to investigations at the small farm level - and the SICS seems the most appropriate body to do this - then the existing staff complement, facilities, equipment and buildings will be totally inadequate. In this regard it is necessary that an early review of existing methods and future requirements should be carried out. It should be noted that facilities for the SICS at Mombasa have been inadequate for a number of years and that this is undoubtedly a constraint on effective performance.

- 6.5 The linkage between laboratory, field trials and survey of storage practice is clearly established. The same link is also apparent between these activities and 'training and extension' although here the continuing involvement of Research Division is not necessarily assured. There can be little doubt that there was a need for stored products specialists at NAL to become involved in training staff and extending knowledge about improved storage practice. This kind of work was continued after the departure of Locke, the 'Team' specialist in this area in 1976, through the work of one graduate with the support of other senior members of staff. The need for training and extension work cannot be questioned, although what clearly is being questioned is where within the Ministry this responsibility should rest. The opportunity presented to the writer to consider this question and discuss the



issue with many of the interested parties, leads to a firm recommendation that Research Division should continue to exercise a training role but that this should be phased out over time in an agreed and pre-arranged manner. Extension is the responsibility of the extension officers at district level including FTC instructors. What they require is initial training, re-orientation and refresher courses in all aspects of farm-level crop storage. In the long-term this training function should ideally be taken over by the Institutes, by Egerton College and the University Faculty of Agriculture but in the short term it will be necessary to build up the capability of the Crop Storage Section of NAL to service these needs as well as the training of its own surveyor staff and that of the marketing boards and the Kenya Farmers Association. All the available evidence points to there being many training needs unfulfilled despite the efforts of the officer concerned over the past two and a half years. Some of these needs are within the marketing agencies but the most apparent and pressing is that coming from the Farm Institutes, Farmer Training Centres and from those Provincial and District Agricultural Officers who are particularly conscious of the need to increase the knowledge and extension techniques of their staff. Unfortunately there are indications within the Research Division of a lack of commitment to this kind of work. This is not on the part of NAL staff but at a higher level where there is no clear recognition of the place for this kind of work within the Division. There is an urgent need for the Ministry to address this problem as the recent occupier of the training/extension post (which significantly is not established with such a title) has recently left the employ of Government to join a non-government agency in his own home area. Unless appropriate steps are taken this type of work will not only diminish - as in the current circumstances it undeniably must - but disappear altogether and not get taken up by any other institution.

6.6 It is extremely fortunate that the Senior Entomologist's own area of specialised research is in stored products entomology. His counterpart association with the TPI Team was most fruitful and productive and his continuing personal involvement has given the stored products 'section' an overall sense of direction and professionalism which it might otherwise have lacked. He does, however, carry a heavy burden of research in addition to his administrative responsibilities. Although his energy and application have enabled him to discharge his duties with great efficiency, the maintenance of the impetus of the work will almost inevitably decline unless additional staff are directed to durable crops storage, as opposed to other 'field entomology' work. Dr. de Lima is well aware of this and has continued to press for recognition of the special needs of this section. A more specific manpower planning approach to the placement of new graduates is necessary if this problem is to be resolved.

6.7 Apart from the monitoring of the Cyprus Bins and contribution to in-service training of operatives, there has been little in the way of storage engineering work at NAL since the departure of Barber in 1976. It would appear to have been generally accepted that structural design work on centralised storage installations although a responsibility of the Ministry of Agriculture, is best discharged from within the Planning Division. Other than this it is most adequately seen as an area of responsibility within the marketing boards. Although as already indicated earlier in this report, there is a market shortage of storage engineering capability within government and the parastatals and it is difficult to see any justification for the Research Division placing a storage engineer within the stored products section of NAL. Attention should however be paid to the establishment of a permanent technical storage installations planner within the Planning Division with responsibilities for durable crops.

Early efforts should also be extended towards the placing of storage engineers within all the produce boards - as within the crops considered here only the Coffee Board appears to be at all adequately staffed in this area. Design work on farm level storage is best seen as part of the responsibilities of the training staff within the storage section of NAL who are likely to need to utilise the specialist knowledge of engineers within the Planning Division (see above) and/or Land and Farm Management Division of the Ministry. In the promotion of adequately tested storage structures the training staff within NAL are well placed (in a geographical sense) to utilise the expanding facilities of the Agricultural Information Centre. As government policy - as stated in the new Plan - is to encourage group extension methods, the effective dissemination of information will necessitate the acquisition of the improved techniques which the Centre will provide to all divisions with any advisory functions.

1.8 The need to determine a recognisable and consistent policy for the storage of cereals.

A common feature of the terminal reports of a number of TPI staff whose work is discussed in this report has been a recommendation that a clear policy on the marketing and storage of cereals should be determined and that without this the development of stored products research and related activities is also handicapped. It is not difficult to sympathise with this view particularly in the way in its relation to the change to bulk handling and the policy on the Mombasa grain terminal. Probably the area of most difficulty has been the improvement of the Cyprus Bin sites which although ambitiously proposed over a three-phased development programme suffered a series of delays in decision-making which affected even the most essential first phase alterations.

Cereals in general and maize in particular have for a number of years been subject to inconsistent policies on pricing, regulation and trading, the size and location of the strategic stocks and the extent of the financial and managerial autonomy of the marketing boards. There appeared to be signs - at least in the draft agricultural sector plan - that the planners within the Ministry of Agriculture were at last coming to grips with the underlying realities of the production and marketing environment. There are indications that maize marketing regulations may be relaxed as:-

"an important step towards reducing marketing costs and improving marketing efficiency".

There also appears to be growing general concern about the need to bring domestic prices more into line with long-term trends in world market prices - especially for those commodities (such as maize) in which the country is at, or close to, self-sufficiency. If this is pursued actively it will be extremely important to maximise efforts to reduce valuable wastage at farm and centralised storage level. This necessitates a comprehensive review of the survey, research, training and appropriate design inputs which the Ministry is best able, together with the marketing boards, to provide.

- 5.9 In February 1979 the Planning Division were reported to be setting up a team to review and formulate policy for all cereals. It is to be hoped that this satisfactorily incorporates early decision making on a number of outstanding issues and in particular that it takes as a base the recommendations of the Barber, Eriksson and Hesselmark report which was not acted upon beyond the level of the Maize Board. It is also extremely necessary for the planners involved in determining cereals policy to work closely with those most technically competent to assist. In particular this means the Senior

Entomologist and the Storage Engineering specialist technical advisor within the Ministry as well as the senior management of the produce marketing boards. The implications for research and the design of installations should be obvious. What has also become increasingly and regrettably obvious in Kenya (and elsewhere) is that left on their own, economists tend to be unfortunately insensitive to and ignorant of, crucial technical parameters and unrealistic about institutional change. There were indications in February 1979 that the 'planning' might be very much 'in house' amongst a small group within the Planning Division of the Ministry of Agriculture. This might expedite planning in the short term but runs the risk of being unwise in the longer term view for the reasons indicated above.

6.10 Implications for the Kenya Government in its use of multi and bi-lateral aid for research, training and project finance.

It will be apparent from the discussion above that there are identifiable areas of work within the stored products field where the right kind of aid at the appropriate level could be extremely valuable to the Kenya Government and the para-statal. This applies particularly to training/extension and storage engineering and, as identified, also to discrete areas of stored products entomology where research needs are apparent but for which sufficient research capability is currently not available. It must be emphasised however that it is necessary for the Kenya Government in all cases to determine what is the 'right kind of aid'. In this regard it is recommended on the basis of this study that bi-lateral or multi-lateral assistance to durable crops storage work should have two main components:-

- (i) The work should build up the capability of local institutions on a permanent rather than temporary basis.
- (ii) It should avoid wasteful duplication of effort and complement the work of local and external institutions.

These two areas are discussed below.

6.11 Building up the capability of local institutions requires a meaningful training component to be built into technical assistance and project aid. The Kenya Government has, it would appear, had some difficulty in meeting the requirements of donor agencies for counterparts or associates. This has not been a major problem at the most senior level even though the Senior Entomologist may find himself counterpart/co-director to more than one programme at any one time, but has been recognised and commented on in earlier sections of this report as a limitation on the success of specific technical assistance inputs. Examples of this from the ODM alone are the assignments of Calverley and Barber (and the current assignment of Hunt) and the greater proportion of Locke's most recent work period. The 'counterpart problem' remains as one which can create a second stage problem of isolation and independence from the institution to which technical assistance personnel are attached. Without the direct association of local staff on a day to day basis it is all too easy for the research, investigatory or advisory work to become remote from the work of permanent staff and to be regarded as not effectively part of an ongoing programme. Building up the capability of institutions on a permanent rather than temporary basis clearly involves, therefore, a more careful approach to the training and manpower planning implications. At one level with the recent TPI work this was very successful

in that the middle-level technician/surveyor staff complement was significantly increased through a suitable in-service and post-experience training programme. At a higher level it was successful in providing appropriate post-graduate opportunities for almost all the staff involved but not so successful in providing adequate counterpart/associate opportunities. In future work it would be an advantage to first of all identify and then plan for the total integration of a number of staff into the work programme of an aid-assisted 'expert'. This would avoid the difficulties which arise when one counterpart is designated and would have the added advantage of building in a recognised training component into all such schemes. The need for this will become particularly apparent in the storage area in Kenya as the range of bi-lateral and multi-lateral agencies involved in storage work increases.

- b.12 With regard to the avoidance of wasteful duplication of effort and the need to integrate the planning of aid inputs from different sources it is helpful to review the situation as at the beginning of 1979. Of the multi-lateral agencies, one of the most significant in the crop storage field is the FAO/SIDA (RAF/114) regional programme on Rural Structures for East and South East Africa. The main objective of this programme is stated as being to:-

"provide assistance to member countries on the development of functional, low cost rural structures - especially for storage".

The regional headquarters for this comprehensive three-year programme is in Nairobi. FAO/UNDP are also involved directly with the Ministry of Agriculture through the Agricultural Equipment Improvement Project (Ken 74/019) which is co-ordinated by T.B. Muckle at

Nakuru. The scope of the work has recently been extended to not only the testing of shelling and milling equipment but also into evaluating alternative farm-level storage structures. In this regard the storage work (within the Unit) is seen by the Regional Director of the FAO/SIDA project (see above) as an integral part of that programme's activities. Both these programmes are at an early stage of development. In contrast, the UNICEF Village Level Technology Programme has been in progress for some time and has included the design and extension of farm-level storage structures from its units at Karen, Bukura and Embu. There are also indications that further funds and technical assistance may be available from an FAO/UNDP Post-Harvest Losses Project and it is understood that the Planning Division of the Ministry of Agriculture has been invited to put forward project proposals.

- 5.13 On the side of bi-lateral agencies there are a number of current and possible future donors with an interest in assisting in the development of the post-harvest subsector. The U.K. currently supports the Ministry of Agriculture through the provision of one storage engineer in the Planning Division, and has recently grant aided the Kenya Government for an extensive programme of bag store installations. The Danish development agency have a long-term programme of assistance to Kenya and this includes the provision of centralised storage, grain driers for use by the Maize and Produce Board, together with back-up technical assistance. U.S. A.I.D. commissioned a study of 'Smallholder Grain Storage' in early 1978, carried out by the Food and Feed Grain Institute of Kansas State University. This has resulted in a proposal for a National Crop Storage Study (A.I.D. Project No.615-0169) which went out to contract in the U.S.A. in late 1978 with the aim of commencing operations in April 1979.



6.14 In the light of the existing and planned aid initiatives it is extremely important that the Ministry of Agriculture should urgently work towards the determination of a genuinely coordinated approach. There is great danger of duplication of effort and of contradictory recommendations which may bear little relation to the needs assessed by the 'permanent staff' in established posts. As a first step it is even necessary to improve the communication of information about aid projects. It was significant that the writer was for example able to inform senior officials in the Planning and Research Divisions of the Ministry about the U.S. A.I.D. project and also about the way in which the FAO/SIDA Regional Storage Structures programme was likely to develop in Kenya on the basis of an outline prepared one year earlier. Although any kind of 'consortium' approach to the planning of aid in this area appears to have broken down, it is not too pessimistic to predict a potentially massive misallocation of resources (many with high opportunity costs) unless an urgent review of activities is carried out. This work could be included with the work of the proposed cereals policy review team discussed earlier in this section but is probably better seen as a responsibility for Research Division. It may be aided by the commendable new policy of incorporating some agricultural economics capacity into the research service - as noted in the draft version of the new Plan.

SECTION 7. Implications for TPI/ODM in Relation to the  
Crop Storage Loss Reduction Programmes in  
Kenya

7.1 Introduction

This short section and the one that follows it are partly in the form of conclusions but are more designed as a means of constructively discussing the main implications. The implications considered here are directed at the ODM and particularly at the Tropical Products Institute, and concern the continuing role of TPI in servicing the needs of durable crops storage in Kenya.

It follows from the previous section that it would be advisable for ODM to assist as far as possible in the early clarification and coordination of policies on aid to the storage sector. As the client, the initiative rests with the Kenya Government although it would be helpful if TPI through the Development Division of ODM could give a clear indication of those areas of work where it feels particularly able and competent to assist. Without reviewing the whole of TPI's activities, and especially that emanating from the TSPC at Slough, it is not possible to relate any views of Kenya's requirements to the existing or planned future world wide commitments of TPI. This responsibility must rest with others. It is possible however to point to those areas in which TPI appears to have some kind of comparative advantage over other donor agencies (both bi- and multi-lateral) and to see how far these measure up against Kenya's needs.

7.2 It is apparent that there is a long and valuable post-independence connection between the Ministry of Agriculture (especially the NAL) in Kenya and the TPI. This has produced a degree of continuity which regretably is not always a feature of aid programmes. It has

also resulted in the establishment of a pool of individual expertise and corporate knowledge on Kenyan and East African conditions within the TSPC, which remains available for the benefit of individual governments. One way in which Kenya could, with advantage, continue to benefit from the TSPC at Slough as a resource centre, is in assistance with specific stored products entomology research. It has been explained above that the professional research capacity in the field of durable crop storage is extremely limited within the Research Division. Although it is hoped that this will be resolved in time, there is likely to remain for a number of years a limited applied research and investigational capacity. This is likely to apply to loss assessment surveys, instore and intransit fumigation monitoring and the evaluation of farm- and centralised-level storage structures and procedures. It may well be most appropriate for much of this assistance to be in the nature of short-term assignments - certainly measured in months rather than years. As an initial step the Kenya Government may wish to request a short-term visit to review the existing research areas in collaboration with the Senior Entomologist and his staff and to identify specific areas where further collaboration might be requested.

- 7.3 The second area of comparative advantage is in training. TPI has developed an increased capacity to meet training needs in recent years and one very satisfactory feature of assistance to NAL and the produce boards over the years has been the way in which it has been possible to place staff on appropriate courses in the U.K. and in particular at Slough. This should continue but should not be simply left to the good offices of the British Council in Nairobi. Even without the involvement of ODM financed technical assistance staff in Research Division, it should be possible to identify training needs and liaise with TPI on available places. The Senior

Entomologist appears to have had some difficulty in getting early approval from the establishments section of the Ministry for individuals to take up scholarships. It would almost certainly be worthwhile attempting to plan further ahead for appropriate placements. Increasingly TPI will be identifying opportunities for in-country training both for staff of one country and also on a regional basis. The East and Central African 'region' is one that lends itself to this type of approach and Kenya probably has some of the best facilities available to host such programmes. These would not necessarily be formal courses but could, with advantage, incorporate attachments to and case study work based on, local areas and institutions. The coincidence of Kenya's needs and TPI's training expertise would be aided by the valuable association of a Kenya institution. Depending upon the specific training area this could be the Agricultural Information Centre, Egerton College (especially with regard to storage structures) or the Faculty of Agriculture at the University. There is likely to be opportunity for 'training trainers' in the crop storage related teaching methods and in this regard there are clear advantages, because of the numbers involved, in adopting a regional approach.

- 7.4 The third area where TPI/ODM may have a particular role in helping to meet Kenya's needs is in the provision of short or longer term advisory personnel specialising in storage engineering. Within this area there appears to be two main types of need. One is that which is directly concerned with centralised storage structures and the other is at the farm storage level. In the light of the current scarcity of experience storage engineers within Government and the marketing boards it is unfortunate that the ODM supported post in the Planning Division currently occupied by Hunt, was established with such wide terms of reference. Although it is possible for an

experienced officer such as Hunt, to extend himself over a wide range of durable and perishable crops, it would undoubtedly have been to Kenya's advantage to concentrate his work on to the storage of cereals and (perhaps) beans. This concentration could still be made and is strongly recommended if the technical assistance post is maintained as it almost certainly should be. Whether this is done or not it would be helpful to consider the short-term assignment of a storage engineer to review the present situation at Maize and Produce Board depots especially the Cyprus Bin sites. This should be regarded as a technical follow-up to the work of Calverley and Barber and if requested by the Kenya Government the assignment should include discussions and recommendations about the future of the post currently occupied by Hunt in the light of the findings of the review.

- .5 The second type of 'storage engineering' need is that which concerns farm-level structures. There is a real danger as indicated in the previous section, that the Kenya Government will receive a considerable amount of contradictory and (in some cases) doubtful advice on the subject of farm-level storage structures. Because of its involvement over the years TPI may have a particular role to play in assisting the Kenya Government to identify and then manage the diverse strands of research, design and extension upon which different foreign based and domestic agencies are embarked. At present there is a strong likelihood that this range of programmes will continue with only very limited coordination from Research Division, as the technical area is not seen as a specific sphere of responsibility. Such coordination is absolutely essential and urgent and would merit a technical assistance supported post within Research Division for a period of not less than six months and not more than one year.

## SECTION 8. Implications for the Effective Design and Management of Technical Assistance Programmes

### 8.1 Introduction

This study has given the writer the opportunity to look in some detail not only at the 'performance' of staff supplying specific technical assistance inputs, but also at the way in which the various programmes have been designed and managed. The evaluation has concentrated as much on assessing the programmes 'as designed' as it has on assessing the effectiveness with which they have been implemented. Although this study has been concentrated on a particular area of work in one country, it appears very probable that some of the implications for planners and managers of technical assistance programmes can be extended beyond the sectoral and geographical bounds of durable crops storage in Kenya. This is the assumption upon which this final section is based.

### 8.2 Programme Design

It has been shown that technical assistance programmes are, on the evidence of this study, often planned and re-planned over long periods of time. It has also been shown that the donor agency often has considerable difficulty in interpreting the needs of the client and that this almost inevitably can result on occasions in generalised and non-specific terms of reference and limited guidance on the more detailed scheduling of the assignment. Even with experienced staff involved this situation is inevitably counterproductive and leads to the client not getting full advantage of the expertise available. On the evidence of this study there is a great need for those planning technical assistance inputs to identify not only a general area of need but also a work programme for the personnel involved. Both planning activities must, if they are to be meaningful, be carried

out jointly by the donor agency and the client. This seems likely to involve a much greater commitment by the recipient government to not only the overall aims of the programme but also to the means by which these are to be achieved.

Within the work programme particular emphasis should be placed on those activities which develop the supported institution on a permanent rather than temporary basis. This is likely to involve the planned association of local staff - and the detailed programming of their involvement wherever possible - and also the commitment of the recipient government to provide the finance, staffing and facilities necessary. In the face of 'aid' which in some cases (although not on the evidence of the work reviewed here) appears to be imposed on recipient governments almost regardless of their wishes, it is very difficult to criticise the clients for their non-commitment to institution building. There is however a tendency towards an almost passive acceptance of technical assistance without an accompanying willingness to take the necessary steps to make the best use of it. Where this is the case - as it has been on occasions in Kenya for stored products work - the aid agency is faced with a difficult decision as to whether it should continue to formulate new programmes. On balance the decision should usually be to continue but to seek to establish a broader based commitment to the programmes concerned than has sometimes been the case in the past. This means for example that broad objectives and work programmes should be agreed and accepted by all local agencies involved. In the storage field this could include the produce boards, farmers' representatives, commercial pesticide and fumigation companies as well as the Head of Research Division in the Ministry of Agriculture. In particular it will be necessary to involve other sections of involved Government ministries at an early planning stage. For stored products in

Kenya this would include Crops Division, Land and Farm Management Division, the Extension Division, Planning Division and representatives of education and training institutions. The responsibility for broadening the area of consultation and agreed involvement must lie with the client although the donor agencies could do much to deliberately encourage this procedure.

- 8.3 An equally significant improvement in the design and planning of technical assistance programmes could be achieved by the more formal statement and, where possible, quantification of ultimate objectives and intermediate goals. Although research, training and advisory work is not easily planned within a 'project' framework it is necessary for the designers of such activities to more rigorously spell out priorities, the sequence of work and the means by which successful achievement of aims will be indicated. This requires a more structured approach to planning which, whilst recognising that there are a number of 'grey areas' where forecasting is difficult, also attempts to more consistently build on that amount of knowledge which is available.

Although there are indications that some recent ODM technical assistance programmes have been prepared in a more rigorous and consistent format, this will only prove to be valuable if it is used as not only a planning but also a management tool. Although scientists and engineers have a healthy disrespect for what they may regard as unnecessary form filling and documentation, the more effective design of new programmes - as well as the improved management of existing ones - could benefit greatly from a regular and serious minded approach to the monitoring of progress in relationship to agreed patterns of work.



#### 8.4 Management

The responsibility for the management of technical assistance programmes is in one sense, shared by the donor and recipient agency in that the latter is usually expected to provide the facilities which support the provision of the staff by the former. The discussion of the implications here, is concentrated upon management by the aid agency although it will be recognised that without the involvement of the clients in the planning of technical assistance programmes, the required quality of management input from them is unlikely to be forthcoming.

The Kenya study has indicated very clearly that the management of a programme may involve up to five institutions/agencies in addition to those of the recipient government. Recent work in Kenya has, for example, had a management input for its ongoing programme from TSPC at Slough, TPI in London, the ODM (Kenya Desk and specialist agricultural advisers) in London, the Development Division of the Ministry in Nairobi and the British High Commission also in the Kenya capital. This is additional to a measure of self-management in the case of a technical assistance team, from the team leader. This almost inevitably leads to delays - sometimes of a regrettably long duration - in decision making and to a remoteness from the real nature of work by some of those involved in the management process. The delays and apparent inconsistencies in approach are extremely irksome to hardworking, professional officers, many with long experience of developing countries. Communication is often inadequate; decisions are not explained fully and the collecting up of diverse opinions sometimes only fudges the main issue. Staff on technical assistance assignments need and merit more direct professional management contact with their own permanent or temporary base. This technical base

(in this study the TSPC) needs in turn a greater measure of control within ODM as far as this concerns the management of technical assistance staff. Desk officers and others involved within ODM for example are not always personally and adequately familiar with the institutional framework within which experienced professional officers have to operate. This means that decisions on accommodation, renewal of assignment and other personnel matters may appear arbitrary and inconsistent over time. The field officer is often looking for more direct and decisive communication and can reasonably expect that procedures should be streamlined. On the evidence of this study this appears to be a prime requirement if the administration of technical aid programmes is to achieve anything approaching the level of overall efficiency which is a feature of the scientific and technical performance. At times, as has been shown by this study, the amateur administration of parts of a programme, particularly those relating to arrivals, departures, contract renewals and housing - by donor and recipient, have come close to threatening the success of a valuable initiative. In so far as this is a result of a top heavy bureaucratic process it can be improved by establishing more direct management contact and encouraging and giving more responsibility to the technical wings of ODM and their staff in specific locations.

- 8.5 In a general sense the TPI programme in Kenya over the latter part of the period studied, appears to demonstrate the value of a team approach to technical assistance. There are certainly clear indications of the advantages that could stem from the establishment of overlapping work programmes. These advantages - at least potentially - seem to outweigh the likely disadvantages of the team approach which develops out of the possible tendency to collaborate more with members of the technical assistance team than with counterpart and associate staff. The

'them' and 'us' problem is a real one with all technical assistance personnel and without careful planning, may be accentuated by the 'team' approach.

8.6 It may be appropriate to conclude with a comment about (TPI) terminal reports. On the whole these are valuable documents although variable in style and comprehensiveness. They tend towards an ex-post justification for the work that has been done and in most cases say almost nothing about the management and implementation of the work programme. They are clearly intended to be technical reports with a research and investigational emphasis but suffer in some cases from the inability or unwillingness of the writers to describe and assess their work fully in the context of the recipient institution. As such they are, in some cases, of limited benefit to the client. They are often written when the writer is already embarked on a new assignment and tend to appear remote from the ongoing problems of local staff and institutions. They could usefully incorporate a guided form of self-assessment and an attempt at the type of evaluation which distinguishes, as this study has tried to do, between the appropriateness of the programme as designed and the effectiveness with which it has been implemented.

## APPENDIX 1

### TERMS OF REFERENCE FOR EX-POST EVALUATION OF TPI/ODM PROJECTS ON THE STORAGE OF DURABLE AGRICULTURAL PRODUCE IN KENYA (AS PREPARED BY TPI)

#### Background to the Evaluation

1. TPI is commissioning a series of ex-post evaluation studies of past major projects and programmes which have either been financed from its own resources, or in which it has played a major role through the supply of staff as TC officers financed by ODM. The objective of the studies is to identify those lessons that can be learned to improve the quality of the Institute's work and to draw attention to whatever changes may be necessary in the Institute's procedures for the identification, appraisal and execution of projects and programmes. The purpose of these evaluations is not to find cause for praise or blame but to learn lessons that can be applied to on-going projects and programmes.

#### Objective of the Evaluation

2. The objective of this particular Evaluation Study is to assess the impact TPI's involvement has had on the storage of durable agricultural produce in Kenya over the past 10 years. During this period, there has been a succession of both short and long term technical cooperation assignments carried out by the staff of the TSPC (TPI) in the storage sector, culminating in the 3-man Advisory Team attached to the Kenya Ministry of Agriculture from 1972-75, based at the National Agricultural Laboratories, Nairobi. It is expected that the Study will concentrate on the work of this Team.

3. It is envisaged that the Evaluation Study will include:-

- (1) an assessment of the influence the advice given by the various TPI inputs has had on the past, current and planned future developments in the storage of durable agricultural produce in Kenya, including those financed by multilateral and bilateral aid donors, with particular reference to any developments financed from U.K. Capital Aid Funds;
- (ii) an assessment of the impact the various TPI inputs have had (in part at least) on changes in Government policies aimed at improving the storage practice for durable agricultural produce and the quality of the stored produce;
- (iii) an assessment of the influence the advice given by the various TPI inputs has had on past, current and planned future research relating to quality and pest-control on durable agricultural produce in storage and handling methods and systems, including all related biological and physical aspects;
- (iv) an assessment of the contribution made by the various TPI inputs to the training of personnel, at all levels, in the storage and handling of durable agricultural produce and to the extension and application of improved practices;
- (v) a qualitative and, if possible, quantitative assessment of the reduced losses that have occurred in the storage of durable agricultural produce that can be attributed (in part at least) to the work of the various TPI projects;

if at all possible, the evaluation should attempt to distinguish clearly between the reduced losses that can be attributed to capital developments, particularly those financed by the U.K. and those that can be attributed to improved management.

- (vi) an assessment of the effectiveness of a technical cooperation team approach to storage problems.

### The Report

4. It is envisaged that the report will include recommendations that will guide the TPI (and the ODM and Kenya Government where appropriate) in improving the effectiveness of similar projects and programmes in the future. Thus attention may be drawn to changes which may be desirable in the Institute's procedures for the identification, appraisal and execution of projects and programmes.

5. The report will be presented jointly to the TPI and the Government of Kenya, and provided these parties agree, will be made freely available to other interested parties, since one of the objectives of these evaluation studies is that useful lessons may be learned by persons who are involved in project identification, appraisal, execution and evaluation.

APPENDIX 2. PERSONS CONTACTED AND INTERVIEWED AND  
THE KENYA ITINERARY.

1. Persons Contacted and Interviewed in the U.K.

Mr. D J B Calverley )  
Mr. J A McFarlane )  
Mr. R W Taylor )  
Mr. W H Andrews ) TSPC Slough  
Mr. J R O Humphries )  
Mr. D L Proctor )  
Dr. P Prevett )

Mr. D C P Evans Principal Agricultural Adviser)  
Dr. D W Hall Environmental Adviser ) ODM  
Dr. B E Cracknell Manpower Planning Unit ) London

2. Kenya Itinerary

5th January to Kenya 6th - 12th January in Nairobi

Initial discussions with British High Commission staff  
and Dr. J. Goldson of Development Division

Initial meeting with Dr. F. de Lima at NAL

Meeting with Director of Agriculture

Head of Planning Division  
Head of Food Crops Division  
Head of Research Division

Mr. G L T Hunt Storage Adviser (TC)  
Planning Division  
Mr. J Kwanzu and Mr. S Muhihu (NAL)  
Mr. T J Aldington Planning Division  
Mr. Parmeet Singh Chief Statistician) Bureau  
Mr. D. Casley Adviser ) of  
Statistics  
Mr. M. Barret )  
Mr. J. Coope ) British Council





22nd January in Kisumu

Mr. J J Gichuki Provincial Director Agriculture,  
and Nyanza Province  
Mr. C. Nyasani Provincial Crops Officer  
Mr. S. Asulude M & PB Dept Manager, Kisumu and  
depot staff

Visited Maize and Produce Board depots and Luanda  
market to inspect locally marketed produce.

23 January Kakamega and Bungoma

Mr. J P K Mbandi Provincial Director Agriculture,  
and Western Province  
Mr. I D R Kariuki Provincial Crops Officer  
Mr. J Kurgat Vice Principal Bukura Farm Institute  
and  
Mr. S Burgess Village Technology Unit (VSO) Bukura  
Mr. F Masibo Principal, Bungoma Farmers Training  
Centre

24th January Bungoma and Kitale

Mr. V Owenga Depot Manager, Maize and Produce Board,  
Bungoma  
Mr. J Masubu, Mr. L Kwinga, Mr. E M Githongo and other  
staff  
Mr. C Odipo Depot Manager, Maize and Produce Board,  
Webuye  
also visited Kitale Maize and Produce Board depot and  
Cyprus Bin site

Meeting with Mr. C Ngetich (KFA) and other staff  
and  
Mr. H Gashigwa Site Manager Cyprus Bins

25th January Eldoret and Nakuru

Mr. J K Wanyonyi Field Officer, Maize and Produce Board,  
Eldoret  
Mr. G K Kahoro RVP Fumigation Officer  
and members of his team  
Mr. L K Mutende Area Manager, Maize and Produce Board,  
Nakuru

Tour of Cyprus Bin site and conventional bag stores  
Meeting with staff on site including Mr. J K Murangi and  
Mr. D Ndolo, Mr. J Bogajo and Mr. W Muhanji (Chief  
Clerk) at Wheat Board Silos, Nakuru

Mr. B Muckle UNDP Mechanisation Testing Advisor

26th January Nakuru and Egerton College, Njoro

Mr. M Mukolwe Provincial Director Agriculture, Rift  
Valley Province  
Mr. W K A Kikwai Deputy Produce Executive, Kenya  
Farmers Association  
Mr. W Nguyo Registrar, Egerton College  
Dr. P A Misiko Head, Department of Engineering  
Mr. E K Ireri Economics Department  
Mr. T J Madindou Biology Department  
Mr. A O Auma Head Crop Production Department

29th January to Embu and Siakago

Meeting with Principal, Embu Farm Institute,  
Mr. E K Muhihu, and Mr. E L Pinto

Inspected Institute stores and Village Technology Unit  
with Mr. P Young (VSO)

Also to Agricultural Machinery Testing Unit at Siakago  
Mr. P P K Kisina Officer in Charge

30th January to 4th February in Nairobi

Discussion with the following:

Mr. D Vining	U.S. Embassy
Mr. J White and Mr. B. Warren	Development Division
Mr. G K Muriithi	Coffee Board
Professor E W Schenk	Agricultural Economics
Mr. T Muchiri	Agricultural Engineering
Mr. J W Raether	Commercial Attache Danish Embassy
Mr. P Scrivener	)
and	) UNICEF
Mr. A. Hooker	)
Mr. I Macdonald	Agricultural Information Centre
Mr. O J Sode	UNDP Regional Storage Team

5th February Departed Nairobi

### APPENDIX 3

#### The Freedom from Hunger Project 1968-70

The project was staffed by an experienced senior officer (Coyne) and a much younger man (Henley) with very limited overseas experience. The scheme was administered by the Ministry of Overseas Development with funding from the U.K. Committee of the Freedom from Hunger Campaign.

The objective was stated as simply to:-

"improve existing grain storage practice on small farms".

The approach adopted was to concentrate initially on one area in Western Kenya where maize was an important small scale crop and where storage losses due to infestation were recognised as significant. A series of courses for extension agents and farmers were held in selected locations in Western, Nyanza and Rift Valley provinces. These courses concentrated on basic improvements in storage practice especially the use and application of insecticide dusts.

After the initial round of courses - which aroused variable interest and response - work concentrated on a pilot scheme at Kurkura in Kakamega District of Western Province where an area was selected for the testing on all designated farms of the recommended improved storage practices. Once the scheme was started it was used as a training area for extension staff from Western and Nyanza Provinces and at that time the senior member of staff, Coyne, moved to Nairobi to coordinate the programme and develop training courses in other provinces.

During the second year of the project it was evident that sufficient funds were available to establish pilot schemes (sometimes called 'hygenic' areas) elsewhere in the country and with the collaboration of the Provincial Directors of Agriculture. 20 such areas were designated. The main use of project funds was for the provision and distribution of insecticides to these areas.

A simple but comprehensive approach to weight loss calculation was devised for the pilot scheme at Bukura. Although this provided some data particularly on differences between pilot area and non-pilot area producers in the incidence of insect damage on maize, the trial was not carried out as planned and very little serious analysis completed before the end of the assignment.

It was left to Francis de Lima of the NAL to carry out the most systematic analysis of available data from the 22 pilot schemes. Based on his analysis which was presented in a Ministry of Agriculture Technical Report, de Lima postulated an approach to maize storage practice on farms which recognised that 'economic injury levels' were only reached after 3 or 4 months of storage in most parts of the country. Given average patterns of consumption, a combination of improved structures and insecticide application to a portion of the crop appeared possible.

At the completion of the FFHC project's planned period of work, Coyne recommended that no further technical assistance was necessary. This was based on the assumption that one Assistant Agricultural Officer should be appointed specifically to storage work in each province. This was not forthcoming and neither was it possible for the NAL to commit more of their meagre staff resources to this work. Writing in 1973 after reviewing a number of FFHC farm level storage

projects in East and Central Africa, Andrews of the TSPC also indicated the lack of any organised follow up noting with reference to Kenya work that:-

"this project suffered from the absence of full-time counterpart follow-up".

It is unfortunate that such a potentially useful technical assistance project achieved so little. One main reason for this was the acute personality conflict between Coyne and Henley which could almost certainly only have been avoided at the initial stages of recruitment. Coyne's apparent authoritarian style of 'command' suited neither the circumstances nor the personality of Henley. There was an extremely wide difference in ages which was not of itself a necessary cause of difficulty but which only served to emphasise other fundamental inadequacies.

Although the unfortunate recruitment decision - which surely should have been avoided - was the main reason for the project's ineffective performance, it also suffered from the too generalised terms of reference. Considerable cooperation was received from the Ministry of Agriculture at provincial level but it is also clear that no recognisable plan was prepared before the staff concerned arrived in Kenya. For this all the parties concerned are responsible. The rather unusual nature of this kind of technical assistance may have prevented a more rigorous approach to the technical planning by ODM through TPI. At the same time the FFHC appear to have handled the scheme in a very amateur fashion and a number of mistakes (even including the basic recruitment ones) might have been avoided had TSPC taken more responsibility for initiating and monitoring the work.

Andrew's assessment study of the FFHC project makes little direct reference to underlying management and planning inadequacies as they affected the Kenya project. This is unfortunate as is the lack of any significant attempt to follow up the pilot areas work by the Storage Team over the 1973/76 period. This would almost certainly have necessitated one extra staff member to concentrate on investigatory work at the small farm level. This need was not adequately recognised at that stage - although it has been since - and the valuable continuity was almost completely lost.





8. NAL Contributions of Crop Storage Working Party II November 1977
9. Kwanzu Extension Services on Crop Storage in Kenya 1978
10. Research Division Draft List of Research Programmes Entomology Section 1978
11. Ministry of Agriculture Draft Development Plan Agricultural Sector June 1978
12. NAL Survey of Maize and Produce Board Stores 1976/7 and 1977/8 Harvest August 1978
13. FAO Report of FAO/SIDA Expert Consultation on Storage and Structures in Developing Agriculture in East and South East Africa 1978
14. de Lima A study of the bionomics and control of Sitophilus zeamais and Sitotroga cerealella and associated fauna in stored maize under laboratory and field conditions in Kenya. PhD Thesis University of London August 1978

B. Reports of TPI/ODM Staff (Excluding short-term assignments)

1. Locke Report on a Five year secondment to the Kenya Government to initiate a storage and infestation control survey in Mombasa (R164)
2. Taylor Report on a Two Year Secondment to the Kenya Government for an investigation into fumigation and related topics (R111)
3. Coyne Report of the Freedom from Hunger Campaign Project to improve grain storage on small farms September 1970
4. Andrews Assessment of Five small farmer grain storage projects initiated by the U.K. Freedom from Hunger Campaign Committee (R273)
5. Wheatley Report on a visit to Kenya (R128)
6. McFarlane A report on Stored Products Research in Coast Province Kenya (R321)

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