



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

NOSCOT



NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

Agricultural Economics Division

School of Agriculture, Aberdeen

*Econ. rpt. 140*

GIANNINI FOUNDATION OF  
AGRICULTURAL ECONOMICS  
LIBRARY

JUN 28 1983

# THE ADEQUACY OF GRAIN STORAGE AND HANDLING FACILITIES ON SCOTTISH FARMS

GARTH ENTWISTLE

May 1983

Economic Report No. 140

THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE  
Agricultural Economics Division

THE ADEQUACY OF GRAIN STORAGE AND HANDLING FACILITIES ON SCOTTISH FARMS

Garth Entwistle

May 1983

Economic Report No. 140

### Acknowledgement

This study is based upon data supplied by the 152 farms involved in our survey. I would like to thank the farmers involved for their co-operation. I am also grateful to my colleagues of the Economics Division, particularly Neil Chalmers for his help with the survey and its interpretation, Chris Mackel for his ideas and Mike Daw as Editor. The study and its publication have been financed by the Department of Agriculture for Scotland. Their support and particularly their help with the survey is acknowledged.

## CONTENTS

|   | Page |
|---|------|
| 1. INTRODUCTION   | 1    |
| Remit   | 1    |
| Background to the Report  | 1    |
| 2. A SURVEY OF ON-FARM GRAIN HANDLING FACILITIES<br>WITHIN SCOTLAND     | 5    |
| Introduction  | 5    |
| Survey Results  | 6    |
| Changes in the Scottish Cereal Area                                     | 6    |
| A Description of On-Farm Grain Stores                                   | 7    |
| The Adequacy of On-Farm Storage Facilities                              | 8    |
| On-Farm Storage Requirements  | 9    |
| Drying and Conditioning Facilities                                      | 10   |
| 3. SUMMARY OF SURVEY RESULTS  | 13   |
| Introduction  | 13   |
| Changes in Scottish Wheat Production                                    | 13   |
| Changes in Scottish Barley Production                                   | 14   |
| The Adequacy of Grain Handling Facilities<br>on Scottish Farms          | 15   |
| Conclusion  | 16   |
| 4. THE DEVELOPMENT OF GRAIN HANDLING FACILITIES<br>BY CEREAL PRODUCERS  | 17   |
| Introduction  | 17   |
| Independent Development of On-Farm Facilities                           | 18   |
| Group Marketing with a Central Store                                    | 20   |
| Group Marketing Using Existing On-Farm Facilities                       | 21   |
| Group Marketing Through Existing Facilities Off the Farm                | 21   |
| 5. CONCLUSIONS  | 22   |
| Appendix I      Distribution of Cereal Units within Scotland            | 23   |
| Appendix II     Questionnaire   | 24   |
| Appendix III    A Comparison of Survey Results with DAFS<br>Census Data | 27   |

## 1. INTRODUCTION

### Remit

The steady increase in the Scottish cereal area experienced in the 1970s and early 1980s has raised questions regarding the adequacy of grain handling facilities on Scottish farms. This report attempts to quantify the on-farm storage and associated handling facilities available within Scotland and assess its adequacy in the light of changes expected in the Scottish cereal market. It is one of a number of studies undertaken by the Economics Division under the sponsorship of the Department of Agriculture and Fisheries for Scotland. Its remit is specifically to:

- estimate the adequacy of on-farm grain storage, drying and conditioning facilities within Scotland.
- assess the intentions of producers to supplement, improve or replace these facilities.
- identify areas within Scotland where the further development of grain handling facilities is required and consider how best these developments should take place.

### Background to the Report

Cereal production within the UK reached a record 22 million tonnes in 1982. This represented a 45 per cent increase on the production levels achieved in the early 1970s which averaged 14.5 million tonnes.<sup>(1)</sup> It is a result of a continual expansion in the UK cereal area from 3,713,000 hectares in 1970 to 4,030,000 hectares in 1982 (+8.5%) and a general improvement in yields encouraged by a swing to higher yielding winter cereals.

In Scotland similar changes have been recorded. The Scottish cereal area has increased from a 1970 level of 452,000 hectares to 520,000 hectares in 1982 (+15%) with winter cereals representing 16% of the total area. Production meanwhile increased from 1.884 million tonnes<sup>(1)</sup> in the early 1970s to 2.605 million tonnes in 1982 (+38%).

In the early 1970s Scottish grain production was mostly consumed on the domestic market and largely as feed. Use of both oats and barley on the farm or origin was high and both wheat and malting barley tended to be imported. Since then the situation has changed dramatically. Farm of origin usage has fallen as the number of specialist arable units has increased and farmers have been faced with important new markets. Changes in the production and usage of cereals in Scotland since 1970 are shown in Table 1.

An increase in off farm sales of barley has partly been absorbed by an expansion in the uptake of Scottish barley by maltsters. This expansion is now over, and given the depressed state of the domestic drinks industry, maltsters will have to look increasingly to export markets even to maintain current levels of barley usage. The use of barley as animal feed is falling as a consequence of declining livestock numbers, increasing use of cereal replacers such as manioc and corn gluten feed and, recently, its partial replacement in rations by wheat which is becoming increasingly available at favourable prices. As a result, the export and intervention markets have emerged as necessary outlets for surplus supplies of barley.

---

(1) Average Production 1969-1973.

Table 1 Production and Usage of Cereals in Scotland Since 1975/76

('000 tonnes)

| <b>WHEAT</b>                             | 1975/76 | 1976/77 | 1977/78 | 1978/79 | 1979/80 | 1980/81 | 1981/82 |
|--|---------|---------|---------|---------|---------|---------|---------|
| Production                               | 154     | 132     | 123     | 103     | 136     | 137     | 200     |
| Retained on Farm or<br>Sold into England | 56      | 9       | 2       | 9       | 8       | 2       | 20      |
| Sales:                                   |         |         |         |         |         |         |         |
| Human                                    | 69      | 56      | 70      | 59      | 55      | 56      | 95      |
| Stockfeed                                | 22      | 64      | 50      | 34      | 72      | 78      | 84      |
| Seed                                     | 1       | 3       | 1       | 1       | 1       | 1       | 1       |
| Exports                                  | 6       | -       | -       | -       | -       | -       | -       |
| Total Sales                              | 98      | 123     | 121     | 94      | 128     | 135     | 180     |
| <b>BARLEY</b>                            |         |         |         |         |         |         |         |
| Production                               | 1,766   | 1,588   | 2,085   | 1,729   | 1,907   | 1,850   | 2,200   |
| Retained on Farm                         | 721     | 541     | 652     | 537     | 654     | 544     | 537     |
| Sales:                                   |         |         |         |         |         |         |         |
| Human                                    | 490     | 595     | 699     | 691     | 737     | 561     | 750     |
| Stockfeed                                | 153     | 331     | 228     | 322     | 306     | 292     | 250     |
| Seed                                     | 25      | 39      | 104     | 71      | 65      | 75      | 75      |
| Exports                                  | 377     | 82      | 402     | 108     | 145     | 351     | 553     |
| Residual Intervention<br>Stocks          | -       | -       | -       | -       | -       | 27      | 35      |
| Total Sales                              | 1,045   | 1,047   | 1,433   | 1,192   | 1,253   | 1,306   | 1,663   |
| <b>OATS</b>                              |         |         |         |         |         |         |         |
| Production                               | 228     | 201     | 204     | 146     | 139     | 133     | 168     |
| Retained on Farm                         | 151     | 130     | 116     | 70      | 76      | 63      | 92      |
| Sales:                                   |         |         |         |         |         |         |         |
| Human                                    | 50      | 34      | 55      | 49      | 38      | 44      | 49      |
| Stockfeed                                | 11      | 18      | 15      | 15      | 13      | 14      | 15      |
| Seed                                     | 15      | 19      | 16      | 12      | 11      | 12      | 12      |
| Exports                                  | 1       | -       | 2       | -       | 1       | -       | -       |
| Total Sales                              | 77      | 71      | 88      | 76      | 63      | 70      | 76      |

Source: DAFS, Customs &amp; Excise and own estimates.

The expansion in Scottish wheat production has partly been matched by an increase in its uptake by Scottish millers. Their use of Scottish wheat is however limited due to its unsuitability for bread making which restricts its use to cake and biscuit flours. As a result and despite an increase in its use as animal feed, Scottish wheat is becoming increasingly available for export either through Scottish ports or into England.

Production of oats in Scotland has fallen sharply through the 1970s. A large part of production is normally retained on farms with the remainder sold for either stock feed, seed or for human consumption. All these markets are either static or declining in importance leaving the market over supplied.



On the basis of present trends both wheat and barley are likely to continue to be in surplus in Scotland throughout the 1980s. These surpluses will only be accommodated by their export or sale into intervention. A strong export trade in Scottish grain is dependent upon several factors outside the producer's control. These factors include the availability of export credit to finance consuming countries' imports and the size and value of export refunds granted by the European Commission.<sup>(1)</sup> Intervention in contrast is a much more secure outlet. The Intervention Board is required to accept feed wheat and feed barley if offered to a minimum standard throughout the year, at the intervention price. It is the intervention market with its precise quality standards that producers must look to, to provide a secure market for their feed grain. These standards in the UK are:-(2)

|                  | <u>Feed Barley</u> | <u>Feed Wheat</u> |
|------------------|--------------------|-------------------|
| Moisture Content | 15%                | 15%               |
| Bushel Weight    | 63 kg/hl           | 68 kg/hl          |
| Impurities       | 12%                | 12%               |

If producers are unable to prepare grain to these standards and hold it until required, their grain is likely to be severely discounted. Table 2 gives an indication of the penalties imposed on producers selling feed barley during the first three months of the 1980, 1981 and 1982 seasons. The table compares ex-farm feed barley prices with the ex-farm value of grain sold directly into intervention at 15% moisture.

Table 2      Price Penalties Imposed on Scottish Feed Barley, August - October 1980-1982

| Average Scottish Ex-farm<br>Prices Reported by the<br>HGCA - Feed Barley |        | Intervention Price<br>Barley Delivered to<br>Store at 15% moisture  | £ per tonne<br>Differential<br>(Price Penalties) <sup>2</sup> |
|--|--------|---|---|
| 1980   |        | less delivery and offering<br>costs of £5.50 per tonne <sup>1</sup> |   |
| August   | 88.65  | 91.42   | 2.77  |
| September  | 85.60  | 92.57   | 6.97  |
| October  | 85.72  | 93.73   | 8.01  |
| 1981   |        | less delivery and offering<br>costs of £6.00 per tonne <sup>1</sup> |   |
| August   | 94.85  | 96.73   | 1.88  |
| September  | 95.22  | 98.12   | 2.90  |
| October  | 96.77  | 99.50   | 2.73  |
| 1982   |        | less delivery and offering<br>costs of £6.00 per tonne <sup>1</sup> |   |
| August   | 103.22 | 105.45  | 2.23  |
| September  | 100.50 | 106.96  | 6.46  |
| October  | 101.55 | 108.47  | 6.92  |

<sup>1</sup>Reflects the cost of transporting intervention quality grain to an intervention store plus an offerer's margin of £1-2 per tonne.

<sup>2</sup>Producers selling grain directly into intervention will have received above average prices. Many producers however with inferior quality grain, will have been forced to sell at below the average price and suffered penalties larger than those indicated.

(1) A more complete description of the Scottish Export Trade is included in C J Mackel & G Entwistle, Exporting Scottish Barley in the 1980s, NOSCA Economic Report No. 135, June 1982.

(2) IBAP, Support Buying of Cereals Leaflet MS/CER/30, (Revised July 1982).



Table 2 shows that during the 1980 harvest average market prices in September and October were £7-£8.00 per tonne below the value of grain sold directly into intervention. This discount was a result of the particularly low bushel weight of the grain harvested in Scotland<sup>(1)</sup> and the resulting difficulty producers had in meeting intervention standards.

The following year a strong export demand for barley supported market prices throughout the harvest period and provided an alternative market to intervention for feed barley. During 1982, in the absence of a strong export trade, average market price during September and October again fell well below the ex-farm value of intervention sales, by up to £7.00 per tonne. Though the quality of the Scottish harvest was generally high many producers were again unable to prepare their grain to intervention standards or hold it until required by the market. The intervention authorities were unable to accept the immediate delivery of grain offered to them during the 1982 harvest due to the weight of grain offered and the limited number of stores they had available. Producers unable to hold their grain were forced to sell their grain at a discount on the open market.

In all three years, price penalties were at a minimum during the month of August when the winter varieties are harvested. Grain harvested in August will generally command a premium over September and October price levels and will trade close to the value of intervention sales. The average price levels reported in all three months disguise the much larger penalties received by many producers selling grain during these periods. These penalties reflect:-

1. The inability of a large part of the Scottish barley harvest to be prepared by producers for sale into intervention.
2. The inability of many producers to hold their grain off the market and control its disposal.

If the export trade cannot provide an attractive alternative to intervention, producers with grain uncommitted to outlets which allow for its immediate movement off farms eg. to maltsters, will require storage to hold their grain off the market and conditioning equipment to prepare this grain to meet the markets' specifications if penalties are to be avoided.

It is the purpose of this report to assess the adequacy of on-farm grain handling facilities in the light of these requirements.

---

(1) HGCA Quality Survey indicates only 37% of the 1980 Scottish barley harvest was above 63 kg/hl.

## 2. A SURVEY OF ON-FARM GRAIN HANDLING FACILITIES WITHIN SCOTLAND

### Introduction

A survey was conducted in July 1982 by the telephone interview of a random sample of 152 cereal growers stratified by region and by the size of their cereal enterprise. The sample was weighted by region according to its share of the total Scottish cereal area. Within each region the sample was broken down further into three size groupings, each, again, weighted according to the relative size of the cereal areas within these groups. Sampling by this method reflected the importance of the larger size groups in the two major grain growing regions of the North East and South East. The distribution of the sample is indicated in Table 3. The distribution of cereal production throughout Scotland from which the sample was drawn is described in Appendix I.

Table 3      Distribution of Samples by Region and Size Group

| Size Group/Region<br>(ha of cereals) | No. of Farms |           |           |           |                        |
|--------------------------------------|--------------|-----------|-----------|-----------|------------------------|
|                                      | N.E.         | N.W.      | S.E.      | S.W.      | Total                  |
| 5 - 39.9 ha                          | 16           | 4         | 12        | 13        |                        |
| 40 - 99.9 ha                         | 16           | 3         | 28        | 5         |                        |
| 100+ ha                              | 12           | 4         | 35        | 4         |                        |
| <b>Total</b>                         | <b>44</b>    | <b>11</b> | <b>75</b> | <b>22</b> | <b>152<sup>1</sup></b> |

<sup>1</sup>This distribution was based initially upon a sample size of 150, which allowed only two samples to be taken in the largest size group of the S.W. A further two samples were taken in this group to improve the representation of the sample.

The questionnaire was split into five sections.<sup>(1)</sup> Questions 1 and 2 asked for a description of the cereal enterprise on the farm and for expected changes in individual crops over the next two years. Questions 3-7 asked for a description of the grain storage facilities available, the adequacy of this storage and the amount of extra storage required to meet the producers expected needs. Development plans were recorded and the importance of short term storage noted. Questions 8 and 9 asked for a description of the drying facilities available, their adequacy and for plans made to develop them. Questions 10 and 11 recorded the presence and adequacy of cleaning and dressing equipment on the farm and whether they were to be improved. Bottlenecks within the grain system were identified. Question 12 recorded the use of grain on the farm and the direction of sales off the farm. The interest in the group marketing of grain was noted.

The results of the survey are considered to give a good representation of the situation on farms within Scotland. Where the survey results are raised to a national level and compared with DAFS census data they stand up quite well.<sup>(2)</sup> The survey estimate of the 1982 Scottish cereal area at 548,428 hectares is only 4 per cent above the DAFS census estimate. However the standard deviations associated with sample statistics are large. The survey results therefore can only be considered to give an indication of the true situation. Any initiatives taken on the strength of these results will need to be backed by further, more detailed studies of the local situation.

(1) See Appendix II.

(2) See Appendix III.

## SURVEY RESULTS

### Changes in the Scottish Cereal Area

When the survey results are raised to a national level, they indicate that the total cereal area in Scotland will again expand in 1983. The winter wheat and winter barley areas will show quite large increases while the spring barley area will contract further. The area of oats is expected to hold steady. These changes are illustrated in Table 4.

Table 4      Anticipated Changes in the Scottish Cereal Area - 1982-1983

| Region (% Change) Area Change (ha)        |          |       |         | Region (% Change) Area Change (ha) |          |      |         |
|---|----------|-------|---------|------------------------------------|----------|------|---------|
| WHEAT                                     | N.E.     | +68   | +4,300  | WINTER BARLEY                      | N.E.     | +41  | +8,900  |
|   | N.W.     | +32   | +200    |                                    | N.W.     | +58  | +750    |
|   | S.E.     | +18   | +7,600  |                                    | S.E.     | +58  | +8,550  |
|   | S.W.     | -5    | -150    |                                    | S.W.     | +33  | +800    |
|   | Scotland | +22   | +12,000 |                                    | Scotland | +48  | +19,000 |
| OATS                                      | N.E.     | -3.8  | -150    | SPRING BARLEY                      | N.E.     | -4.3 | -5,900  |
|   | N.W.     | -     | -       |                                    | N.W.     | -3.5 | -1,050  |
|   | S.E.     | -     | -       |                                    | S.E.     | -3.4 | -7,350  |
|   | S.W.     | -     | -       |                                    | S.W.     | -1.0 | -550    |
|   | Scotland | -0.76 | -150    |                                    | Scotland | -3.4 | -14,850 |
| <u>Region (% Change) Area Change (ha)</u> |          |       |         |                                    |          |      |         |
| TOTAL CEREALS                             | N.E.     | +4.2  | +7,150  |                                    |          |      |         |
|   | N.W.     | -0.2  | -100    |                                    |          |      |         |
|   | S.E.     | +3.2  | +8,850  |                                    |          |      |         |
|   | S.W.     | +0.16 | +100    |                                    |          |      |         |
|   | Scotland | +2.9  | +16,000 |                                    |          |      |         |

Source: Survey Results Raised to a National Level.

The survey indicated that the Scottish cereal area is expected to increase by 2.9 per cent (+16,000 ha) between 1982 and 1983. This increase is confined though to the S.E. and N.E. where increases of 3.2 per cent (8,850 ha) and 4.2 per cent (7,150 ha) respectively are expected. Changes recorded for the N.W. and S.W. are marginal. The Scottish wheat area is expected to increase by 22 per cent (+12,000 ha), winter barley to increase by 48 per cent (+19,000 ha), while the spring barley area will fall by 3.4 per cent (-14,850 ha).<sup>(1)</sup> Oats will show only a marginal change falling by 0.76 per cent (150 ha).

The swing away from spring barley towards winter barley is consistent throughout Scotland with similar movements recorded in all four regions. Changes in the wheat area are more variable. The S.W. reported an expected 5 per cent net fall (-150 ha) in its wheat area while the N.E. stands out with a 68 per cent increase (+4,300 ha). Smaller percentage increases in wheat area were indicated in the N.W. (+32 per cent) and S.E. (+18 per cent). A change in the oats area was anticipated only in the N.E.

(1) Provisional estimates from the December 1982 Census confirms a 22 per cent rise in winter wheat but indicates a 60 per cent rise in the winter barley area.

### Description of On-Farm Grain Stores

The survey results indicated there to be 3.3 million tonnes of grain storage available on Scottish farms in 1982. On the 152 sampled farms multi-purpose stores were the most widely used (43 per cent of all storage available) followed by on-floor stores (32 per cent) and bins (22 per cent). The relative importance of each of these store types within Scotland is indicated in Table 5.

Table 5                      Distribution of Grain Stores on Sample Farms - By Type

|              | Scotland | N.E. | N.W. | S.E. | S.W. | (% of Total Storage Available) |
|--------------|----------|------|------|------|------|--------------------------------|
| Bins         | 22       | 21   | 15   | 21   | 30   |                                |
| On-Floor     | 32       | 26   | 50   | 29   | 53   |                                |
| Multipurpose | 43       | 51   | 35   | 48   | 3    |                                |
| Other        | 3        | 2    | 0    | 2    | 14   |                                |
| Total        | 100      | 100  | 100  | 100  | 100  |                                |

The highest proportion of storage in single purpose grain stores ie. bins and on-floor stores, was found in the N.W. and S.W. where they made up 65 per cent and 83 per cent of the total respectively. Multipurpose stores represented approximately half of the storage available in the S.E. and N.E. In these two areas, sales off-farm are much more important with a large part of the harvest being held for only relatively short periods before sale. Consequently short term storage facilities in multipurpose buildings (cattle courts, potato sheds etc.) are sufficient on many farms. These short term grain stores represented 26 per cent of the total on-farm storage available in Scotland. In the N.E. and S.E. they provided 30 per cent and 31 per cent of the total respectively, in the N.W. 14 per cent and in the S.W. only 1 per cent. This distribution is illustrated in Table 6.

Table 6                      Distribution and Importance of Long and Short Term Storage in Scotland

|          | Total Storage | Short Term (%) |    | Long Term (%) ('000 tonnes) |    |
|----------|---------------|----------------|----|-----------------------------|----|
| N.E.     | 965           | 293            | 30 | 672                         | 70 |
| N.W.     | 199           | 28             | 14 | 171                         | 86 |
| S.E.     | 1,776         | 549            | 31 | 1,227                       | 69 |
| S.W.     | 380           | 4              | 1  | 375                         | 99 |
| Scotland | 3,320         | 874            | 26 | 2,446                       | 74 |

Source: Survey Results Raised to a National Level.

A dependence upon storage facilities available for only limited periods is not serious. A review of cereal stocks held on farms at the end of October indicates that substantial movements of grain off farms occur before November. DAFS statistics show that in 1978 and 1979 approximately 57 per cent of the Scottish harvest remained on farms at the end of October. In 1980 the proportion fell to 49 per cent and then to 41 per cent in 1981 as a result of high interest rates and the development of a strong export trade early in the season which encouraged early sales. The importance of early cereal sales to the cash flow position of many farms, the regular movement of natural barley to maltsters during the harvest period and the uncertainties that surround price movements later in the season are likely to regularly encourage sales of grain early in the season almost regardless of the availability of long term storage on farms.

### The Adequacy of On-Farm Storage Facilities

The estimates made of the capacity of on-farm cereal stores at 3.3 million tonnes exceeds the 1982 Scottish cereal harvest of 2.605 million tonnes<sup>(1)</sup> by 27 per cent. While this is a smaller margin than that estimated in 1972 (44 per cent)<sup>(2)</sup> and in 1978 (39 per cent), it appears to indicate on-farm storage within Scotland to be more than adequate.

The survey however showed storage was considered adequate by cereal growers themselves on only 77 per cent of the farms surveyed. This suggests that grain storage is not distributed amongst cereal growers in proportion to their cereal production and that almost a quarter of cereal producers have unsatisfactory storage facilities that must need either replacing, upgrading or supplementing with additional stores.

Adequate storage on a farm is assumed to be storage capable of holding the cereal output of the farm, less normal harvest sales (eg. malting barley), in good condition to at least the end of the harvest period to allow for the orderly marketing of the grain. The distribution of sample farms within Scotland with such storage is illustrated in Table 7. The Table compares the total storage available on individual farms in the survey with the cereal output from the farm less any sales of malting barley. Malting barley sales are assumed to occur at harvest with its immediate removal off the farm.

Table 7      Adequacy of Storage on Sample Farms

(Grain storage on individual farms expressed as a % of cereal production expected in 1982 less malting barley sales)

| Size Group<br>(ha of cereals) | N.E. | N.W. | S.E. | S.W. | Scotland |
|-------------------------------|------|------|------|------|----------|
|                               | %    | %    | %    | %    | %        |
| 5.0 - 39.9 ha                 | 86   | 110  | 128  | 115  |          |
| 40.0 - 99.9 ha                | 74   | 171  | 81   | 90   |          |
| 100+ ha                       | 113  | 112  | 151  | 115  |          |
| All Units                     | 88   | 124  | 108  | 109  | 106      |

Note <sup>1</sup> Expected levels of cereal production on individual farms in the survey were forecast using yields similar to 1981 levels.

<sup>2</sup> All malting barley sales are assumed to take place at harvest. While a number of specialist growers will hold malting barley for sale after the harvest period, the quantities involved are not considered significant enough to alter the above estimates. Respondents were asked to assume malting barley sales similar to 1981/82 levels. Sales below this level will reduce the estimates of adequacy made above.

(1) Trade estimates.

(2) C R Orton "Room for more Grain" Arable Farmers, May 1973. This estimate is based upon a survey of storage on farms in Scotland in 1972 and the average level of production 1971-72.

(3) Angus Nicholson "Grain Storage Capacity on Scottish Farms." Scottish Agricultural Economics Vol XXIX, 1979, pp 232-235. This estimate is based upon a survey of storage on farms in Scotland in 1978 and a production figure obtained by combining 1977 record yields with 1978 cereal area.

Whilst the table indicates Scottish on-farm storage to be slightly in excess of production less malting sales (+6 per cent) it highlights the uneven distribution of this storage. Whereas the N.W., S.W. and S.E. regions all had storage in excess of production, storage in the N.E. amounted to only 88 per cent of production. Within all the regions considerable differences occurred between units in different size groups. Only in the N.W. was storage consistently greater than production. The table shows storage to be inadequate on all farms with less than 100 hectares of cereals in the N.E. and also on farms in the S.E. and S.W. with 40-99.9 hectares of cereals. Elsewhere storage could be considered adequate by this measure.

#### On-Farm Storage Requirements

The previous section identified the areas within Scotland which had insufficient on-farm storage to accommodate the production remaining after the harvest sale of malting barley. The following table describes the on-farm storage that was estimated to be required by producers after the survey results had been raised to a national level and the planned development of this storage. These estimates not only indicate the need to provide additional storage in some areas, but also the need to replace and upgrade existing storage facilities.

While the figures presented cannot be taken as precise estimates of the situation in Scotland, they effectively demonstrate the imbalance between storage requirements and development plans.

Table 8      Storage Required on Farms within Scotland and its Planned Development

|                |                               |   |  | tonnes  |
|----------------|-------------------------------|---|--|---------|
| Region         | Size Group<br>(ha of cereals) | Estimate of On-Farm<br>Storage Required | Estimate of the Planned<br>Development of On-Farm Stores | Balance |
| N.E.           | 5 - 39.9 ha                   | 66,000                                  | 36,000   | 30,000  |
|                | 40 - 99.9 ha                  | 34,000                                  | 13,000   | 21,000  |
|                | 100+ ha                       | 33,000                                  | 15,000   | 18,000  |
| Total N.E.     |                               | 133,000                                 | 64,000   | 69,000  |
| N.W.           | 5 - 39.9 ha                   | 4,000                                   | 4,000  | 0       |
|                | 40 - 99.9 ha                  | 0                                       | 0  | 0       |
|                | 100+ ha                       | 0                                       | 0  | 0       |
| Total N.W.     |                               | 4,000                                   | 4,000  | 0       |
| S.E.           | 5 - 39.9 ha                   | 22,000                                  | 0  | 22,000  |
|                | 40 - 99.9 ha                  | 47,000                                  | 30,000   | 17,000  |
|                | 100+ ha                       | 59,000                                  | 86,000   | +27,000 |
| Total S.E.     |                               | 128,000                                 | 116,000  | 12,000  |
| S.W.           | 5 - 39.9 ha                   | 11,000                                  | 3,000  | 8,000   |
|                | 40 - 99.9 ha                  | 0                                       | 0  | 0       |
|                | 100+ ha                       | 3,000                                   | 0  | 3,000   |
| Total S.W.     |                               | 14,000                                  | 3,000  | 11,000  |
| Scotland Total |                               | 279,000                                 | 187,000  | 92,000  |

Source: Survey Results from 152 Farms Raised to a National Level.

A total of 279,000 tonnes of on-farm storage was estimated to be required by producers within Scotland. Of this, 67 per cent was expected to be developed in the near future, leaving a need for a further 92,000 tonnes of on-farm storage. **The greatest discrepancy between storage required and developments planned was in the N.E.** In this region only 48 per cent of the 133,000 tonnes thought to be required was covered by development plans. Half of this requirement for extra storage, 66,000 tonnes was found amongst the smallest sized units with only 5-39.9 hectares of cereals. The remainder was equally distributed between the two larger size groups. Elsewhere serious differences between the storage required and estimated development existed only amongst units in the smallest size grouping in the S.E. Here there were no developments planned to meet a requirement for 22,000 tonnes of storage.

### Drying and Conditioning Facilities

The distribution of drying facilities on sample farms is shown in Table 9.

Table 9      Distribution of On-Farm Drying Systems in Scotland  
- Sample Farms - All Scotland

|                                 |     | % of Sampled Farms with System |    |
|---------------------------------|-----|--------------------------------|----|
| Continuous flow Drier           | 32% | Grain dried off the farm       | 5% |
| Batch Drier                     | 16  | Grain stores wet in Towers     | 7  |
| Ventilated Bins with heat       | 16  | " " " with Propionic Acid      | 12 |
| Ventilated Bins without heat    | 5   | " " " other methods            | 2  |
| On-floor stores with ducked air | 10  | Grain sold undried             | 10 |
| Mobile Driers                   | 3   |                                |    |
| Other Driers                    | 1   |                                |    |
| <u>All Types of Drier</u>       |     | <u>83</u>                      |    |

Driers were found on 83 per cent of farms in the survey. While continuous flow driers were the most popular type, no one system stood out. Grain was stored wet using a variety of methods on 21 per cent of the farms and sold undried from 10 per cent. Only 5 per cent of the farms surveyed utilised drying facilities off the farm.

These drying facilities were considered adequate on 73 per cent of the farms surveyed. The distribution of farms which considered their drying systems to be inadequate or uncertain is shown in Table 10.

Table 10      Distribution of Farms with Inadequate or Uncertain Drying Facilities

| Size Group<br>(ha of cereals) | N.E.        | N.W.      | S.E.      | S.W.      | Scotland  |
|-------------------------------|-------------|-----------|-----------|-----------|-----------|
|                               | %           | %         | %         | %         | %         |
| 5.0 - 39.9 ha                 | 54          | 0         | 38        | 15        |           |
| 40.0 - 99.9 ha                | 25          | 0         | 30        | 20        |           |
| 100+ ha                       | 13          | 25        | 32        | 0         |           |
| <u>All Units</u>              | <u>29.5</u> | <u>10</u> | <u>32</u> | <u>13</u> | <u>27</u> |



Over half of the units with less than 40 hectares of cereals in the N.E. considered their drying facilities to be inadequate or uncertain. Smaller but important proportions of units in all the other size groups within the N.E. and S.E. also considered their drying facilities inadequate. In the S.W. inadequate drying facilities were recorded only on farms with less than 100 hectares while in the N.W. the reverse was true with inadequate diers on farms of over 100 hectares only. Though 27 per cent of all the units sampled indicated their drying facilities were inadequate or uncertain, only 11 per cent of the cereal growers in the sample planned to improve their drying facilities.

The survey showed pre-cleaning equipment was available on only 35 per cent of farms and only 30 per cent had any grading or dressing equipment. Not unexpectedly, the proportion of farms with this equipment increased in the larger size groups. The distribution of producers who considered they could prepare grain to intervention standards is shown in Table 11.

**Table 11**      Distribution of Farms Capable of Preparing Grain to Intervention Standards

| Size Group     | N.E. | N.W. | S.E. | S.W. | Scotland |
|----------------|------|------|------|------|----------|
|                | %    | %    | %    | %    | %        |
| 5.0 - 39.9 ha  | 7    | 33   | 12   | 0    |          |
| 40.0 - 99.9 ha | 25   | 66   | 18   | 40   |          |
| 100+ ha        | 73   | 50   | 78   | 80   |          |
| All Units      | 36   | 50   | 55   | 70   | 43       |

Less than half (43 per cent) of producers considered they could prepare grain to intervention standards. Their ability to meet these standards again increased from a very low level amongst units in the smallest size group to levels around 70-80 per cent on the farms in the largest size group.

The involvement of producers in cereal marketing groups is shown in Table 12.

**Table 12**      Proportion of Sampled Producers Selling Grain Through a Marketing Group

|  |       |
|--|-------|
| Yes - currently selling through a group        | 2.6%  |
| No - but has sold through a group in the past  | 1.3%  |
| No - but interested in selling through a group | 39.5% |
| No - and not interested in marketing groups    | 49.3% |
| Don't know                                     | 7.2%  |

While only 2.6% of cereal producers in the survey sold at least part of their grain production through a grain marketing group, approximately 40 per cent of producers expressed an interest, at least in the concept of marketing groups. The interest of farmers with inadequate storage in the concept of co-operation is recorded in Table 13.

Table 13Proportion of Cereal Producers with Inadequate Storage Registering Interest  
In the Group Marketing of Grain

| Size Group     | N.E. | N.W. | S.E. | S.W. |
|----------------|------|------|------|------|
|                | %    | %    | %    | %    |
| 5.0 - 39.9 ha  | 33   | 50   | 0    | 0    |
| 40.0 - 99.9 ha | 100  | -    | 50   | -    |
| 100+ ha        | 60   | -    | 14   | 100  |

Interest was consistently shown by producers in all the size groups within the N.E. Elsewhere comparable levels of interest were only reported in the smallest size group in the N.W. and amongst medium sized cereal units in the S.E. The high degree of interest apparently expressed in the S.W. was produced by the one representative within the size group with inadequate storage and cannot be considered significant.

### 3. SUMMARY OF SURVEY RESULTS

#### Introduction

In common with the rest of the UK, Scotland has experienced a substantial increase in cereal production during the 1970s and early 1980s. While part of this increase has been absorbed by the domestic market, a growing surplus has emerged in Scotland of both wheat and barley that is available for export or for sale into intervention. The swing to higher yielding winter cereals is continuing in Scotland and will add to the potential size of the Scottish harvest. The 22 per cent increase in the winter wheat area in 1983, anticipated by the survey will lift wheat production to a potential 350,000 tonnes in 1983 and provide an exportable surplus of around 80,000 tonnes in 1983/84. The winter barley area is meanwhile forecast to rise by 48 per cent. Barley production may reach 2.35 million tonnes in 1983 with an exportable surplus of up to 750,000 tonnes.

The presence of these surpluses has increased the attention given to the quality of grain traded. Grain that cannot meet the standards set by the market is increasingly being discounted. The avoidance of these penalties rather than the attainment of a premium in the market should be the principle aim of cereal producers.

The export market is the only outlet that can completely remove surpluses of grain from the Scottish markets. However the uncertainties that surround this trade have forced producers to look to intervention as the target market for feed grains. The standards set by the Intervention Board are high and more precise than those generally applied in the feed grain market. Producers unable to prepare grain to this standard and present it when required by the Board have suffered penalties during the harvest period of up to £10 per tonne and which averaged £7.00 during September and October 1982. It is these penalties that has encouraged this evaluation of grain storage and conditioning facilities on farms in Scotland.

#### Changes in Scottish Wheat Production

The increase in the Scottish wheat area, anticipated by the survey will lift the total Scottish wheat area from 40,200 hectares in 1982 to 52,200 hectares in 1983. Scottish wheat yields over the period 1977-1982 averaged 5.79 hectares and ranged from a low of 4.93 t/ha in 1978 to a record 6.67 t/ha in 1982<sup>(1)</sup>. These yields imply Scottish wheat production in 1983 could be around 300,000 tonnes and may approach 350,00 tonnes. The effect of this increase in production will have on the Scottish wheat market is illustrated in Table 14.

The Scottish milling industry is expected to be unable to increase its uptake of Scottish wheat much beyond the 1982/83 level of 129,000 tonnes.<sup>(2)</sup> The increase in the availability of wheat at favourable price relative to barley is however encouraging its greater use as animal feed. Wheat usage by Scottish compounders increased by 8 per cent in 1981/82 and is expected to increase by 20 per cent in 1982/83. A similar increase in 1983/84 will lift total usage of wheat as feed in Scotland to 120,000 tonnes.

---

(1) DAFS and Trade Estimates.

(2) College Estimates Following a Survey of Scottish Millers

Table 14 Changes in the Production and Consumption of Scottish Wheat since 1980/81

('000 tonnes)

|                      | 1980/81          | 1981/82          | 1982/83          | 1983/84              |
|----------------------|------------------|------------------|------------------|----------------------|
| Production           | 137 <sup>1</sup> | 200 <sup>1</sup> | 268 <sup>1</sup> | 300-352 <sup>2</sup> |
| Retained on Farms or |                  |                  |                  |                      |
| Sold into England    | 2                | 20               | 22               | 22                   |
| Sales Off-farm:      |                  |                  |                  |                      |
| Milling              | 56               | 95               | 129              | 130                  |
| Animal Feed          | 78               | 84               | 100              | 120                  |
| Seed                 | 1                | 1                | 1                | 1                    |
| Export/Intervention  | -                | -                | 16               | 27-79                |
| Total Sales          | 135              | 180              | 246              | 278-330              |

Source: DAFS, Author's Estimates.

Note 1<sup>1</sup> DAFS estimates.

2<sup>2</sup> Author's estimates assuming yields in 1984 range from 5.79 t/ha (average Scottish Wheat yields 1977-1982) to 6.75 t/ha (Scottish record).

Despite these increases, these two industries are unlikely to be able to accommodate fully the Scottish wheat harvest. Up to 80,000 tonnes of Scottish wheat is expected to be available for export in 1983/84. The ease however with which this amount can be removed from Scotland is likely to increase the uncertainty in the Scottish wheat market.

#### Changes in Scottish Barley Production

The changes in the Scottish barley area, forecast in Chapter 2 will result in the winter barley area increasing from 44,200 hectares in 1982 to 63,200 hectares in 1983.<sup>(1)</sup> The spring barley area meanwhile will fall from 411,800 hectares in 1982 to 397,000 hectares in 1983. Assuming an average spring barley yield of 4.6 t/ha (37 cwts) and an average winter barley yield of 6.18 t/ha<sup>(2)</sup> (50 cwts/acre), production in 1983 will amount to 2.216 million tonnes. Above average spring barley yields will lift this figure to above 2.3 million tonnes. The market for this grain in 1983/84 is described in Table 15.

The production of 2.20-2.35 million tonnes of barley is expected in Scotland in 1983. The uptake of barley by maltsters and distillers from the 1982 crop is reported to have fallen to around 700,00 tonnes<sup>(3)</sup> and little recovery can be expected in 1983/84. Trade returns show that the use of barley by Scottish feed compounders fell during 1981/82 by 18 per cent to 134,270 tonnes due to a sharp increase in the use of cereal replacers. Feed barley usage on farms is expected to have fallen less steeply but will continue to fall as cereal replacers become more widely available. A cut of 10 per cent in the overall amount of barley sold for feeding is expected in 1982/83 with further falls in 1983/84. As a result the surplus available for either export or sale into intervention will increase to 700-850,000 tonnes. On-farm retentions are a residual

(1) See Note (1) on page 6.

(2) Spring Barley Yields are the Average of Scottish Yields 1977-1982.  
Winter Barley Yield is the UKASTA 1982 Estimate.

(3) Provisional DAFS Estimates.

figure and will vary with the size and quality of the harvest, its suitability as either malting barley or for intervention and the level of export demand. Any increase in the availability and use of cereal replacers may reduce the amount of barley retained on farms or sold for feeding and will add to this exportable surplus.

Table 15      Changes in the Production and Consumption of Scottish Barley since 1980/81

|                      | ('000 tonnes) |         |         |                      |
|----------------------|---------------|---------|---------|----------------------|
|                      | 1980/81       | 1981/82 | 1982/83 | 1983/84 <sup>1</sup> |
| Production           | 1,850         | 2,200   | 2,200   | 2,200-2,350          |
| Retained on farms    | 544           | 537     | 567     | 517                  |
| Sales Off-farm:      |               |         |         |                      |
| Malting & Distilling | 561           | 750     | 700     | 700                  |
| Animal Feed          | 292           | 250     | 225     | 200                  |
| Seed                 | 75            | 75      | 75      | 75                   |
| Export/Intervention  | 378           | 588     | 633     | 708-858              |
| Total Sales          | 1,306         | 1,663   | 1,633   | 1,683-1,833          |

Source: DAFS, Author's Estimates.

Note <sup>1</sup>For estimates for 1988/89 see: Exporting Scottish Barley in the Eighties. NOSCA Economic Report, No. 135, pp. 5-11.

#### The Adequacy of Grain Handling Facilities on Scottish Farms

The survey results when raised to a Scottish level indicate grain storage facilities on Scottish farms in 1982 totalled 3.32 million tonnes. This represented 127 per cent of the 1982 Scottish cereal harvest of 2.605 million tonnes. This storage is however, unevenly distributed and in need of replacement or repair as only 77 per cent of producers considered their storage to be adequate.

Grain storage on farms can only be considered adequate when it is capable of holding the farm's cereal output - less any sales that would normally take place at harvest eg. malting barley - so that the grain can be disposed of in an orderly fashion. A comparison made in Chapter 2 of storage on individual farms in the survey with the farms cereal output less any sales of malting barley, showed on-farm storage capacity within Scotland to be 6 per cent in excess of requirements. It highlighted however the unevenness of the distribution of this storage with the N.E. standing out with farm storage for only 88 per cent of requirements. Within the N.E., this inadequate storage was confined to units growing less than 100 hectares of cereals. Units with over 100 hectares of cereals were shown to possess quite adequate storage. In both the S.E. and S.W., units with 40-99.9 hectares of cereals were also shown to have inadequate storage.<sup>(1)</sup>

If the need to repair, replace or upgrade existing storage facilities on farms was taken into account, it was estimated that 278,000 tonnes of storage facilities would be required on Scottish farms. Development plans on individual farms covered only 67 per cent of these requirements. The greatest discrepancy between storage requirements and

(1) Several groups of producers throughout Scotland have access to storage facilities off the farm. However as these groups are predominantly concerned with the marketing of malting barley their presence will not alter these estimates.

development plans was again the the N.E. where only 48 per cent of the 133,000 tonnes of storage required was planned to be developed on individual farms. Elsewhere serious differences between the storage required on farms and its planned development, were found only amongst units with less than 40 hectares of cereals in the S.E. where no developments were planned to meet a requirement for 22,000 tonnes of storage.

Grain driers were found on 83 per cent of farms. Only 73 per cent of growers however considered their drying facilities to be adequate. Over half of the units with less than 40 hectares of cereals in the N.E. considered their drying facilities to be inadequate. Smaller but important proportions of units in all the other size groups within the N.E. and S.E. also considered their drying facilities inadequate.

Less than half of Scottish producers considered they could prepare grain to intervention standard. In the smallest sized units with less than 40 hectares of cereals, the ability of producers to meet these standards was particularly poor and ranged from 0-33 per cent. As units increased in size however, the proportion able to meet intervention standards increased to a maximum level of 80 per cent amongst units with over 100 hectares of cereals.

### Conclusions

These survey results indicate there is a need for the further development of both the storage and the conditioning facilities available to grain producers throughout Scotland. While the survey showed the total grain storage currently available on farms in Scotland is capable of accommodating the Scottish cereal harvest, this storage was shown to be unevenly distributed amongst cereal producers. In all areas there will be farms with inadequate storage. The North East stands out however as an area particularly deficient in on-farm storage. In all the Scottish regions a large number of producers, particularly the smaller producers, appeared incapable of preparing grain to intervention standards. These producers need either to develop further their on-farm facilities or gain access to facilities off the farm, if they are to avoid price penalties when selling feed grains.

#### 4. THE DEVELOPMENT OF GRAIN HANDLING FACILITIES BY CEREAL PRODUCERS

##### Introduction

Producers with little or no control over the timing of their grain sales or over the markets into which their grain can be offered are expected to continue to suffer the price penalties described in Section 1 which averaged £7 per tonne during September and October 1982.

To avoid these penalties producers require access to the following facilities:

1. Drying equipment to take grain down to a safe condition for storage and allow it to be presented for sale at least below the intervention standard of 15 per cent moisture.
2. Sufficient storage to allow grain other than that normally sold at harvest to be held off the market for a sufficient period of time to allow for its orderly disposal. Normal selling patterns indicate that up to 60 per cent of this need only be short term storage in multi-purpose buildings, as a large part of the Scottish harvest is generally sold off the farm in the first three months of the season.
3. Cleaning equipment to prepare grain to at least intervention standard to allow for its presentation for sale in a variety of markets.

Table 16 indicates the levels of investment that can be justified in facilities that will enable penalties of £4, £7 and £10 per tonne to be avoided.

Table 16      Justifiable Levels of Investment in Grain Storage and Handling Facilities<sup>1,2</sup>

| Rate of Return on Investment | £ per tonne       |                                 |     |      |
|------------------------------|-------------------|---------------------------------|-----|------|
|                              | Without Grant Aid | With Grant Aid at: <sup>3</sup> |     |      |
|                              |                   | 22½%                            | 28% | 32½% |
| 4                            | 28                | 36                              | 39  | 41   |
| 7                            | 49                | 63                              | 68  | 72   |
| 10                           | 70                | 90                              | 97  | 102  |

Note <sup>1</sup>Assumes a real rate of interest of 10 per cent discounted over 10 years. The real rate of interest in the first half of 1983 at 8 per cent is historically high and takes into account the cost of borrowing money, currently at 13 per cent interest and an inflation rate of 5 per cent. However cereal prices are expected to rise below the rate of inflation which implies a higher real rate of interest at 10 per cent should be applied in the cereal sector.

<sup>2</sup>Assumes depreciation allowances and the offsetting of interest payments against tax are available to businesses consistently paying tax. These figures assume a business taxed at 30 per cent on marginal profits. J R Crabtree, B S Pack, Appraising Building Investment Farm Building Progress, January 1983, pp. 13-16.

<sup>3</sup>Grant aid is available under the following schemes:

1. Agricultural and Horticultural Grant Scheme (AHGS) at 22½% on a grain store.
2. Agricultural and Horticultural Development Scheme (AHDS) at 32½% on grain stores.
3. Central Council for Agricultural and Horticultural Co-operation (CCAHC) Grant aid on a co-operative grain store is available at an average rate of 28%. This includes 32% on buildings and 25% on plant and machinery.

The discounting of an annual return over 10 years at a real annual interest rate indicates the maximum capital expenditure that can be justified if the investment is to at least break even. It assumes the interest and capital repayments associated with the investment - particularly at the start of the project when these payments are high,



will be shared by the whole farm business. Three levels of grant aid are considered in the Table for businesses consistently paying tax at 30 per cent and able to claim tax relief from the investment.

With an annual return of £7 per tonne, investments of up to £49 per tonne appear initially to be justifiable. Grant aid available under various schemes lifts the levels of justifiable investment considerably higher to a maximum of £72 per tonne. Many producers with inadequate grain handling facilities will suffer penalties in excess of £7 per tonne. Table 16 shows that the regular avoidance of a £10 per tonne penalty will justify investments of £90-£100 per tonne depending upon the level of grant aid available.

The limits to the justifiable levels of investment indicated in Table 16 restricts the strategies producers can adopt to avoid price penalties. Four options are discussed below.

#### **Independent Development of On-Farm Facilities**

The cost of developing on-farm facilities independently is likely to be the most expensive option. Producers will be unable to take advantage of the economies of scale that can be achieved with large shared facilities established off the farm. However, costs can be kept to a minimum if only extensions to established facilities are necessary and producers will retain direct control over their grain. Development grants are available to participants in the Agricultural and Horticultural Development Scheme (AHDS) at 32½ per cent on general farm buildings or under the UK Agricultural and Horticultural Grant Scheme (AHGS) at 22½ per cent.

The cost of developing on-farm storage can range from £10-£120/tonne depending upon the system. Various systems are shown in Table 17.

Table 17      Capital Cost of On-Farm Grain Storage Systems

|  | £ per tonne (approx) |
|--|----------------------|
| Indoor circular bins of hardwood, plywood or weldmesh and lined with impermeable material  | 10                   |
| Outdoor circular bins of galvanised steel with low volume ventilation equipment  | 35-40                |
| On-floor store with above ground laterals in new clear span building   | 40                   |
| On-floor store with prefabricated drying floor in new clear span building  | 50                   |
| Continuous drier with low volume ventilator on-floor store with below floor laterals   | 110                  |
| Indoor square or rectangular bins of galvanised steel with either bottom ventilation and air-sweep emptying or sloping floor with continuous drier | 120                  |

Source: ADAS Guide Prices and Trade Sources - 1982/83.

Note 1. Costs, before grant, include associated grain handling and conveying equipment for on-farm developments of up to 2,000 tonnes.

A comparison of these costs with the levels of justifiable investments, estimated in Table 16 show that small indoor circular bins at £10 per tonne can easily be justified even without grant aid. These bins while only suitable for small volumes of grain of up to 40 tonnes per bin may effectively hold the increases in production of small cereal farms.

With grant aid, outdoor bins or on-floor stores can be considered and justified for larger parcels of grain if penalties of £7 per tonne can be avoided. The development of more sophisticated systems on farms can only be justified if returns greater than £7 per tonne can be achieved. Many producers selling grain off the combine will be suffering penalties well in excess of £7 per tonne and may well be able to consider investments of around £100 per tonne in grain drying and storage facilities.

Table 18 gives an indication of the expenditure on grading equipment alone that can be justified. It assumes the sale price of grain can be increased from £100 per tonne by £7 if up to 10 per cent screenings are removed. If these screenings are valued at £90 per tonne as feed, the net improvement in value is £5.30 per tonne. An annual return of £5.30 per tonne will over 10 years justify investments of up to £32.50 per tonne. Table 18 indicates the total investment that can be justified at varying levels of throughput.

Table 18      Estimation of the Level of Justifiable Investment in Cleaning Equipment

|   |                           |
|---|---------------------------|
| Value added to grain after 10 per cent screenings removed from grain initially valued at £100 per tonne | £7.00 per tonne sold      |
| Net improvement in value with 10 per cent screenings valued at £90 per tonne                            | £5.30 per tonne harvested |

Maximum Justifiable Level of Investment Repayable over 10 Years<sup>1</sup>

|                         |         |
|-------------------------|---------|
| Rate of Interest        | 10%     |
| Tonnage Grain           |         |
| Cleaned      100 tonnes | £3,250  |
| 200 tonnes              | £6,500  |
| 400 tonnes              | £13,000 |

Note <sup>1</sup> Assumes a return of £5.30 per tonne on this investment.

With grading equipment rated at 6-12 tonnes per hour costing around £2-£3,000 its justification is marginal only on small units treating around 100 tonnes. Elsewhere the use of grading equipment appears justifiable despite increases in the costs of larger capacity machines.<sup>(1)</sup>

(1) 1982/83 costs of grading equipment with double aspiration:  
6-12 tonnes per hour - £3,000. 10-20 tonnes per hour - £4,000.

### Group Marketing with a Centralised Store

The marketing of grain through a group provides the producer with the opportunity to share the cost of establishing grain handling facilities with other group members. The commitment of a large total tonnage will allow members to take advantage of the economies of scale associated with large grain driers and stores, and establish facilities at a relatively low initial capital cost per tonne.

These costs will be further reduced by the grants available through the Central Council for Agricultural and Horticultural Co-operation (CCHAC).<sup>(1)</sup> Groups employing full time marketing staff with access to improved market information are able to gain access to buyers not normally available to individual producers eg. shippers or continental end user, and maximise total grain revenues by directing specific qualities to specific markets in large tonnages throughout the season.

The cost of establishing a 10,000 tonne grain store with a high capacity grain drier, precleaner and grader and two intake pits with separate wet bins is estimated at £70-£75 per tonne.<sup>(2)</sup> The CCAHC recommend the financing of such an investment by a grain marketing group should follow these lines.

|   |                      |
|---|----------------------|
| Total Capital Cost  | £75 per tonne        |
| Grant Aid from CCAHC 32 per cent Building<br>25 per cent Plant & Machinery<br>Overall 28 per cent   | approx.£20 per tonne |
| Bank loan on 40 per cent of costs repayable over 10 years and serviced by a charge per tonne of grain handled (additional grant aid from FEOGA will substantially reduce this)                        | approx.£30 per tonne |
| Members interest-free loan on 33 per cent of cost repayable over 10 years (Minimum no. of members 7 with a minimum commitment of 80 per cent of harvest rising eventually to 100 per cent of harvest) | approx.£25 per tonne |

A comparison of these costs with the levels of justifiable investment estimated in Table 16 shows that with grant aid at 28 per cent, the project is at best marginal if returns of only £7 per tonne are achieved. If producer returns however can be improved by £10 per tonne the project appears justifiable.

---

(1) CCAHC grants include 32 per cent on buildings, 25 per cent on plant and machinery as well as grants towards feasibility studies and management costs.

(2) Trade Estimates, 1982/83 Costs.

### **Group Marketing Using Existing On-Farm Facilities**

An earlier NOSCA report<sup>(1)</sup> has considered the requirements of a grain marketing group, operating without purpose-built centralised facilities. These groups undertake to make use of under-utilised grain storage and conditioning facilities available on farms within a fairly close area. With these facilities, grain committed by group members can be prepared to set standards and marketed in bulk.

The report estimated a minimum committed tonnage of 4,000 tonnes of grain was necessary to create a presence in the market and provide a flexible marketing policy over a reasonable period of time with sizeable parcels of grain. Conditioning and storage facilities that were to be used by a group, need to be concentrated in as few locations as possible to ease control problems and reduce transport costs. The proliferation of small stores holding less than 200 tonnes is undesirable. As the marketing of committed grain must be in the hands of a single individual, probably an outside agent, members must be prepared to relinquish their control of grain sales.

The report compared ex-farm and ex-group prices and concluded that while only marginal economic benefits would arise group marketing could provide members with more secure outlets for their grain.

### **Group Marketing through Existing Facilities Off the Farm**

The formation of a group to market committed grain through an established commercial store would enable members to enjoy all the benefits of group marketing without any significant investment in handling facilities. They would need to guarantee a large throughput of grain, possibly of at least 10,000 tonnes, in return for attractive drying, handling and collection costs. Further benefits would arise from the matching of grain qualities with market requirements with the aid of a professional marketing staff.

The established storekeeper/trader will have the opportunity to share the overheads of the store with a wide range of trading activities and be in a better position to reduce the risks associated with grain trading. Such a liaison of groups with the established grain trade will concentrate rather than dilute the movement of grain and should allow producers to benefit from this increase in marketing strength. Producers however, will have to accept a loss of control of their grain and its commitment to one particular trader. The commitment of a large tonnage of grain through perhaps a number of groups will give some encouragement to storekeepers to develop further their grain storage and handling facilities. Under present rules such a development would not be grant aidable by the CCAHC.

---

<sup>(1)</sup>C Mackel & G Entwistle, Group Grain Marketing Using On-Farm Facilities, NOSCA Economic Report No. 133, May 1981.

## 5. CONCLUSIONS

A continued increase in the Scottish cereal area combined with a swing towards higher yielding winter varieties is increasing the production of grain at a time when domestic consumption is at best static or declining. The resulting pressure on the market is forcing a very strict application of quality standards and the severe discounting of grain that cannot be presented to these standards.

This report has highlighted the inadequacies of Scottish grain handling facilities and points to a need for the establishment of grading equipment that can prepare grain up to intervention standard, on farms throughout Scotland and a need to encourage the further development of grain storage facilities in the North East of Scotland in particular.

The report considers a number of options that can be justified with grant aid and tax relief, in the light of the price penalties experienced during the harvest of 1982.

On-farm storage in the form of simple, indoor bins, larger outdoor bins or purpose built, on-floor stores can be justified on farms if this storage enables penalties of up to £7 per tonne to be avoided. Grading equipment becomes justifiable when at least 100 tonnes of grain is regularly prepared for sale off the farm.

The establishment of more comprehensive grain handling facilities that include driers, whether on the farm or off the farm as a large co-operatively owned facility, only becomes justifiable if producer returns can be improved by approximately £10 per tonne.

Individual groups of farmers can obtain the benefits of group marketing at little cost however, by liaising with established storekeepers. By guaranteeing a large throughput of grain, individual producers acting through a group can benefit from competitive grain drying, handling and storage costs with little or no capital investment. Further benefits will arise from the more efficient marketing of grain in larger bulks.

While any investment by groups operating in this way will not be grant aidable by the CCAHC under present rules, the commitment of large tonnages by perhaps a number of groups will give encouragement to established storekeepers to expand their storage and conditioning facilities to meet local needs.

At a time when a great deal of uncertainty surrounds the future development of the Common Agricultural Policy and the long term viability of cereal growing in many areas of Scotland, this final option with little or no capital investment required on the part of farmers, appears most attractive and needs to be considered by producers requiring storage and dressing facilities for large volumes of grain.

## APPENDIX I

Distribution of Cereal Units within Scotland - By Region and Size Group

| Cereal Area                         | N.W.           |                 | N.E.           |                 | S.E.           |                  | S.W.             |                  |
|-------------------------------------|----------------|-----------------|----------------|-----------------|----------------|------------------|------------------|------------------|
|                                     | Units          | Area            | Units          | Area            | Units          | Area             | Units            | Area             |
| 0.1 - 4.9 ha<br>(0.25 - 12.1 ac)    | 2,851<br>(68%) | 4,465<br>(10%)  | 956<br>(18%)   | 2,545<br>(1.7%) | 405<br>(9%)    | 1,142<br>(0.5%)  | 1,084<br>(25%)   | 3,053<br>(4.3%)  |
| Units of above 5.0 ha               |                |                 |                |                 |                |                  |                  |                  |
| 5.0 - 39.9 ha<br>(12.3 - 98.6 ac)   | 1,071<br>(81%) | 14,689<br>(40%) | 3,122<br>(74%) | 54,510<br>(37%) | 2,015<br>(48%) | 39,584<br>(16%)  | 2,865<br>(80.8%) | 43,005<br>(64%)  |
| 40.0 - 99.9 ha<br>(98.8 - 246.8 ac) | 171<br>(13%)   | 10,613<br>(29%) | 893<br>(21%)   | 53,951<br>(37%) | 1,420<br>(34%) | 91,465<br>(37%)  | 317<br>(9.8%)    | 17,747<br>(26%)  |
| 100+ ha<br>(247 + ac)               | 74<br>(6%)     | 11,665<br>(31%) | 225<br>(5%)    | 37,797<br>(26%) | 743<br>(18%)   | 117,810<br>(47%) | 45<br>(1.4%)     | 6,444<br>(10.0%) |
| Total of Units 5.0+ ha              | 1,316          | 36,967          | 4,240          | 146,259         | 4,178          | 248,860          | 3,227            | 67,195           |
| Total No. of Units                  | 4,167          | 41,432          | 5,196          | 148,803         | 4,583          | 250,003          | 4,311            | 70,248           |

Source: June 1981 Census.

## APPENDIX II - QUESTIONNAIRE

## Section A. Description of Cereal Enterprise

- Q.1 (a) How many acres do you farm in total?
- (b) How many acres of cereals do you grow - 1982 harvest?
- (c) Of this how much is: WHEAT  
WINTER BARLEY  
SPRING BARLEY  
OATS
- (d) What yields do you expect?
- Q.2 (a) Can you tell me whether you expect to increase, decrease or not change these areas over the next two years?
- (b) Do you have an idea of the areas involved in these changes?
- | CROP     | AREA CHANGE | % CHANGE     |
|----------|-------------|--------------|
| POTATOES | GRASS       | OILSEED RAPE |
- (c) Will changes in the cereal area affect the area of other enterprises:

## Section B. Grain Storage Facilities

- Q.3 (a) Do you have any storage?
- (b) How much in total?
- (c) Of this, how much is Bin Storage?
- (d) How much is in Specialised On-floor stores?
- (e) Multi-purpose storage - cattle courts, potato sheds etc?
- (f) Other types - including Wet Towers.
- Q.4 (a) Do you think you have sufficient storage to meet your present requirements and to cover any planned expansion?
- (b) If No/Don't Know, how much more do you require to hold your expected needs?

## EXPANSION PLANS - STORAGE

- Q.5 (a) Would you envisage this storage you have to need replacing within 5 years?
- (b) Do you plan to increase your overall storage capacity in the foreseeable future? If yes - WHEN?



- (c) Is this to replace existing storage?
- (d) How much storage do you hope to add?
- (e) How much of this would be: BIN STORAGE  
SPECIALISED ON-FLOOR  
MULTI-PURPOSE  
OTHER

#### MULTI-PURPOSE STORAGE

- Q.6 (a) Do you have to move grain out of the multi-purpose store later on in the year - WHY?
- (b) By the end of which month will most of the grain in store need to be moved?
- SEPTEMBER OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY MARCH
- (c) How much will need to be moved?

- Q.7 (a) Can you store different varieties or qualities separately?

#### Section C. Drying Facilities

- Q.8 (a) Do you have drying equipment?
- (b) What type?
- (c) If dried off farm do you use a GROUP DRIER  
COMMERCIAL DRIER  
NEIGHBOUR DRIER
- Q.9 (a) Are these drying facilities adequate to meet present and future requirements?
- (b) Do you plan to replace or supplement your drying facilities within the next five years?
- (c) What are these plans?

#### Section D. Conditioning Equipment

- Q.10 (a) Do you have a precleaner?
- (b) Do you have a grader/dresser?
- (c) Are they sufficient to bring grain upto intervention standard?

(d) Do you intend installing grading and dressing equipment?

Q.11 (a) What is the maximum size of vehicle which you can load?

(b) What is the typical number of tonnes you can load an hour?

(c) Given the overall grain system on your farm, are there any particular bottlenecks in the system?

Section E. Use of Grain

Q.12 (a) Can you tell me roughly how your grain is used?

(b) Do you sell grain through a Marketing Group?

## APPENDIX III

A Comparison of Survey Results with DAFS Census Data

|               | Survey Estimates of Scottish<br>Cereal Area 1982 | DAFS Census<br>Data June 1982 |
|---------------|--|-------------------------------|
| Wheat         | 52,896   | 40,200                        |
| Winter Barley | 40,071   | 51,700                        |
| Spring Barley | 435,463  | 403,800                       |
| Total Barley  | 475,534  | 455,500                       |
| Oats          | 19,998   | 31,500                        |
| Total Cereals | 548,428  | 527,200                       |

The survey results throughout this report have been raised to national levels by applying the sampling fraction to the sample totals in each of the size groups within the regions. The size group estimates are then summed to give regional estimates and these in turn are summed to give Scottish estimates.

When the survey results were raised to a national level their estimate of the total Scottish cereal area at 548,428 hectares was only 4 per cent above DAFS census estimates. However the survey underestimated the winter barley area and overestimated the wheat area by a similar margin of 11,000 hectares. The largest difference in survey and census estimates was with respect to the area of oats. Oat production is concentrated amongst the smaller units where the sampling fraction of the survey was particularly small.

While the above comparison encourages us to draw inferences from the survey for the whole of Scotland, the standard deviations associated with sample statistics are large. As a result the survey can only be taken to give an impression of the true situation on Scottish farms and not a precise description.