Cooperation

March, 1961 REPORT NO. 125

UNIVERSITY OF BRISTOL
Department of Economics (Agricultural Economics)
Bristol II. Province

CO-OPERATION

A Report on an Experiment in setting up Co-operative Groups for the purpose of making grass silage

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Price Three Shillings and Sixpence

ACKNOWLEDGEMENTS

The Department of Economics (Agricultural Economics) of the University of Bristol at Newton Abbot gratefully acknowledges the assistance of Mr. D. G. Baglow (National Agricultural Advisory Service) of the Nuffield Farm Project in providing much of the physical data incorporated in this report.

The assistance of all the farmers taking part in this experiment is also gratefully acknowledged.

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Cover photograph by courtesy of

Mr. D. G. Baglow

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INTRODUCTION

The co-operative ownership and use of farm machinery is a relatively recent development in Britain, but one which is slowly being accepted by some farmers as a genuine method of self help.

With the increasing range and complexity of farm equipment, the future would appear to offer considerable scope and inducement for farmers to join forces to their mutual advantage. Yet with doubts, and perhaps a natural distaste to forfeit even a little of their cherished independence, there is often a natural barrier retarding the formation of such groups.

The following report describes the formation of three machinery groups set up in the Teign Valley of Devon in the Spring of 1960. They were set up as part of an experimental project in advisory techniques sponsored by the Nuffield Foundation incorporating the active participation of the National Agricultural Advisory Service and Bristol University Agricultural Economics Department.

The initial stimulus which culminated in this venture arose from a recommendation made by the policy formulating committee of the Project to encourage the use of modern equipment for making grass silage. With the uncertain climatic conditions that prevailed in the area, plus the heavy labour requirements necessary for hay-making, it was felt that grass silage could eliminate some of the risks and spread the workload over a longer period.

Various alternatives were considered and it was eventually agreed that endeavours should be made to interest farmers of the area in the formation of co-operative machinery groups. Although the basic premise for this venture was not specifically directed towards co-operation as such, this aspect took on an equal significance to that of the original objective of promoting the technique of grass conservation in the form of silage.

These groups have brought to light some of the problems of co-operation as well as the positive features associated with it. This study is an attempt to assess critically the methods adopted in setting up the groups and the results that have been achieved.

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FORMATION

Procedure

The initial objective was to attempt the formation of three groups. This number would be sufficient for comparative purposes and would enable adequate supervision to be undertaken.

Initial publicity was given at general meetings and this met with an interested response, mainly displayed by those farmers farming relatively large acreages, when compared to the average farm size in the area.

Once the pattern of interest became discernible the location of the three potential groups more or less resolved itself. Meetings were held in each of the three areas for invited audiences consisting of those farmers who had either indicated that they would like to know more, or to farmers who it was felt would benefit from participation.

At these first meetings, after a brief outline of the objects intended, followed by a general discussion, it was suggested that a draft set of rules and conditions would be drawn up by the Project Officers and a further meeting held to discuss them in detail.

This was done and the draft was carefully discussed clause by clause. A small number of amendments and alterations were suggested and these were incorporated into the final document. It was agreed at these meetings that when the final set of rules was available it should provide a section for intended acreages to be cut, and also for signature. It could thus serve as a form of membership when completed.

Each farmer who had attended the preliminary meetings was sent a form together with a letter indicating that if sufficient completed forms were returned by members of their potential group the signatories would be considered to have accepted membership of the group. (A copy of the acceptance form is to be found in Appendix I).

The groups were each situated in a different parish and these parish names were used to designate them. Table 1 summarises the potential members and the actual acceptances, together with the estimated silage acreages submitted.

Table 1

Group	Potential Members	Acceptances	Acreages to be dealt with as silage
Longdown	8	4	99
Dunsford	8	5	83
Bridford	8	8	169

Organising the Groups

Due to the differences of size and composition of each group a standard form of organisation had to be devised which would prove sufficiently flexible to meet such variations. The basic formula for operating was incorporated in the rules, and these it was felt provided scope for each group to cater for their specific requirements while at the same time having certain basic principles to guide them.

Organizationally it was felt that for the groups to work efficiently each should consist of no more than eight members. Therefore, when eight potential members had been found for each group, no effort was made to enlarge the numbers.

As will be seen from Table 1 only in one group did all the potential members accept. In the Dunsford group two farmers decided to leave farming, while another intended to change his farming system. As a result they all felt obliged to withdraw.

The features of the Longdown group withdrawals were more complex. Initially there was considerable interest in the scheme, but the potential composition of the group made some individuals refrain from joining in. Attempts were made to increase the number in this group but it was not possible to interest other farmers within a practicable working distance of the original acceptors.

With some reservations concerning the Longdown group it was decided to proceed further with technical details for setting up all three groups.

The next stages were as follows:-

1. A meeting with the N.A.A.S. Machinery Officer to discuss the type and make of equipment most suitable for the conditions they would have to operate in.

2. Preparation of estimates of the total cost of the necessary equipment.

3. Submitting these together with details of the conditions and rules to the Nuffield Foundation for approval of the expenditure required.

Once financial approval had been given two further meetings were held with each group. The first such meetings were to discuss technical details of operating the equipment with the Machinery Officer present. This was an important aspect as very few of the farmers concerned had previously had any experience in the use of the equipment that was to be provided. Also, as most of the tractor power was to be provided by the farmers co-operating, it was necessary to ensure that they had suitable tractors for the work.

When the equipment had been delivered the second series of meetings were held at which each group elected a Secretary and Treasurer (both functions were combined in the Longdown group). The working procedure was also gone into in some detail and each group was furnished with a log-book. A copy of the log sheets that had to be filled in will be found in Appendix II.

On 23rd May, 1960 all groups commenced working. The firm that supplied the equipment also provided a man to assist in adjusting the machines and advising about their use so that they all got off to a good start.

Finances

In the initial discussions for setting up these groups it was considered important that each group should have the opportunity of continuing independently once the experimental period was completed. This factor made it imperative that each group should be established with a financial system that would enable such a transition to take place smoothly.

It was also considered desirable that the charge to each

individual participating should be a fair reflection of the true cost involved, while also ensuring that such a charge would be no greater than would be incurred when using their normal method of making silage. To meet these two opposing criteria and to ensure equity for all participants irrespective of acreage, a system of charging based on total acreage of silage to be cut was devised.

Such a system made the cost to each individual dependent on the total stipulated acreage of each group. The larger the group acreage, the lower the cost per acre, was a point that was constantly emphasised with a view to encouraging the maximum number of acres to be cut for silage. Each member, therefore, had to submit an estimate of the acreage he intended to cut and by so doing became responsible for the charge on such acreage whether it was in fact cut or not. To ensure that the stipulated acreage was also the optimum intended, a provision was included that any member who wished to increase his acreage would have to wait until all work had been completed by other members or the equipment was not in use. (see rules 15 and 16, Appendix I).

The actual basis used to determine the amount each group would be committed to was kept as simple as possible. In the first experimental season their maximum liability would be 13% of the total net cost of the equipment purchased for them. Of this total, 10% would be equivalent to an annual depreciation charge to be refunded to the Nuffield Foundation, the remaining 3% being a fund to cover general expenses such as insurance, repairs, maintenance and inspection, plus any administrative costs that might arise. A provision was included limiting the groups liability to this amount. Thus, if it proved inadequate to cover the actual expenditure incurred, the balance would be made good by the Nuffield Foundation. If the reverse was the case and the 3% was not all used the residue was to be re-distributed pro rata at the end of the season (see rules 3, 4 and 5).

In fact the costs to be met by the sum realised from the 3% charge were in excess of the amount contributed. Such charges should logically be based on the amount of work done rather than on the initial capital cost. However, to ensure a high standard of maintenance, it was felt necessary to set a fixed charge. It was reasoned that if the groups were to be encouraged to take over the equipment it must be in a satisfactory condition at the end of the season. Had the cost been wholly the groups' responsibility they would have endeavoured to keep such expenses to a minimum. As this was an experiment intended to foster the independent continuance of the groups, it was considered necessary not to prejudice this objective by the introduction of financial requirements inimical to this end. On the basis of the

actual expenses incurred in the first year the charge for repairs and maintenance was increased from 3% to 5% of cost for additional groups set up in 1961.

With such a system it was impossible to specify in advance what the actual cost per acre would be for the use of the equipment. Quite naturally the question of cost was uppermost in the minds of those interested in the idea. It was possible, however, to indicate the likely cost by postulating hypothetical acreages and estimating the cost of equipment to the group. From such simple arithmetic plus the views expressed by potential members it was estimated that an acreage charge of 25s. 0d. would be acceptable and this would in turn require a total acreage for each group of about 100 acres.

Had the eight potential members of each group accepted, group acreages in all three cases would have totalled over 100 acres. When all the acceptances were in, the only group to exceed 100 acres was at Bridford, where all potential members accepted. Although the Longdown group submitted a total of 99 acres, it was felt at the time and subsequently confirmed, that this overestimated their true requirements. As the four members of this group were most anxious to be included and knowing that too small an acreage submitted might damage their prospect of inclusion, they all overestimated their known requirements.

As it was not necessary to purchase a tractor for the Dunsford group it was less essential for them to provide an acreage comparable with these submitted by the other groups. As such, their total of 83 acres was sufficient to keep their acreage cost to an economic level. Although they did not in fact cut the full acreage submitted, this was due to heavier yields than anticipated, rather than to deliberately overestimating acres.

In addition to silage acres each farmer was asked to indicate separately what other uses, if any, he ~~may~~ might require the equipment for. This category included a variety of intentions; cutting for hay, topping pastures and harvesting maize being the main intended usages. These estimated acreages did not commit the farmers who submitted them to payment if they did not undertake the work. Thus for purposes of calculating cost these other acreages were not included. However, consideration of these additional uses was borne in mind when assessing the potential viability of each group.

Once the groups had been established it was felt that the best method of dealing with these other uses to be made of the equipment

would be to set hire charges for individual items. In this way maximum use of all the equipment would be encouraged when silage making was not in progress. It was also made clear that all revenues derived from hire would first have to offset any charges for repairs over the 3% allowed. This provision was made as hire of equipment could result in increased repair bills. Once this had been allowed for, the balance would be used to reduce the silage acreage cost pro rata.

Estimates were made which indicated that if all the equipment was kept in use constantly, the revenue so derived would more than cover the 10% charge, which would mean in effect that the actual charge for silage making would be nil. This eventuality was most unlikely, but such a system made it virtually impossible to even tentatively indicate what the final acreage cost would be in each group until the end of this first experimental period, which for convenience was set at 31st December, 1960. (A copy of the equipment hire rules is to be found in Appendix III).

The elected treasurer of each group was made responsible for collecting charges from members. Each member was requested to pay his contribution to the 3% fund before work commenced and to pay 10s. 0d. for every acre cut for silage once the work had been done. In this way it was felt that the cost to each individual would be partly met at the time the work was being undertaken.

In practice this payment of 10s. 0d. was not collected by any of the treasurers. As the work on each farm was spread over a considerable period of time the treasurers were reluctant to press for payment and the members generally wished to settle their debts to the group in one transaction only.

With a view to the groups continuing in the future, arrangements were made with a bank for them to be set up as partnerships. Members of each group were signatories to a simple partnership agreement which gave them a legal identity without any restrictions other than a requirement that all financial dealings would be made in the name of the group. The only special proviso required that all cheques withdrawing money from the group account required the treasurer's signature plus the signature of any one other member of the group.

A name had to be chosen for each group and for convenience they were named the Bridford, Dunsford and Longdown Farmers' Syndicates. The treasurers were supplied with account books, receipt books and rubber stamps with their group's name. Both the treasurer and secretary for each group were honorary positions, but arrangements were made that they

would be reimbursed for any expenses which they incurred when performing their respective functions.

Equipment

The equipment eventually purchased for all three groups was as follows:-

2 International B.275 Diesel tractors with hydraulic lift and two-speed constant P.T.O.
2 Lundell 40" in-line forage harvesters with swivel heads.
1 Lundell 60" off-set forage harvester with swivel head.
1 Buckrake with narrow tines.
6 Weeks 3 ton rear tipping trailers with silage sides.

In addition to the above a Lundell 60" maize attachment was purchased.

The distribution of the equipment to the groups was as follows:-

Bridford group and Longdown group each had	1 tractor 1-40" harvester 2 trailers
Dunsford group had	1-60" off-set harvester 2 trailers 1 buckrake

The maize attachment was supplied for use by members of any group.

The choice of equipment was determined by:-

(a) The method of working that was to be employed.
(b) The estimated throughput that could be satisfactorily dealt with.
(c) The nature of the terrain that would be worked.

All these factors were closely inter-related and equipment was chosen which would deal satisfactorily with the worst conditions it was likely to be subjected to.

As conditions varied for each group one possibility would have been to choose the equipment for each group separately. This would

possibly have resulted in different makes of equipment being purchased. Consideration was given to this aspect but it was felt that the advantages of all groups having similar equipment far outweighed any benefits that might be derived from varying the equipment to each group.

The choice of a 60" off-set harvester for the Dunsford group was necessitated by a variety of circumstances. At least one farmer in each group had displayed an interest in growing maize for silage. As the harvesting attachment for maize had to be fitted to an off-set machine one 40" off-set model was ordered initially. This model, however, was not available in time and the manufacturers supplied a 40" in-line machine until the other could be supplied. When the off-set machine became available there was some doubt as to whether the maize attachment could be obtained in time for the harvest. As a 60" attachment could be obtained and the Dunsford group felt that a 60" off-set machine would benefit them in the future it was decided to order the larger machine.

When considering the equipment required it was hoped that each group would have been able to manage without the necessity of providing them with tractors. By doing this the cost would have been substantially reduced. After going into the tractor position of each group it was felt that with the exception of the Dunsford group, for the work to proceed smoothly, one tractor would be required by both the other groups. In the Bridford group this was due to the acreage to be cut. Although suitable tractors were available it would not have been satisfactory to rely on them being available when required, as the period involved would have deprived their owners of their use if the group had first claim on them. For the Longdown group the situation was rather different. They themselves felt they could in fact manage without an extra tractor but this was in some doubt and a tractor was obtained for them. Arrangements were made that if the Dunsford group should require a tractor at any time and the Longdown group were not using theirs, this would be available to them. The Dunsford group did not in fact require the use of this tractor.

As the cost to each group was ultimately determined by the cost of the equipment they were to be provided with, efforts were made to obtain the best terms when purchasing it. Various enquiries were made and arrangements were agreed by which a 10% discount was allowed on the basic cost of all the equipment. This was granted by the firm concerned in view of the experimental nature of the scheme.

The total cost of all the equipment was over £3,500, after allowance had been made for the discount. With the 10% charge for the

period deducted this left over £3,150 outstanding by the three groups combined. This can roughly be apportioned at £1,160 each for the Bridford and Longdown groups and £700 for the Dunsford group. The difference in the above amounts is due to the exclusion of a tractor in the Dunsford group. The balance of £130 is accounted for by the maize attachment.

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METHOD OF OPERATION

In the original calculations the period of mid-May to mid-June was postulated as the time during which the bulk of silage would be made. Excluding Sundays, and making allowance for possible wet days, a total of approximately 20 working days was arrived at. If each unit had to deal with 100 acres then 5 acres had to be cut each day. With an estimated yield of six tons per acre, it was anticipated that a daily output of about 30 tons would be achieved.

Results of this magnitude were well within the working capacity of the equipment provided. The 40" harvester has a maximum output of over 10 tons per hour under suitable conditions, and calculating on the basis of a 7 or 8 hour working day, it would only have to operate at less than half this output potential to attain the level of estimated required output.

The method of working that was chosen was designed to ensure a steady production flow. Each harvester was to be serviced independently by two tractor and trailer units. While one trailer unit was being filled the other would be unloading at the silo and would return in time to take over when the other trailer was full.

In the initial stages the trailers could be unloaded direct into the silo, but once the first layer had been completed some additional work would be required at the silo end. Various tentative ideas were put forward as to how to deal with this part of the process. One such idea was to use metal grids to enable the tractor and trailer to run over the heap and tip direct. This method was tried but was found to be rather time wasting. Attempts were also made to drive over the first layer of grass without any supports but this method also proved unsatisfactory. The actual procedure that was eventually adopted was to use the well tried method of buckraking each load of grass onto the heap, using a short-tined buckrake.

To ensure adequate consolidation and to enable the fermentation process to proceed at the desired rate meant that each silo had to be filled in a number of stages. This aspect of the process proved beneficial in that it was not necessary to complete work on one farm before proceeding to the next. The system devised was for a circuit of farms which were ready to make silage to be worked consecutively. In some cases this meant working on two farms in one day, but in most cases one day per farm was adopted.

When one round of the circuit had been completed, work would commence again on the first farm. This method had the advantage of flexibility while at the same time ensured that there would only be a minimum delay for any one farmer to have his silage made.

For such a system to operate smoothly required a considerable amount of organisation prior to the work commencing. The person responsible for arranging this was the group secretary. His main duty was organisation of a rota of farms to be worked and to ensure an adequate supply of labour and tractor power on each farm.

It was hoped that each secretary would draw up a detailed rota to ensure that each member of the group had the opportunity to balance his contribution. In practice the method used was of an ad hoc nature. Viewed in retrospect this was almost inevitable, but it did lead to a maldistribution of labour and tractor time. To partly overcome this the log-sheets of each group were collected periodically and the secretaries informed of the labour position at that time so that these could be rectified in future.

The basic operational principle entailed co-operative working as well as joint payment for the use of the equipment. In this sense the scheme differed from most of the machinery co-operative schemes operating elsewhere. Co-operative working was imperative to ensure that there would be a full team working on each farm. A full team consisted of four men and three tractors in addition to the equipment provided. In some cases three men and two tractors were sufficient when one man and tractor could be spared from trailer work for part of the time to buckrake onto the pit.

As most farmers could only provide their own labour and possibly one other man, in almost all cases some labour and tractor power had to be provided by other members of the group.

To ensure that silage making would conflict as little as possible with routine farm work, a working day from 10 a.m. to 6 p.m. was suggested.

With only one exception all participating members were able to provide tractors suitable for pulling and tipping the trailers. One or two had to purchase hydraulic extensions for tipping and two farmers purchased drawbar attachments which though not vital, simplified hitching up.

In general each member of a team supplied his own tractor.

In some cases, however, this was either not necessary or inconvenient.

To eliminate the need for cash settlement of any outstanding tractor and labour time owed when the work had been completed by each group a provision was made that this should be returned in kind. Similarly, rather than making this an individual obligation which might involve a proliferation of cross-transactions, it was suggested that the overall position should be assessed and only the net creditors and debtors should be involved.

In a scheme of this nature in which there are significant disparities between members with regard to farm size and labour employed, certain problems of organisation are almost unavoidable. Some of these will be dealt with later, but it is perhaps worth including in this section some reference to the member farming single-handed.

Organisationally such members require most additional assistance while at the same time being able to contribute very little. Providing that the acreage they wish to cut is small this is no great handicap. However, if they wish to cut a large acreage it almost inevitably involved them in owing a considerable amount of labour/tractor time, which conversely means that the other members have to contribute more than they receive.

Such a situation is complicated by the fact that a post-silage reciprocal scheme does not satisfy either party. The original idea had been that any labour/tractor time owed at the end of the silage making period should be repaid in kind on any farm jobs, in order to avoid cash payment for work done. However, the man farming on his own can rarely spare the time to repay his debts in labour hours, while those who provided the labour initially do not really require his services as they employ an adequate labour force.

Such situations, therefore, made it inevitable that in certain cases a cash settlement became unavoidable. In view of the experimental nature of the scheme those farmers who were owed a period of labour/tractor time when all work had been completed agreed to make a charge of 8s. 0d. per hour, a sum which would just cover the cost to them; but even this meant moderate sums changing hands.

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RESULTS

The results for each group are set out in the tables following this section and for convenience a table has been included summarising the average results of all three groups to enable direct comparisons to be made.

The individual figures were obtained from the log sheets filled in on each farm. Physical results were obtained by having silage samples analysed from all silos and a visual estimate made of the quantity of finished silage produced. To estimate the cost to each member the procedure followed entailed dividing the actual acres cut into the cost each member bore for the use of the equipment. In addition man and tractor hours supplied by the farmer himself or purchased from other members are charged at 4s.0d. per hour and the total divided by the number of acres cut. The total of these two charges indicates the likely cost per acre to each member.

This procedure has a limited validity but though it might distort the true cost to each individual to some extent, it does enable a comparison to be made between both individuals within groups and also between the groups themselves.

The method employed for distributing the 10% charge to members in each group was arrived at as follows. If acres cut were less than the estimated acres then the member was charged on his estimated acres. Where acres cut exceeded estimated acres then the member was charged on actual acres cut.

The total acres thus obtained were then divided into the sum to be realised to provide the basic charge per acre.

By applying this formula the charge per acre for the Dunsford group was 19s. 0d., for the Bridford group 13s. 0d., but for the Longdown group it would have been £2 4s. As it was realised in advance that the charge to the Longdown group would be considerably in excess of that to the other two groups it was agreed that they should be charged at the same rate as that charged to the Dunsford group. They were thus charged only 19s. 0d. per estimated acre and the balance of the 10% charge was made good by the Nuffield Foundation.

The differences in charges to individuals for the hire of the equipment resulted from the relationship between estimated and actual acres cut. Fewer acres cut than estimated increased the cost, and if cut acres exceeded estimated acres the cost per acre decreased. This

relationship came about due to the fact that the 3% maintenance and repair charge was made on estimated acres only and thus became a progressively smaller part of the acreage charge as cut acres exceeded estimated acres.

This rather complex system of charging was necessary due to the experimental nature of the scheme. Such a procedure is not, however, a satisfactory method of charging once groups are independently set up, and the method of charging under such conditions are dealt with later.

Although equipment costs per acre varied very markedly between individuals in each group, and between the groups themselves, the actual estimated cost per ton of silage was not directly related to these costs. Of more importance was the yield per acre.

Essentially each farmer was primarily concerned with producing a given tonnage of silage. If yields per acre exceeded those anticipated then the acreage cut would be reduced proportionately and if yields did not come up to expectations then more acres would have to be cut. This factor acted as a compensating mechanism. In both Dunsford and Longdown, both parishes situated on the heavier culm soils, yields tended to be relatively high, whereas on the lighter granite soils of Bridford yields were rather poor. As a result of this the actual estimated cost per ton of silage produced was highest at Bridford even though they had the lowest total cost per acre.

It was originally hoped that by obtaining the number of trailer loads, a fairly accurate estimate would be obtained of acreage yields. This, however, did not in fact prove possible, for although the number of loads per acre provided some indication of yield, quite considerable variations occurred in load weight according to the method of operation and the state of the grass.

In dry conditions the speed of operations can be greater than when the grass is moist. This does not allow the grass in the trailer to settle, due both to its lightness, being dry, and to the speed at which it is cut. Thus, though a trailer is capable of holding three tons of cut grass, it is unlikely that in the period when the bulk of the grass was cut that much more than one ton of grass comprised a load. At a later stage, however, when wet conditions prevailed and the grass itself contained more sap, load-weights probably more than doubled.

A better guide turned out to be a visual one of tons of

completed silage. Although the margin of error in estimating tons of completed silage can be considerable, especially if the silage is made in an earth pit, the only instances in which farmers queried the totals related to crops of maize silage. These it was felt were underestimated by about 20%.

No allowance was made for wastage in estimating total tons of silage. This aspect is partly related to the type of silo and partly to the total quantity produced. In general, wastage was rarely more than that normally found for the types of silos used.

The quality of all the silages made was satisfactory with the exception of the farm indicated in Table 3. Dry matter content was, however, appreciably greater in most cases when made in a covered silo. The actual method of making silage with a forage harvester was generally agreed to be superior to the traditional method of mowing and buckraking in terms of efficient use of labour and machines. It was, however, accepted that if the fields to be cut were adjacent to the silo, then there was very little saving in time when using a forage harvester, and that costs would be appreciably lower if the buckrake method was used. With some reservations most farmers also felt that the finished product was superior and that handling the silage was simpler when cut by forage harvester. None of the farmers participating had had any previous experience of either using this particular method of making silage or of operating machinery co-operatively. As such it is highly probable that the overall level of performance fell far short of the optimum. In the initial stages there was a tendency for too much labour to be employed and in all groups there was also a tendency for performance figures to improve as the work proceeded.

There was a noticeable difference in the speed of operations on those farms in which the farmer had experience of modern farm machinery. Breakdowns or holdups were less frequent and were dealt with more speedily. This was in part due to the nature of the terrain, the better farms being those which were most mechanised. In parts of Bridford the stony nature of the soil tended to put a greater strain on the equipment and breakages of flails were commonplace. In parts of Longdown the land was often steep and fields awkwardly shaped and these two factors tended to reduce the speed of operations. Although conditions were not always ideal at Dunsford they were more satisfactory than in the other two parishes. These factors are reflected in the performance figures for each group when assessed against the tons of silage produced per acre.

Although the technical performance figures have only an indirect bearing on the aspect of co-operation, from the farmers point of view these were the main criteria for evaluating the efficiency of the scheme. Nevertheless, most, if not all, had certain initial doubts regarding the practical application of co-operative working. Whether all these were fully assuaged is difficult to assess, but the general reaction was one of slight surprise that everything went as smoothly as it did.

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Table 2

Dunsford Group - Individual and Group Results
Operational Performance

Farmer	A	B	C	C Maize	D	E	Total	Group Av.
Estimated acres	10	15	20	5	25	8	83	17
Acres cut	10.0	8.0	21.5	5.0	15.5 (+3H)*	4.2	64.2	12.8
Total farm acres	75	70	263	(263)	127	39	574	115
Est. acres as % total acres	13.3	21.4	7.6	1.9	19.7	20.5	-	14.8
Acres cut as % total acres	13.3	11.4	8.2	1.9	12.2	10.8	-	11.1
Acres cut as % est. acres	100.0	53.3	107.5	100.0	62.0	52.5	-	75.3
Cutting time - hours	21.0	18.5	24.0	6.0	40.0	13.0	122.5	24.5
Total tractor hours	74.5	62.0	84.0	18.0	114.0	41.5	394.0	78.8
Hours cutting time per acre	2.1	2.3	1.1	1.2	2.6	3.1	-	1.9
Cutting time as % total tractor hours	28.2	29.8	28.6	33.3	35.1	31.3	-	31.1
Total man hours	74.5	62.0	84.0	18.0	121.0	41.5	401.0	80.2
Man hours per acre	7.5	7.8	3.9	3.6	7.8	9.9	-	6.2
Total trailer loads	78	61	100	25	70	32	366	73
Trailer loads per acre	7.8	7.6	4.7	5.0	4.5	7.5	-	5.7
Man hours per load	1.0	1.0	0.8	0.7	1.7	1.3	-	1.1

* Hay crop cut with forage-harvester.
The figures in brackets are not included in the total and average results.

Table 3

Dunsford Group - Individual and Group Results
Output and Costs

Farmer	A	B	C 1st cut	C 2nd cut	C Maize	D	E	Group Av.
Silage acres	10.0	8.0	11.5	10.0	5.0	15.5	4.2	12.8
Tons silage [1]	65.0	45.0	90.0	40.0	45.0	140.0	30.0	91.0
Type of silo [2]	u.c.	c.	c.	c.	c.	c.	c.	-
% dry matter	20.4	21.2	24.4	18.1	16.2	17.6	22.5	20.1
pH value	4.3	4.4	5.1	4.3	3.7	4.5	4.2	4.4
Estimated starch equivalent	10.2	10.6	12.2	10.0	8.1	7.9	11.3	10.0
Estimated protein equivalent	1.4	1.7	1.8	2.2	1.0	1.0	1.8	1.6
Protein classification	M	M	M	V.H.	L	L	M	-
Cost per acre cut - equipment only [3] shillings	25.0	54.0	29.0		32.0	35.5	53.0	37.5
Other harvesting costs per acre - shillings [4]	59.5	62.0	33.0		29.0	58.5	79.0	49.5
Total costs per acre - shillings	84.5	116.0	62.0		61.0	94.0	132.0	87.0
Tons silage per acre	6.5	5.6	6.0		9.0	9.0*	7.0	7.1
Estimated cost per ton [5] - shillings	13.0	20.7	10.3		6.8	10.4	18.9	12.3

* This pit was left unsealed and absorbed a large volume of rain water. The high moisture content produced a high tonnage with poor feeding value. The farmer concerned had difficulty in getting his stock to eat the silage and a considerable proportion was waste.

For number references see notes at end of tables.

Table 4

Bridford Group - Individual and Group Results
Operational Performance

Farmer	A	B	C	C Maize	D	E ø	F	G	H *	Total	Group Av.
Estimated acres	35	40	34	3	15	5	18	14	5	169	21
Acres cut	39·0	51·0	26·0	3·0	13·5	-	13·2	30·0	(4H)	175·7	29·3
Total farm acres	91	127	198	(198)	65	35	121	36	37	710	89
Est.acres as % total acres	38·5	31·5	17·1	1·5	23·1	14·3	14·9	39·9	13·5	-	23·6
Acres cut as % total acres	42·8	40·1	13·1	1·5	20·8	-	10·9	83·3	(10·8H)	-	35·4
Acres cut as % est. acres	111·4	127·5	76·5	100·0	90·0	-	73·3	214·2	(80H)	-	112·4
Cutting time - hours	67·0	106·0	42·0	16·0	32·5	-	21·0	58·0	(6H)	342·5	57·1
Total tractor hours	210·0	291·0	170·0	49·0	90·0	-	68·5	175·0	(6H)	1050·5	175·1
Hours cutting time per acre	1·7	2·1	1·6	5·3	2·4	-	1·6	1·9	(1·5H)	-	1·9
Cutting time as % total tractor hours	31·9	36·4	24·7	32·7	36·1	-	30·7	33·1	(100)	-	32·6
Total man hours	246·0	291·0	170·0	46·0	90·0	-	68·5	188·0	(6)	1099·5	183·3
Man hours per acre	6·3	5·7	6·5	15·3	6·6	-	5·2	6·3	(1·5)	-	6·3
Total trailer loads	169	163	142	30	48	-	77	142	-	771	128
Trailer loads per acre	4·3	3·2	5·4	10·0	3·5	-	5·8	4·7	-	-	4·4
Man hours per load	1·5	1·8	1·2	1·5	1·9	-	0·9	1·3	-	-	1·4

ø This farmer was unable to make any silage.

* This farmer also made no silage but experimented with the forage harvester to cut four acres of hay. The figures in brackets have been excluded from the total and average results.

Table 5

Bridford Group - Individual and Group Results
Output and Costs

Farmer	A		B		C			D		F	G		Group Av.
	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	Maize	1st cut	2nd cut		1st cut	2nd cut	
Silage acres	29·0	10·0	34·0	17·0	19·5	6·5	3·0	6·5	7·0	13·2	22·0	8·0	29·3
Tons silage [1]	90·0	25·0	100·0	40·0	60·0*	15·0	30·0	20·0	15·0	80·0	40·0	20·0	89·1
Type of silo [2]	u.c.		u.c.		u.c.		u.c.	c.		u.c.	u.c.		-
% dry matter	20·0	19·2	18·5	n.a.	17·5	n.a.	14·1	27·5	24·8	20·0	17·0	15·0	19·4
pH value	4·5	5·3	4·7	n.a.	5·3	n.a.	4·7	4·8	5·3	3·8	5·2	4·2	4·8
Est. starch equiv.	9·0	9·6	8·3	n.a.	8·8	n.a.	8·1	13·7	13·6	10·0	7·7	7·0	9·6
Est. protein equiv.	1·4	1·5	1·2	n.a.	2·2	n.a.	1·0	2·1	2·4	1·5	1·1	1·0	1·5
Protein classification	L	M	L	n.a.	V.H*	n.a.	L	M	H	M	L	L	-
Cost per acre cut-equip. only - shillings [3]	17·0		16·5		25·0		32·0	19·5		24·0	15·0		18·7
Other harvesting costs per acre - shillings [4]	40·0		37·0		45·5		100·0	40·5		35·0	40·5		41·0
Total costs per acre - shillings	57·0		53·5		70·5		132·0	60·0		59·0	55·5		59·7
Tons silage per acre	3·0		2·7		2·9		10·0	2·6		6·1	2·0		3·0
Est. cost per ton - shillings [5]	19·0		19·8		24·3		13·2	23·1		9·7	27·7		19·9

* A large proportion of this was arable silage, which comprising oats and vetches, accounts for the very high protein classification.

n.a. Not available. In the two cases of farmers B and C suitable samples of second cut silage were not available for analysis when collection took place.

Farmers E and H have been excluded as neither made silage. Both were charged on their estimated acres and each had to pay £4 8s. 0d. as their contribution.

Table 6

Longdown Group - Individual and Group Results
Operational Performance

Farmer	A	B	C	D	Total	Group Av.
Estimated acres	20	31	13	35	99	25
Acres cut	7·5	25·0	8·5	18·0	59·0	14·8
Total farm acres	65	172	145	76	458	115
Est. acres as % total acres	30·7	18·0	9·0	46·0	-	21·7
Acres cut as % total acres	11·5	14·5	5·8	23·7	-	12·9
Acres cut as % est. acres	37·5	80·6	65·4	51·4	-	59·2
Cutting time - hours	18·5	50·0	19·0	42·0	129·5	32·4
Total tractor hours	65·0	151·5	39·0	123·5	379·0	94·7
Hours cutting time per acre	2·4	2·0	2·2	2·3	-	2·2
Cutting time as % total tractor hours	28·4	33·0	48·7	34·0	-	34·2
Total man hours	65·0	151·5	39·0	123·5	379·0	94·7
Man hours per acre	8·7	6·1	4·6	6·9	-	6·4
Total trailer loads	38	130	47	48	263	66
Trailer loads per acre	5·1	5·2	5·5	2·7	-	4·5
Man hours per load	1·7	1·2	0·8	2·5	-	1·4

Table 7

Longdown Group - Individual and Group Results
Output and Costs

Farmer	A	B	C	D	Group Av.
Silage acres	7·5	25·0	8·5	18·0	14·7
Tons silage [1]	40·0	135·0	55·0	60·0	72·5
Type of silo [2]	u.c.	c.	c.	u.c.	-
% dry matter	n.a.*	32·1	20·5	17·6	23·4
pH value	n.a.	4·6	4·5	4·7	4·6
Estimated starch equivalent	n.a.	13·4	10·3	8·8	10·8
Estimated protein equivalent	n.a.	1·8	1·6	1·5	1·6
Protein classification	n,a.	L	M	M	-
Cost per acre cut - equipment only [3]	66·5	30·0	38·0	48·5	45·7
Other harvesting costs per acre - shillings [4]	59·0	40·5	27·5	45·5	43·1
Total costs per acre - shillings	125·5	70·5	65·5	94·0	88·8
Tons silage per acre	5·3	5·4	6·5	3·3	4·9
Estimated cost per ton - shillings [5]	23·7	13·1	10·1	28·5	18·1

* n.a. Not available. This farmer sold his farm before the end of the experimental year and silage samples were not analysed.

Table 8

Summary of Group Average Results

Operational Performance	Duns-ford	Brid-ford	Long-down	Output and Costs	Duns-ford	Brid-ford	Long-down
Estimated acres	17	21	25	Silage acres	12.8	29.3	14.7
Acres cut	12.8	29.3	14.8	Tons silage [1]	91.0	89.1	72.5
Total farm acres	115	89	115	% dry matter	20.1	19.4	23.4
Est. acres as % total acres	14.8	23.6	21.7	pH value	4.4	4.8	4.6
Acres cut as % total acres	11.1	35.4	12.9	Est. starch equiv.	10.0	9.6	10.8
Acres cut as % est. acres	75.3	112.4	59.2	Est. protein equiv.	1.6	1.5	1.6
Cutting time - hours	24.5	57.1	32.4	Cost per acre cut - equipment only shillings [3]	37.5	18.7	45.7
Total tractor hours	78.8	175.1	94.7				
Hours cutting time per acre	1.9	1.9	2.2	Other harvesting costs per acre - shillings [4]	49.5	41.0	43.1
Cutting time as % total tractor hours	31.1	32.6	34.2				
Total man hours	80.2	183.3	94.7	Total costs per acre-shillings	87.0	59.7	88.8
Man hours per acre	6.2	6.3	6.4				
Total trailer loads	73	128	66	Tons silage per acre	7.1	3.0	4.9
Trailer loads per acre	5.7	4.4	4.5	Est. cost per ton - shillings [5]	12.3	19.9	18.1
Man hours per load	1.1	1.4	1.4				

Notes

Weighted averages have been used where appropriate.

Table 3

1. These are estimates of finished tons of silage - no allowance has been made for waste.

2. C = Permanent fixed cover. U.C. = Uncovered, but all except * sealed.

3. 3% + 10% charge per acre arrived at as follows. Total estimated acres plus any additional acres cut divided into total 10% charge. Members charged on estimated acres if acres cut were equal or less than estimated acres. If acres cut exceeded estimated acres, members charged on actual acres cut.

4. These sums represent opportunity costs rather than real costs. They have been arrived at by allowing a charge of 8s.0d. per man/tractor hour, the sum arrived at being divided by total acres cut.

5. This sum represents the estimated cost of ensiling each ton and does not include the cost incurred in producing the crop.

Table 5

See notes relating to Table 3 above.

Table 7

Notes 1, 2, 4 and 5 above.

3. For reasons explained in text the acreage charge to this group was charged as per Dunsford group.

ADMINISTRATION

(a) Rotas

It was felt that a detailed planned rota system was not practicable, and in fact although each secretary was asked to produce a rota none did. During the initial working period an informal rota was arrived at as a matter of convenience in all groups. These were solely based on when the grass was considered suitable for cutting. After the first busy period it was more or less left to each individual to notify the secretary when he would like the equipment, and between them they arranged for the necessary labour.

This system worked quite well but has a number of drawbacks. It tends to produce a series of slack periods interspersed with short periods of intensive work. This in turn requires that the interests of the person wishing to use the equipment must supercede the interests of the people helping him. With a relatively large group it is possible to find a working team at short notice, but with a small group this can lead to considerable inconvenience.

Farmers tend to plan their activities at least a few days in advance and being requested to drop their scheduled work in order to provide labour for a group member can cause a certain amount of annoyance.

During this experimental period these problems were not particularly prevalent. Almost all members, being anxious to make the system work, were willing to put up with a certain amount of inconvenience and the general atmosphere in each group was free of any rancour. Nevertheless one can envisage a lower degree of tolerance in the future and it would appear that even if a strict rota system is not feasible, a provision of at least a week's notice of requirements would eliminate the probability of undue inconvenience.

(b) Log Sheets

No members made any complaint about having to fill in the log sheets daily, and on the whole they were completed moderately well. There was some doubt in a number of cases as to what was required, though the log-sheet itself was drawn up with care and the details to be entered were made quite explicit.

In a number of cases there were omissions of loads or hours worked and in one case even acres cut. Rather curiously the people

responsible for omitting details were some of the office holders in the groups. Under any system of machinery co-operation some method of simple recording of work done is required. It need not, however, entail the provision of the sort of details provided in this experiment. Filling in forms after a days work is often considered one of the more objectionable features of this form of co-operation and it is necessary to ensure that this task becomes an integral part of the work procedure.

(c) Group Officers

The main responsibility for organisation fell on the secretary, but to quite a large extent group members tended to organise themselves. As they were working together on each others farms it was relatively simple to make arrangements for the following days. As such, secretarial duties were not quite as onerous as the elected secretaries envisaged.

The problem of more than one member wanting the equipment on the same day, a belief which underlines many of the objections to co-operation, did not in fact arise. Often the secretary was occupied in trying to find a member who wished to avail himself of the equipment.

The treasurer's job was very nominal and it is probably far simpler for the secretary to be responsible for money matters also. An alternative is to make every member of the group responsible for some specific function so that all feel that responsibilities are equally divided.

* * * * * * *

FARMERS' COMMENTS

Each group secretary was requested to give his comments on how he thought the experiment had gone, and to specify any features which he considered relevant. The following is a summary of those together with comments on them.

Machinery

(a) Forage Harvesters. The swivel-head on all three harvesters gave some trouble. The worm gear for rotating the head tended to either stick or slip and required frequent adjustment. The nuts and bolts on the adjustable shute worked loose and had to be replaced periodically. Also the rope for adjusting the shute wore out very quickly.

As these complaints were general the firm who supplied the equipment was asked to bring this to the notice of the manufacturers. This was done and a representative of the manufacturers came and saw the machines. He indicated that he would convey these complaints and arrange for more flexible bearing to be supplied but nothing further has been heard from them.

Flail blades needed frequent replacement in Bridford and to a lesser extent at Longdown. The stony nature of the land caused rapid blunting and many blades were either bent or broken.

A spare set of blades provided with each harvester proved to be inadequate and additional ones had to be purchased. The bent and blunt blades were re-sharpened and straightened when possible but it was often cheaper to have them replaced.

The replacement of blades took a considerable time and as the damage tended to be progressive it was invariably the innocent party that had to replace them. This occasionally led to a little friction.

To deal with this it was suggested that an extra set of blades should be obtained and each user should replace the five worst ones before passing the equipment on. This would mean that all members shared the work.

Under wet conditions there was a tendency for the driving belt to slip, but this indicated that it was too wet to work rather than the machine was unsatisfactory.

(b) Trailers. The trailers were of all metal construction with welded joints. Some of the welding was rather shoddy and gave under strain but this was never serious and was dealt with by the supplier.

With sheet metal sides it was difficult for the tractor driver to see into the trailer to see where the grass was going and whether the trailer was full. In some cases this was overcome by removing one section at the front, but this reduced the load capacity.

A suggestion was made to the suppliers that they suggest to the manufacturers that a mesh section should replace the solid one. This was apparently done but nothing further has been heard from them.

As the trailers were delivered they tended to be rather unstable and in fact two overturned, one at Bridford and one at Longdown. These accidents could have had serious results but fortunately nobody was hurt and the trailers only suffered minor damage. To rectify this instability the suppliers increased the wheel-base and moved the axle units forward, which gave them much greater stability.

Complaints about the design of the mesh swing door were made in a number of cases. When unloading it was necessary for the door to be held high, otherwise it tended to get caught in the heap of grass. There are apparently patent fittings which rectify this but the expense would hardly be justified. In general the trailers stood up to the loads on them very well.

(c) Tractors. Forage-harvesting requires a great deal of potential power. Although adequate, the 35 horse-power tractors provided were working at maximum capacity when dealing with heavy crops on sloping ground. This is not good for the tractor and makes working difficult under such conditions.

A more powerful tractor was used at Dunsford and they found the reserve of power enabled work to proceed more smoothly. It would appear that as a long term investment larger tractors would have been preferable.

Both tractors developed a number of minor troubles but were never put out of action. It was regretable, though unavoidable, that the tractors were immediately introduced to work at maximum capacity before undergoing a period of running-in.

Servicing and maintenance were carried out by the suppliers. At Bridford it was thought that this had not been done satisfactorily.

Each member appeared to provide oil and water when necessary, and the suppliers were prompt in attending to the tractors when they were requested.

General

A number of general points were made quite frequently:-

(a) Reliance on outside labour restricts working day. This point was made by those farmers who employed sufficient labour to operate the equipment without outside assistance. In some instances a smaller team was used for a longer working day and this system proved quite satisfactory.

(b) The group should be as compact as possible. This is an obvious point, but one aspect of it that was brought to notice was the matter of minor repairs. In the Longdown group it was necessary on a few occasions to have to travel to and from the storage farm to get some item required to do the repairs, and this involved considerable wastage of time.

It is unlikely that this is a valid reason for compactness of the group, but there would appear to be a spacial limit of about two miles from the storage farm.

(c) The work is quite arduous and noisy and requires constant alertness and thus too long a period at it is fatiguing. This really refers to the person operating the forage harvester and was mentioned by those working in difficult conditions for a number of consecutive days.

* * * * * * *

At the end of the year each group was notified that if they wished to continue independently the Nuffield Foundation would be prepared to sell them the equipment at 20% less than cost. This was equivalent to a 10% saving as they had already paid 10% for the use of the equipment in the first year. The reason for this offer was that the 10% charged did not reflect the true market depreciation of the equipment and it was felt that 20% loss of value was a more realistic figure.

It was stated quite specifically before the groups were set up that there would be no obligation to continue once the experimental year had been completed. Each group was also informed that if they wished to continue to co-operate they could purchase the equipment required from any source they chose. If they wished to purchase only part of the equipment this could be arranged. In effect it was felt that no pressure should be put on the groups so that any course chosen would be a completely voluntary one.

The developments in each group are set out below.

Longdown

Before the year had been completed one member sold his farm and the new owner was not interested in participating. Of the remaining three members, one did not wish to continue. Representing the more traditional farming attitude he started with a rather ambivalent attitude towards both co-operation and silage. Although his participation throughout was exemplary he was not convinced that grassland conservation in the form of silage was of value to him.

The two members left were both anxious to continue but the prospect of taking over the equipment was not feasible. The Nuffield Foundation agreed that if additional members could be persuaded to join, this group could continue on the same basis in 1961 as it did in 1960. Eventually another two members were found but the acreage submitted was insufficient to make economic use of all the equipment. To overcome this difficulty it was mutally accepted that the tractor should be withdrawn from the group. As this reduced the cost by about half it was possible for the group to continue. Whether this group will be in a position to continue independently in 1962 is in doubt. One member is contemplating selling his farm and the continuation of this group will largely depend upon whether the

incoming farmer is willing to participate.

In many ways this group brought to light a number of interesting features which were not present in either of the other groups. Perhaps of most significance is the problem of group composition. Although it is difficult to indicate the sort of group characteristics which stimulate co-operation, the composition of a group will determine more than any other factor whether it is capable of co-operating. Perhaps the most important requirement is that all members feel confident that they will not be expected to make sacrifices for one of their number. Once the seed of distrust is engendered, whether or not it is justified, the essential basis for co-operation is destroyed. Similarly this feeling is conveyed outside the group, thus diminishing the chance of readjustments in the future.

This aspect was probably partly responsible for the difficulty in obtaining sufficient additional members to operate in the second year.

Another feature of this group which is perhaps also symptomatic of the above was that each member tried to rely on his own labour resources as much as possible. It is perhaps true to say of them that the idea of co-operative ownership appealed far more than that of co-operative working. With the limited acreage to be cut this was not difficult to accommodate but had there been an economic acreage to be cut this approach would have broken down.

Dunsford

Technically, this group was the most efficient. This was due mainly to the fact that all members and their employees were technically acquainted with modern equipment. The conditions that the group operated in were also the most favourable of all groups.

A minor complication in this group was the fact that one member was a part-time worker for another member but this did not in any way affect the work. The problem it raised was of recompense between the two members but this was sorted out satisfactorily.

Of the five members three decided to leave the group at the end of the experimental year. Only in one case was this the result of dissatisfaction, and even this individual was not dissatisfied with the aspect of co-operating as such. He had doubts whether the forage harvester method of making silage had any advantage over the simpler buckrake method. In the past he made excellent silage by buckrake

and claimed that it took him no longer. In his case this was probably correct for he only cut fields adjacent to the silage pit, and under such conditions the advantage of using a forage harvester is very slight and the cost is undoubtedly higher.

One member decided to give up farming and another did not feel he could meet the financial requirements if the group was to become independent.

A member of the Bridford group wished to join forces with one of the remaining members of this group and they decided to purchase the equipment jointly on the terms offered. The remaining member of this group was the part-time worker mentioned above and it was agreed that to absolve him of any financial commitment his employer would cut his silage for him on a contract basis.

The two farmers who formed the group were able to obtain as much credit as they required from a local bank to purchase the equipment. This was done on a half shares basis and no formal arrangements apart from the financial one was entered into.

As the two farmers concerned are farming relatively large farms and were already participating in a co-operative purchasing group which they helped to form, this for them was a natural and logical development. Their intention is to jointly purchase a number of other items of farm machinery, and at least one other item had been acquired shortly after the silage equipment was taken over.

Bridford

Being the largest one, this group had the most difficult task to perform, and yet it operated remarkably smoothly. Fortunately individual requirements were evenly spread out in time, which eliminated the necessity to work full out to cut the acreage required.

Co-operation among the various group members was maintained at a high level throughout the whole of the working period. A definite team spirit was produced and every individual did what was expected of him.

As will be seen from Table 4 two members of this group did not in fact make any silage. These were two of the smallest and most awkward farms and the acres they submitted were only a small percentage of the group total. One farmer used the forage harvester to cut a crop of hay rather than make silage, the other had hoped to make some late

silage but the weather made this impracticable. Neither of these farmers wished to participate in an independent group largely because they felt that their farms were both too small to make it worth their while.

As mentioned previously one member of this group had already agreed to join forces with one member of the Dunsford group. This left five members remaining. All were interested in forming a group to continue similar future co-operation. However, due to a variety of circumstances one member felt obliged to withdraw.

Although the four members left were anxious to continue, whether they did so or not was dependent on arriving at an arrangement satisfactory to all and acceptable to a bank to provide a loan for the bulk of the capital sum required.

Initially the group were informed of the possibility of arranging the financial side through Syndicate Credits, an organisation which sponsored the setting up of machinery syndicates in Hampshire and which had taken root in a number of other counties. It was felt, however, that if satisfactory arrangements could be obtained with a bank direct that there would be no advantage in obtaining credit through Syndicate Credits.

The bank manager who had dealt with all three group accounts was approached and he offered to meet the group to explain the sort of guarantees that would be required before they could offer the credit needed. The conditions indicated seemed acceptable to the group and with assistance from the Project Officers a set of rules and conditions were drawn up which are set out in Appendix IV.

These rules embodied a number of principles which all members wished to be included. Note was taken of the rules applying to some other machinery syndicates, but essentially the final provisions incorporated were drawn up with little reference to these other sources.

The capital liability was divided into fourteen shares which were then distributed between members on the basis of the likely use to be made of the equipment in the future. Each member had to pay a deposit based on his share quota and the balance of the capital and interest had to be repaid over a period of three years.

Operating expenses were to be covered by a fixed hourly charge for each item of equipment, and this was to be supplemented by reduced charges when members wished to hire all or part of the equipment for

purposes other than silage making. Any deficit was to be made good on a share basis and any surplus would be used to reduce the capital liability.

To obtain the details necessary to record each members use of the equipment for silage making, a simplified log sheet was drawn up (see Appendix V).

It was felt that each group member should have some specific responsibility and this was included in the rules.

In order to ensure the continuance of the group during the period in which the capital sum was to be repaid a clause was included binding each member to his obligations over this period.

Although it is too soon to adequately assess the long term prospects of this group it appears to have worked very smoothly in all respects.

Initially they considered purchasing new equipment rather than taking over the existing equipment, but after examining the matter carefully they decided to retain the equipment originally provided.

This group has demonstrated more than any of the others that the idea of group co-operation is both feasible and sound, and given a suitable membership with a desire to make the thing work, technical and adminstrative problems can be satisfactorily resolved.

It also seems to indicate that for the type of equipment being used, that a group comprising four members is the ideal size. Fewer members, unless large farmers, would not justify the capital expense, whereas a larger group would tend to complicate the working organisation.

A New Group

In 1961, an additional experimental group was set up in the Project area centred in the parish of Trusham. As most of the farms were relatively small it was felt that at least six farms would be necessary to justify it. To allow for possible refusals nine farmers in all were approached and all accepted. It is unlikely that a group of this size could continue independently in the future, but there is every prospect of a viable group continuing.

* * * * * * *

CONCLUSIONS

The schemes outlined above were sponsored and had their origins in a Project which was set up in the Teign Valley for quite different ends. This scheme was undertaken as a small part of a much wider programme and was throughout treated as an experiment and not as a pioneering crusade.

Due to its origins it would perhaps be inappropriate to draw too many conclusions as to the more general application of such co-operative enterprise. However, machinery co-operation has been practised elsewhere for a number of years and many farmers are interested in the possibilities it holds out. Thus the lessons learnt and the conclusions to be drawn from this experiment may have some validity to the general nature of the problems posed.

Judged from a variety of criteria the experiment would appear to have been a success; Not perhaps if viewed primarily from the standpoint of the numbers of participants who continued once the experiment ended, but this was not intended to be the most important yardstick. What it did do was to help to assess the relative factors for and against such co-operation, thus enabling a more objective appraisal to be made of the theoretical advantages that machinery co-operation provides.

Although almost half the farmers participating decided to withdraw at the end of the experiment, none did so because they were disappointed with the aspect of co-operation. Whereas the majority of the farmers had initial doubts as to the practical application of this form of co-operation, almost all were convinced at the end that it was a practical proposition.

One other indication of the success of the venture was the general attitude of the local farming community. At first this was undoubtedly sceptical but during the season there was a noticeable change of attitude. A number of individuals enquired to ask why they had not been approached, or could they join. Still others went to have a look at the group working and although in conversation they said little, they were obviously giving the matter some thought. The general reaction appeared to change from a completely negative one of 'its a good idea, but it won't work,' to the more personal note of 'have I missed something.' Whether a fundamental change of attitude took place is doubtful but the seeds of interest were sown.

An interesting reflection was the attitude of the traditional farming element in each group. They tended to see the opportunities provided only in relation to their current farming practice. The majority of the members represented either the younger and more progressive farming element, or people who had come into farming from some other occupation. These tended to see the opportunities provided in terms of what changes it made possible. As most of the work done was what had previously been planned had the groups not been formed, one significant aspect, namely the influence they could have in modifying farming systems, will have to wait for the future.

One important conclusion is that it is not only necessary for a group to co-operate in the actual work, but it is also equally important for them to co-operate in planning their future requirements. Essentially what this means in practice is that if the equipment is to be of maximum benefit to all members of a group a certain amount of prior organisation is necessary before work commences. Which fields to cut? When will they be ready? What sort of treatment do they require? These and other questions have to be resolved long before work commences in order to ensure both a steady flow of work and the satisfaction of each members requirements.

A rather disappointing conclusion is that there seems to be little scope for the farmer working single-handed to benefit from this sort of co-operation. Conversely the larger farmer employing labour does undoubtedly benefit. Part of the answer is that the scale of operations on the small farm does not require speed but cheapness. In contrast, on the larger farms the work would normally be done with modern equipment, and as such with co-operative ownership there is a considerable saving.

This is only one small aspect and it would be untrue to assume that it was axiomatic that no small farmers can benefit. What is true, however, is that the larger farmers do have a relative advantage.

The implications of this are rather disturbing for in fact if one were planning a group on the basis of efficiency and maximum benefit, a small group of large farmers would always be a more logical unit than a larger group of small farmers. This is rather unfortunate for it is the small farmer who should have the comparative advantage if he is to compete at all with his larger competitors.

A tentative conclusion that can be drawn is that the individual composition of a group determines the likelihood of its successful operation more than any other single factor. From this it follows that every member must be satisfied that each other member is prepared and

capable of fulfilling his obligations.

From this experiment it would appear that there are many other items of equipment that could lend themselves to co-operative use far more simply than those used for silage making. Many farmers already own equipment which is used very infrequently and this could be included into a group's resources without the necessity of large capital outlay. It is also possible that with large items of equipment which can be used throughout the year e.g. ditch making machines, bull-dozers, etc., a number of groups could amalgamate for its use. The ultimate logical pattern would be a whole series of co-operative groups, with individuals being members of maybe three or four separate groups for different purposes.

The experiment has served a dual purpose insofar as it has been concerned with both silage making and co-operation.

As regards silage making it is difficult to assess the effect it has had. There would appear to be a general trend towards silage as an alternative to hay, as a means of conserving grass. Whether the groups have accentuated this significantly will only be reflected in the future. It is almost certain that any effects will be positive but it is doubtful whether they will be very profound.

Although silage making is a practice which has increased in popularity very considerably with the introduction of the forage harvester, it is far from being generally accepted in the Teign Valley. A good part of this can be put down to traditional conservatism, but it would be unwise to assume that such attitudes are of necessity unsound. In many cases a change from hay to silage would be either a retrogressive step or would not provide any worthwhile benefit.

One characteristic of the small dairy farm in the Teign Valley is that relative to the larger farms they tend to be more difficult to work. The land is often very steep, access tends to be poor and farm layouts rarely lend themselves to take full advantage of modern techniques.

Often what is required is substantial capital investment on roads and buildings, but even with the grants available this is rarely a sound proposition even if the capital could be found. To introduce silage on many such farms is unlikely to provide any tangible gain, and will almost certainly add to the workload which is often already excessive.

If one adds to these factors a measure of skill required to produce

good quality silage and the fact that the percentage of waste increases the smaller the quantity made, there are often sound logical reasons for deciding against its introduction.

On the larger farms (over 75 acres) the circumstances usually point the other way. There are still probably some cases in which a change to silage would be disadvantageous but they are a minority.

In many cases there is a sufficiency of relatively flat land on which a forage harvester can be used effectively. The quantities of silage that can be made enable it to be produced at a low cost per ton and with little waste. If any capital investment is required it is usually a sound economic proposition. Furthermore, silage making would lead to a more even utilisation of labour resources and would eliminate such of the risk involved in making large quantities of hay.

If these premises are valid; and being predominantly empirical, it is reasonable to assume they are, then it would appear that both from the purely technical side of making silage as such, and also from the organisational side of co-operation in the making of it, the larger farm is likely to derive most benefit.

This reasoning does not apply to the same extent to other kinds of co-operation and there are likely to be some forms of co-operation that favour the smaller farm. Perhaps foremost in this latter category is the idea of a machinery pool. Most small farms almost invariably have recourse to rely on primitive and worn out equipment. This frequently necessitates the use of contractors to do routine jobs such as ploughing and cultivating. Although this is an expensive method of getting the work done it is almost unavoidable, for the alternative would be for each small farmer to invest in a lot of equipment which could not be economically justified even if it could be afforded.

A certain amount of borrowing does take place, and neighbours do help one another but at best this is a system which depends on a degree of good will and mutual convenience which is rarely found.

The conclusion to be drawn from this would appear to be that if one aims to help the small farmer, co-operation in the form adopted for the three silage groups is largely unsuitable to cater for their needs. However, co-operation in other less complex forms could be very beneficial to them.

It is often assumed that the formation of machinery syndicates involves borrowing money by the participants and sometimes this is

unavoidable, but in many cases there is less logical validity in borrowing to purchase equipment collectively than for an individual to buy the equipment outright. Similarly there is no reason why existing equipment cannot be accommodated into a group scheme, providing all the participants are agreeable.

Although it would be convenient if a specimen procedure could be applicable to all groups, it would appear that no single procedure will cover all the likely issues that can arise when machinery co-operation is contemplated. If such a procedure could in fact be devised it is almost certain to be restrictive. Difficulties arise from a variety of sources. The type of equipment; the size of farms; the number in the group, are some of the aspects that can only be adequately dealt with if the procedure adopted is directly related to the specific circumstances.

It is also likely that priorities will vary from group to group. For some the most crucial aspect will be the distribution of the financial liability while for others the problem of ensuring equitable use will be most important. Certain types of equipment require stringent maintenance and overhaul while others do not. The keynote would appear to be flexibility in the methods chosen to run such groups providing that adequate provision is made for covering all likely contingencies.

It is far too soon to draw any more specific conclusions from this experiment in co-operation. As an exercise it provided the empirical knowledge necessary for further progress in this field, and it has shown that it can work quite successfully. This is an encouraging conclusion which would probably be endorsed by almost all the members who participated and in the final analysis it is their views which are of most significance.

* * * * * * *

APPENDIX I

NUFFIELD FARM PROJECT

Rules for the _____ Group

Machinery Syndicate for Silage Making During 1960

1. The acceptance of participation in the first year does not commit any individual to participate in future years, nor does this participation commit the Nuffield Farm Project to assist or encourage the continuation of financial or organisational help in the future.

2. All disputes shall be settled by arbitration, the Project Officers working on the Nuffield Farm Project acting as arbitrators. In all disputes their findings will be binding on all participants.

3. The syndicate will be responsible for an annual charge of 10% of the total cost of the equipment provided; this sum to be paid to the Nuffield Foundation. If any additional equipment is required for special work 10% of the cost will be paid only by those using it. This charge will also be on an acreage basis if used by more than one farmer.

4. The cost to each individual should be based on the acreage of silage to be cut, e.g. total acreage ÷ total cost = cost per acre x farm acreage.

5. In addition to the above charge a reserve fund will be created for insurance, repairs, servicing and inspection. This will also be charged on an acreage basis, 3% of total cost to be paid by syndicate members prior to commencing operating the equipment provided. If this charge is inadequate to cover the costs that arise the Nuffield Farm Project should be responsible for the balance.

6. A rota should be drawn up for the use of labour and equipment. Each farm should have the use of the equipment for one day in turn, unless there is general agreement to the contrary.

7. As far as possible the rota should be based on the anticipated state of the grass to be cut. If this is not practicable then a rota

should be agreed either in alphabetical order, or on a farm circuit basis.

8. For each man/tractor days work provided by syndicate members on his farm each farmer must guarantee to provide an equivalent amount of labour and tractor time on a neighbours farm.

9. Any additional manual labour provided should be paid for by the farmer receiving it at a fixed price - suggested 4s.0d. per hour plus a charge per tractor hour if he is unable to provide an equivalent amount of labour in return.

10. One person to be responsible for storage and arranging for servicing and repairs to be undertaken.

11. If a tractor is supplied as part of the equipment, tractor fuel and oil is to be provided by the member on whose farm the equipment is being used; the tractor to leave each farm with full fuel tank. If this is not possible the cost of the fuel to be paid to the member supplying it.

12. All the equipment provided must be taken to a suitable place of storage each day after use, and the farmer whose grass has been harvested that day is responsible for ensuring that the equipment is in a satisfactory state to commence operations on the following day.

13. In the case of mechanical damage the firm responsible for maintenance must be notified as soon as possible, either direct by the member responsible, or by this person to one designated as responsible for this function.

14. If due to mechanical damage or weather conditions operations are postponed, the rota originally drawn up will be deferred by the period of the postponement.

15. If the actual acreage undertaken by any member is less than the estimate originally submitted he will still be responsible for the original charges incurred. This applies to the total acreage submitted for grass silage only.

16. If any member wishes to increase his acreage over the original estimate he will have to wait until all work has been completed on acreages submitted by other members. This may be amended in the case of a member who can complete part, or all, of the extra acreage

on a day when the equipment is on his farm, or if the equipment is not otherwise in use during the required period.

17. For the above, or when the equipment is used by any member for work other than that originally laid down, that member will be responsible for any damage that may occur when this work is being undertaken, which is not covered by the insurance agreement.

18. In addition to this a charge per day will be paid for all such work. The first call on this extra money will be to meet any maintenance costs additional to the initial acreage charge. If there is any residue this will be divided on a pro-rata basis at the end of the season.

19. These charges will be based on the equipment used; a separate charge being made for each item of equipment. The rate to be agreed by a majority of syndicate members and a list of permissible jobs to be drawn up.

20. A log book will be provided and full details will be entered daily by those using the equipment.

21. The syndicate will elect two members, one to act as secretary and one as treasurer. There will be no payment for these services but all costs arising from this work will be paid out of the repair fund. The secretary to be the person responsible for storage and servicing arrangements.

22. The equipment to be used only by members, or their employees, on members land.

23. The syndicate shall have authority to increase its membership after it has been set up providing there is unamimous agreement by all syndicate members. Only farmers with holdings in the Project area being eligible applicants.

24. A separate bank account to be opened for all financial transactions relating to the syndicate.

25. All members or employees who use the equipment must be covered by personal accident insurance.

26. At the end of the season - on a date to be fixed - a meeting should be called of all syndicate members together with

representatives of the Nuffield Farm Project to review the future of the syndicate.

I shall require the use of the equipment for work on the following acreage:-

(a) Grass silage making during May and June .....acres

(b) Grass silage making during the remainder of 1960.....acres

(c) Other anticipated work during the remainder of 1960. State type of work and acreage.

.....Type .....acres

Acreages under (c) will be charged under Clause 18 with Clause 5 applying, e.g. will not be included in initial acreage estimate.

I agree to become a member of the ..... syndicate and accept the above rules without reservation.

Date ..... Signed .....

* * * * * * *

APPENDIX II

RECORD SHEET ..... SYNDICATE. DATE.....1960

(Important; A separate sheet should be made out each day and/or on each farm if more than one farm is done in one day.)

Name of Farm .....

TRACTOR/FORAGE HARVESTER UNIT

Operator's Name .....
Time Commenced ..... Time Finished .....
Approx. number of acres cut .....
Remarks .....

Signed .....

TRACTOR/TRAILER UNIT I

Operator's Name .....
Time Commenced ..... Time Finished .....
Number of Loads ..... Full/Threequarters/Half
(delete those not applicable)

Remarks .....

Signed .....

TRACTOR/TRAILER UNIT II

Operator's Name .....
Time Commenced .....
Number of Loads ..... Full/Threequarters/Half
(delete those not applicable)

Remarks .....

Signed .....

TRACTOR/BUCKRAKE UNIT

Operator's Name .....
Time Commenced ..... Time Finished .....

Remarks .....

Signed .....

If tractor(s) provided by person(s) not working on farm this day, give particulars:-

Name of tractor owner ..... Operator .....

Name of tractor owner ..... Operator .....

* * * * * * *

APPENDIX III

SILAGE SYNDICATES EQUIPMENT HIRE

The following are the suggested charges for the hire by Syndicate members of the equipment. They are not final and each group can revise them if a majority so wish. The charges have been designed to encourage the full use of the equipment at a reasonable cost. The minimum time unit for hire should be one day. Charges are either for daily or weekly hire, the latter showing a considerable saving over the equivalent charges at a daily rate.

Charges

Item	Daily £	s	d	Weekly (7 full days) £	s	d
Tractor	1	10	0	6	0	0
Forage Harvester	1	5	0	5	0	0
Trailer		7	6	1	10	0

Bookings should be made in advance to the Secretary. All requests should be dealt with in consecutive order. Notice should be given of cancellation, unless due to weather conditions. Cancellations should not be allowed to alter the list of bookings.

Payment for hire should be made as soon as convenient after the equipment has been returned.

The revenue from hiring will be used to reduce the silage acreage cost to each member.

Tractor fuel to be provided by the hirer, or purchased from another member. Lubricating oils to be made available by the Syndicate at no cost to the hirer.

All equipment must be collected from and returned to a place of storage made known by the Secretary when hiring takes place.

It is the responsibility of the hirer to see that the equipment is in a satisfactory condition to operate when returned, or else to have informed the Secretary of the reasons why it is not.

Work Permitted

The nature of the work to be undertaken should be made known to the Secretary when booking equipment. In order to maintain the equipment in a clean state and not to subject it to the likelihood of unnecessary damage the Secretary will have discretion to refuse a booking. If there is some doubt the Secretary should refer to the Project for guidance.

Trailers should not be used to transport either dung or rocks, nor any other material which might soil the interior or scratch the paintwork unduly.

The load carried by trailer should not exceed three tons at any one time.

The use of all equipment should be limited to work required by the farmer and under no circumstances should be used for contract work.

Please inform your Secretary of your views about the above so that he will know whether to call a meeting to discuss the question of charges and conditions of hire. In the case of general acceptance without discussion, the above conditions will be taken to apply.

* * * * * * *

APPENDIX IV

BRIDFORD MACHINERY SYNDICATE

We the undersigned hereby accept without reservation the following conditions and rules to apply to the purchase and use of the following equipment:-

1 B.275 International Tractor
2 Week's Tipping Trailers
1 40" In-line Lundell Forage Harvester with swivel-head

purchased from the Nuffield Foundation at a total cost of £1,050.

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1. The name of the Syndicate shall be the BRIDFORD MACHINERY SYNDICATE.

2. Membership of the Syndicate implies acceptance of a contractual agreement for a period of three years, during which period the total balance of the initial liability must be repaid together with interest at the ruling rate on the annual balance outstanding.

3. (a) The outstanding capital liability to the lender, Barclay's Bank, Exeter, shall be divided into fourteen (14) equal shares distributed as follows:-

M. C. Athorpe	5 shares
M. Bishop	4 "
G. Hearnden	3 "
F. Brimblecombe	2 "

(b) Each member shall pay a deposit of £10 per share as a prior requirement to obtaining the credit facilities for the balance.

(c) The capital sum borrowed, plus interest thereon, shall be repaid over a period of three years commencing as from April 18th, 1961. The minimum amount to be paid annually to be equal to one-third of the total capital liability, plus interest due on the total balance outstanding during the year in question.

4. The total remaining Syndicate liability to Barclay's Bank, Exeter, shall be covered at all times that such liability exists on the share basis of 3(a) above.

5. Credit facilities for any additional equipment purchased shall, with the lenders consent, require a downpayment of 10% of cost; the balance to be paid off in a period not exceeding three years from the date of the loan being granted, and subject to the same conditions as apply above.

6. The stipulated annual repayment shall be collected and paid to the Bank in two half yearly amounts, the total for each year to be at least equal to the sum required under 3 (c) above.

7. Responsibility for the Syndicate organisation shall be distributed as follows:-

M. C. Athorpe	-	Chairman
M. Bishop	-	Work Organiser
G. Hearndon	-	Secretary and Treasurer
F. Brimblecombe	-	Machinery maintenance

With the exception of Mr. Brimblecombe who shall receive a payment of 4s.0d. per hour for all work done to the equipment, no member shall receive any payment for his services, but shall be reimbursed for any expenses that may be incurred while performing them.

8. Charges for the use of Syndicate equipment (or members own labour and equipment) in addition to the capital repayment and interest charges, shall be required from the member on whose farm the equipment is being used. These shall be fixed as follows:-

(i) Per man 4s. 0d. an hour
(ii) Per tractor 6s. 0d. an hour
(iii) Per harvester and trailers 3s. 0d. an hour

9. Each member may individually hire one or more items of the Syndicate's equipment at the following charges:-

(i) Tractor - 7s.6d. per day plus 6d. per hour registered on tractor clock
(ii) Forage Harvester - 4s. 0d. per day plus replacement of broken flails
(iii) Trailers - 2s. 6d. per day.

10. Revenue due to the Syndicate from 8 and 9 above to be paid into Bank and to be used to cover insurance, repair and maintenance costs. If the sum thus realised is inadequate to meet all such costs, the balance shall be obtained from members on the basis of

their share commitment. If the sum realised is in excess of such costs, any residue will be used to reduce the capital liability.

11. In the first year each member shall make a contribution of 10s. 0d. per share to the Treasurer before the commencement of work, to provide a fund to cover any expenses that might be incurred prior to work commencing.

12. The Syndicate equipment may only be hired to non-members with the consent of all members; charges for such hire to be agreed in advance.

13. Once the Syndicate has been set up new members can only be added to the existing group with the unanimous consent of all members.

14. Any member wishing to leave the Syndicate within the first three years will not receive back any portion of the contributions made by him. Similarly he will still be bound to honour any outstanding commitments to the Syndicate, unless a new member acceptable to the remaining members can be found.

15. If the Syndicate shall disband before the expiration of the three year contract, the equipment shall be sold on the open market, unless one or more members wish to purchase the equipment at a price agreed by all members, and at least equal to the balance outstanding at that time.

    If sold on the open market, should the price received exceed the balance of debt outstanding, the excess money shall be distributed amongst the members in proportion to their share commitment.

    If the price received is less than the balance of debt outstanding, the difference shall be paid by members in proportion to their share commitment.

16. If the Syndicate shall wish to disband after the expiration of the three year contract, the equipment shall be sold on the open market, unless one or more members wish to purchase the equipment at a price agreed by all members.

    The total amount thus realised shall then be distributed amongst the members in proportion to their share commitment.

17. No purchase of machinery shall be made by or on behalf of the Syndicate, except with the approval of all those members who wish to accept financial responsibility for it, as to the price and terms of purchase.

18. In the event of death of a member, his estate shall remain bound to honour his obligations to the Syndicate, unless the Syndicate unanimously agrees to accept his liability or to arrange for a new member to take it over.

19. Whilst the loan is outstanding none of the machinery may be sold without the prior consent of the lender, and on the sale of any machinery any outstanding loans, in respect of the machinery in question, shall become immediately repayable.

Signed	Address	Shares	Date
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

* * * * * * *

APPENDIX V

BRIDFORD MACHINERY SYNDICATE

Farm ..... Date .....

Important - When employed labour is used enter employers name and not the name of person doing the work.

Syndicate Tractor

Operator	Time Commenced	Time Finished
.....	.....	.....

Other Tractors

Tractor Owner	Tractor Operator	Time Commenced	Time Finished
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Labour only provided

Provided by	Time Commenced	Time Finished
.....	.....	.....
.....	.....	.....
.....	.....	.....