

Operation Of Hay Conditioners On 91 New York Farms 1957

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INTRODUCTION

High quality roughage is recognized as the cheapest source of nutrients for dairy cows. Research has shown that early harvesting is essential for top quality hay. In experiments conducted at Cornell University, hay cut in early June produced one-fourth more milk per acre than that cut in early July.^{1/} The problem is one of how to get hay cured early in June.

Many new machines and methods have been introduced to speed hay-making, eliminate the chance of weather damage, and produce high quality roughage. All such machines require the investment of considerable sums of money and a farmer is faced with the problem of deciding which piece or pieces of equipment is best suited to his farm. One such piece of equipment is the hay conditioner. The principle of conditioning is not a new one. Recently, however, more satisfactory and less expensive conditioners have been developed.

Purpose of Study

In an effort to answer some of the questions that dairymen have been asking about conditioners, and to provide information that would be useful to the many farmers who are currently in the process of deciding on whether or not to purchase a conditioner, a study was conducted during the early Fall of 1957 with the objective of answering the following questions:

1. How much does it cost to purchase and operate a
hay conditioner?
2. What are some of the advantages and disadvantages
of hay conditioners based on farmers' experiences?
3. Under what circumstances is a hay conditioner a
feasible investment?

Method of Study

In May 1957, a letter was sent to county agricultural agents requesting the names of farmers in their county whom they knew to have hay conditioners. All but three agents replied. From these, a list of farmers who had conditioners was compiled. It was recognized that this list did not contain the names of all farmers who operated conditioners in the State, so no attempt was made to select a random sample. Furthermore, travel time and the wide scattering of farmers with these machines seemed

^{1/} Trimberger, et al., Effects of Curing Methods and Stage of Maturity Upon Feeding Value of Roughages. Part I, Cornell Bulletin P910.

to make the random selection procedure impractical. Instead, counties with relatively large numbers of conditioners, distributed throughout the major dairy areas, were selected for study. The areas visited and the number of records obtained in each county are indicated in figure 1.

The county agents assisted the enumerators in locating the farmers. Some additional names of owners of conditioners were obtained from farmers visited. During September 1957, information on costs and experiences with hay conditioners was obtained from 91 New York farmers in 14 counties by the personal interview method. Farmers with the major makes and kinds of conditioners (crushers, crimpers, and combination mower and crusher) were visited. The large number of farmers visited and the wide geographic distribution of the farms provides a reasonable degree of randomness.

The 1957 haying season was dryer than usual. In general, throughout the State drying conditions were excellent. These excellent conditions may have helped speed up hay-making and caused farmers to use conditioners less than ordinarily might have been the case.

Business Organization of Farms With Hay Conditioners

The farms included in this study were larger than the average of dairy farms in New York. The farms surveyed had an average of 60 cows and 191 crop acres. This is roughly double the number of cows on typical New York dairy farms ^{2/}, and about three times the average number reported in the 1954 Census.

TABLE 1. SIZE OF BUSINESS
91 Farms With Hay Conditioners, New York, 1957

	Average	Range
Number of cows	60	14 to 220
Productive man work units	1,063	342 to 3,904
Man equivalent	3.2	1.0 to 10.7
Lbs. 3.7% milk sold	591,400	136,000 to 2,000,000
Crop acres	191	53 to 793

Man equivalent averaged 3.2 compared to 2.0 on the typical New York dairy farm. Although cow numbers were double, labor force was only 50 per cent more. Over half of the farms visited kept between 30 and 70 cows.

^{2/} Bratton, C. A., New York Dairy Farm Business Summaries for 1956, A.E. 1068, July 1957.

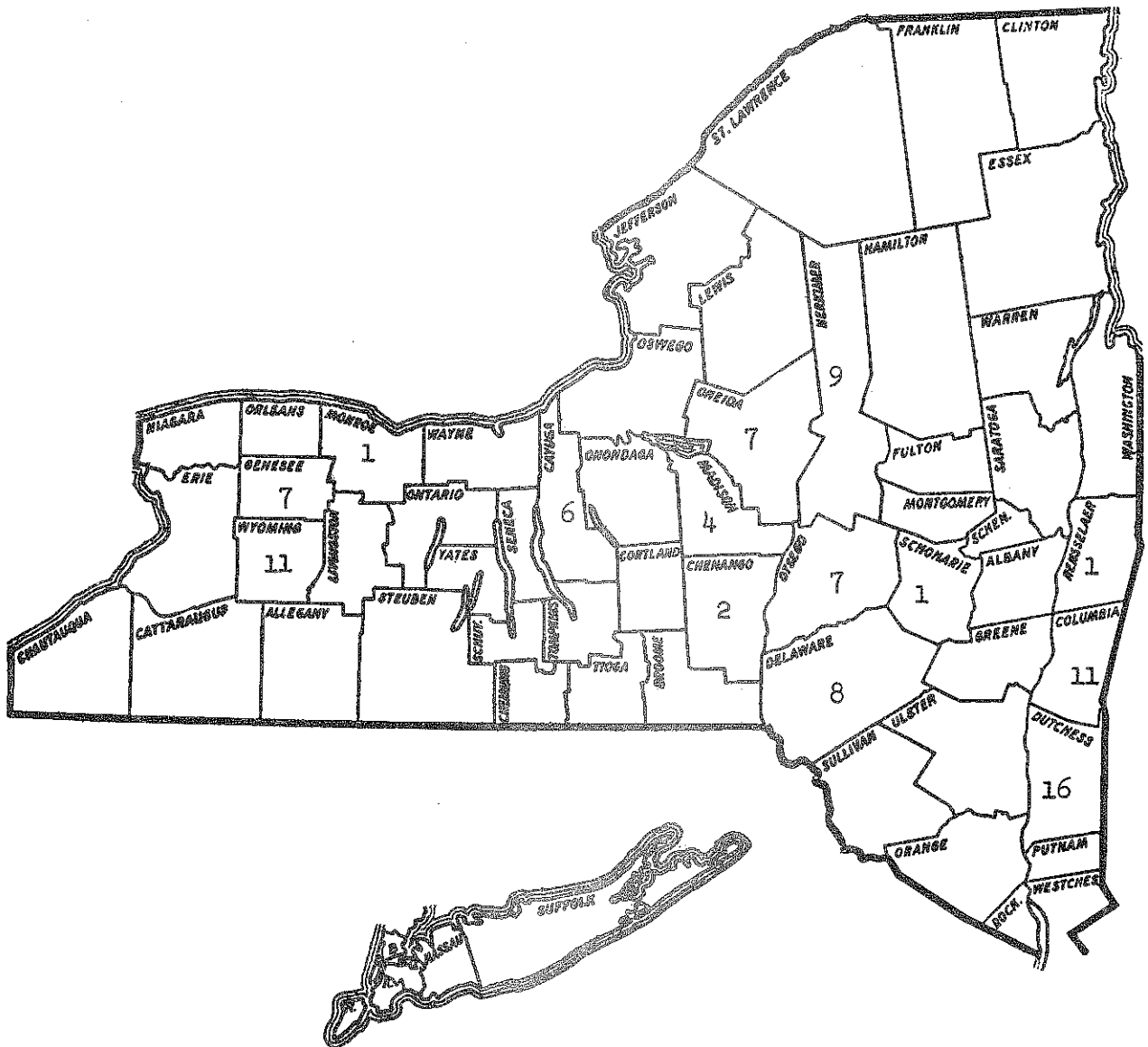


Figure 1. Location of Farms Visited Which Operated Hay Conditioners in 1957.

TABLE 2. DISTRIBUTION OF FARMS BY NUMBERS OF COWS
91 Farms With Hay Conditioners, New York, 1957

Number of cows	Number of farms
Less 20	2
20 - 29	11
30 - 39	9
40 - 49	20
50 - 59	10
60 - 69	10
70 - 79	9
80 - 89	6
90 and over	14

As might be expected on intensive dairy farm businesses, roughage production was of major importance. A large proportion of the cropland was devoted to the production of forage crops. The average farm had 93 acres of first cutting hay, 21 acres of corn silage, and 8 acres of grass silage. This means that roughly 70 per cent of the cropland on the average was in roughage crops.

TABLE 3. ACRES OF FORAGE CROPS
91 Farms With Hay Conditioners, New York, 1957

	Average	Range
Acres of hay (1st cut)	93	32 to 300
Acres of corn silage	21	0 to 80
Acres of grass silage	8	0 to 85
% of cropland in forage crops	70	10 to 100

General Description of Conditioners

The principle of conditioning is to crush or crimp the stems of the forage in order to speed up drying and to make leaves and stems dry at approximately the same time.

Three major types and several different makes of hay conditioners are generally available to farmers -- the crusher and the crimper which are used in a separate operation from mowing, and the single operation combination crusher with mower. All are power take-off operated.

The crusher picks up hay in the swath and runs it between two smooth steel rolls. In the process, the stems are cracked lengthwise.

The crimper, in general, consists of two corrugated rolls under spring pressure. The hay is picked up from the swath and passes through the interlocking rolls where the stem is kinked at about three or four inch intervals, i.e., the crimper breaks the stems across the fiber.

The combination mower and crusher combines mowing and conditioning into one operation. The hay is mowed and the swath previously cut is conditioned. The conditioning process is the same as the crusher described above.

Further references to crusher, crimper, or combination will refer to the machines as described above.

COST OF OWNING AND OPERATING HAY CONDITIONERS

In deciding on whether or not to purchase a hay conditioner, a farmer needs to consider not only the original cost of the machine but also the cost of operation. The actual experience of farmers can provide general information on these two items. This information can serve as a guide to other farmers when they are confronted with this management decision.

Original Cost of Hay Conditioners

Seventy-one of the 91 farmers visited purchased new hay conditioners in 1956 or 1957. The other 20 were purchased over the previous ten years. In this section, the original cost of only the 71 purchased in 1956 and 1957 are considered.

The prices farmers paid for new hay conditioners in 1956 or 1957 varied widely ranging from \$670 to \$1,350 per conditioner. This price depended on the type of conditioner purchased (crusher, crimper, or combination) and the "deal" the individual farmer was able to make.

TABLE 4. COST OF HAY CONDITIONERS PURCHASED IN 1956 AND 1957
71 New York Farms

Type	Number of conditioners	Average cost	Range in cost
Crimper	53	\$ 773	\$700 to 930
Crusher	11	768	670 to 825
Combination mower and crusher	7	1,130	950 to 1,350

Farmers who purchased crushers and crimpers paid between \$670 and \$930. However, over half spent between \$750 and \$800 for their conditioner. Those who purchased the combination mower and crusher paid between \$950 and \$1,350. The average was \$768 for crushers, \$773 for crimpers, and \$1,130 for the combination mower and crusher. The combination mower and crushers were higher priced since they consisted of both a conditioner and a mower.

Years of Life

The average life expectancy of the conditioner as estimated by the 91 farmers was 10 years with 56 per cent estimating their conditioners would last exactly 10 years and 70 per cent estimating between 8 and 12 years.

The data on life expectancy was analyzed with the thought in mind that farmers estimates of years of life were related to either the length of time they had had the machine or the amount of use made of the conditioner or both. Neither of these proved to be true. It is likely, however, that farmers are influenced in estimating how long a machine will last by income tax depreciation and by awareness that machines often become obsolete before they either "wear out" or "rust out".

Acres of Use

The amount of use that farmers made of their conditioners varied widely. The farmers visited conditioned an average of 115 acres of hay in 1957. This total includes first, second, and third cuttings combined. In other words, on the average, these farmers conditioned about 85 acres of first cutting, 25 acres of second cutting, and 5 acres of third cutting. The acreage conditioned ranged from 21 to 285 acres. Sixty per cent conditioned between 50 and 150 acres of hay.

TABLE 5. DISTRIBUTION OF ACRES OF USE FOR THE SEASON
 91 Hay Conditioners, New York, 1957

Acres of use	Number of farms	Per cent of total
less 50	12	13
50 - 99	37	41
100 - 149	17	19
150 - 199	14	15
200 and over	11	12

The majority of farmers conditioned both first and second cuttings. However, 15 conditioned only the first crop.

Per Cent of Hay Crop Conditioned

Forty-eight per cent of the farmers reported that they condition all of their hay crop (first, second, and third cuttings). Only about 10 per cent conditioned less than half of their crop. The overall average was about 75 per cent of the acreage conditioned.

Many of the farmers who conditioned less than 50 per cent of their crop had large acreages of hay (100 or more) and also large acreages of second cutting. With large acreages, time and manpower frequently were not available for conditioning. Second cutting often was light and farmers did not think it justified conditioning.

Costs of Operation for Hay Conditioners

The total cost of owning and operating the 91 hay conditioners during the 1957 haying season varied widely depending on the repairs required, the total investment, and the farmers estimate of the years of life.

The average annual cost of owning and operating crimpers and crushers (machine cost only) in 1957 was \$131 per conditioner. Two-thirds of them had costs between \$100 and \$175. This included depreciation, interest, and repairs, but did not include the cost of insurance, housing, or cost of tractor or man to operate the conditioner.

Since more was invested and two machines involved, the cost to operate a combination mower and crusher was slightly higher. On the average, it cost these farmers \$188 to operate.

TABLE 6. AVERAGE OPERATING COST PER HAY CONDITIONER*
91 Hay Conditioners, New York, 1957

Items of cost	<u>71 Crushers and Crimpers</u>		<u>20 Combination mower-crushers</u>	
	Average cost	Per cent of total	Average cost	Per cent of total
Depreciation	\$ 84	64	\$133	70
Interest	37	28	42	23
Repairs	<u>10</u>	<u>8</u>	<u>13</u>	<u>7</u>
TOTAL	\$131	100	\$188	100

*Does not include insurance, housing, or cost of tractor and man to operate conditioner.

Over ninety per cent of the total operating costs were made up of the fixed costs of depreciation and interest. The only variable cost included here was repairs. Total operating costs for individual conditioners varied from \$53 to \$309.

Depreciation - The most important component of the operating costs was depreciation. The straight line method was used in figuring depreciation. It ranged from \$20 to \$229 per conditioner varying with the expected years of life and the original cost of the conditioner. Depreciation on the average accounted for about 70 per cent of the annual operating expenses.

Interest - A charge was made for the use of capital invested in the hay conditioner based on the current depreciated value of each conditioner. Interest was charged at an annual rate of six per cent assuming that most farmers would have to pay a similar rate if they had to borrow money to buy a conditioner. Interest charges ranged from \$8 to \$46. The average

interest charge on all conditioners was \$38 and was the second largest item of fixed cost on most farms.

Repairs - Less than half of the farmers reported any repairs to their conditioners in 1957. In several cases, the dealer or the manufacturer provided some repairs, modifications, or modernizations. The repair costs incurred by farmers on an annual basis ranged from \$1 to \$126. Annual repairs reported averaged \$10 for crushers and crimpers and \$13 for the combinations.

The nature of the repairs varied widely. On the crimpers, breakage of bearings on one make and some trouble with the rollers on another make seemed to be the major difficulty. The most frequently repaired item on the crushers was the pickup. The combination crusher and mower had a variety of repairs varying from a few teeth on the pickup to a new shaft through the rollers. However, most of the combinations were older machines and had been in use much longer than the other types of conditioners.

In actual fact, relatively few conditioners were repaired. Some troubles that did happen were relatively expensive to fix. However, the average yearly repair cost for all conditioners was only \$11.

Most of the machines were new which may account for the low repair cost. Repairs may be expected to increase as conditioners get older.

Other - Two other items are actually part of the annual cost of operating a conditioner -- housing and insurance. Most farmers carried some kind of insurance on their equipment. Because of the difficulty of determining how much should be allotted to the conditioner, this item was not included in the operating cost calculated here. Likewise, it is difficult to determine total machinery housing costs and to allocate them to individual machines such as a conditioner.

The amount of lubricant and the time spent lubricating the conditioners was so small that it was omitted from the cost items.

Operating Cost Per Acre

Two methods used to figure the per unit cost of operating a conditioner are cost per acre, and cost per ton. The cost of conditioning an acre of hay depends on both the total number of acres conditioned and the total operating costs. Conditioning costs per ton depend on the total tons conditioned and the total operating costs. When fixed costs such as depreciation and interest are spread over a large acreage or tonnage conditioned, the costs are relatively small on a per unit basis.

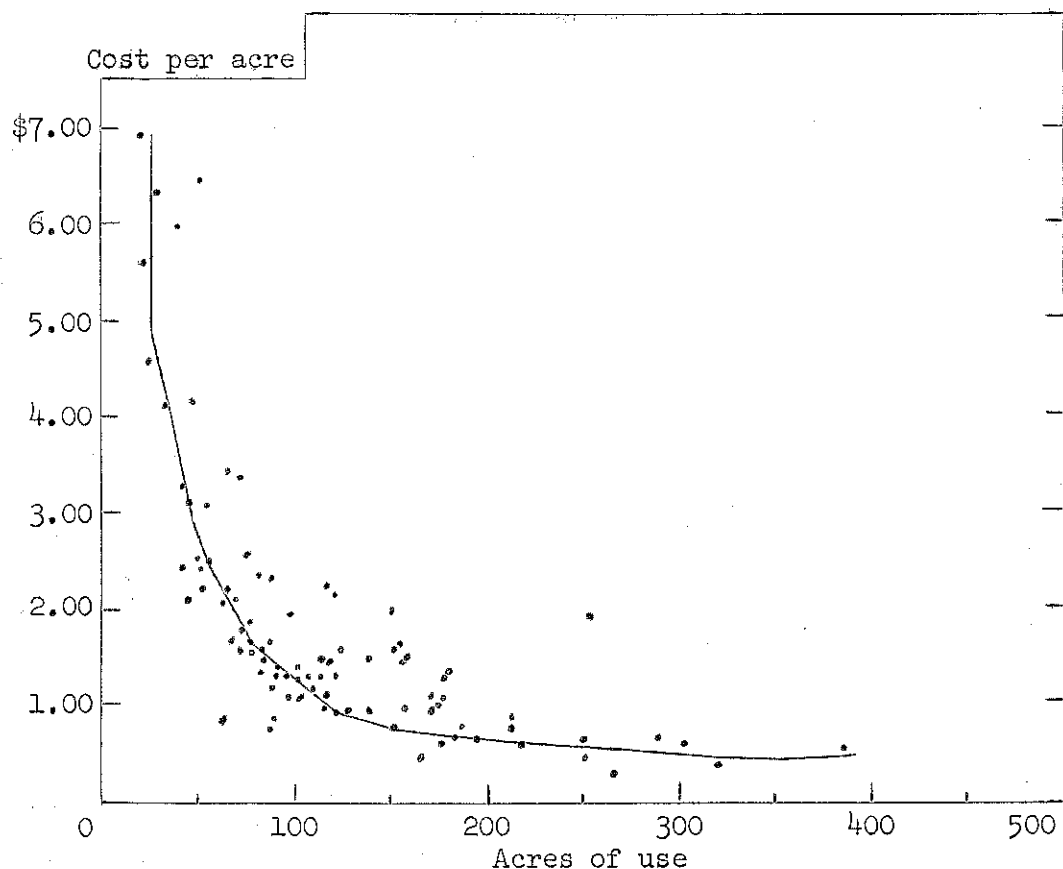
The weighted average cost per acre for the conditioner alone was about \$1.30 computed by dividing the total operating cost on all farms by the total acreage conditioned. The range was from \$.31 to \$6.90 per acre conditioned. However, the simple average of operating costs on individual conditioners was \$1.80. Since operating costs on an acre basis varied from \$.31 to \$6.90, the simple average is biased upward. The cost per acre of operating some conditioners was high because they were not fully used.

The operating cost per acre was plotted for each farm to indicate the relationship between the number of acres conditioned and the cost per acre (figure 2). Although all the conditioners were not alike in original cost and operating costs, the chart serves to show how operating costs per acre for individual conditioners varied in relation to the number of acres conditioned.

In general, as the number of acres of hay conditioned increased, the cost per acre decreased. Cost per acre declined rapidly to \$1.25 per acre and then decreased more slowly.

All the farmers who conditioned 150 or more acres of hay had operating costs of less than \$2.00 per acre. Those who conditioned between 50 and 150 acres had costs ranging from \$.50 to \$3.50 per acre. Among the farmers who conditioned between 25 and 50 acres, only one had costs below \$2.00 per acre while the majority had costs exceeding \$4.00 per acre.

FIGURE 2. ACRES OF USE AND COST PER ACRE TO CONDITION HAY
91 Hay Conditioners, New York, 1957



Conditioning Cost Per Ton

Based on the data obtained from farmers on cost of operating their conditioners and estimates of the cost of tractor and man labor, a farmer with a 30-cow dairy who makes about 85 tons of hay can expect it to cost him about \$1.50 per ton to condition his hay. A farmer with a 60-cow dairy putting up about 175 tons of hay can expect a cost of \$1.00 a ton to condition his hay. This includes not only the machine cost but also the cost of the extra tractor and extra man involved.

TABLE 7. ESTIMATED COST PER ACRE AND PER TON OF CONDITIONING HAY

Items of cost	30-cow Dairy (87 tons of hay)*	60-cow Dairy (175 tons of hay)**
Conditioner cost per acre	\$2.50	\$1.30
Tractor cost per acre***	.60	.60
Labor cost per acre***	.50	.50
COST PER ACRE	\$3.60	\$2.40
Tons of hay per acre	2.5	2.5
COST PER TON	\$1.44	\$.96

*Assuming 35 acres first cutting, 20 acres second cutting or total of 55 acres conditioned.

**Assuming 70 acres first cutting, 40 acres second cutting or total of 110 acres conditioned.

***Assuming conditioning rate of 2 acres per hour, tractor cost of \$1.20 per hour, and wage rate of \$1.00 per hour.

OPERATIONAL CONSIDERATIONS

In the interviews, the farmers were asked specific questions about how they operated their conditioners, and their opinions concerning questions which are frequently raised in relation to conditioning hay. It is recognized these are the opinions of the individual farmers based on their experience which in some instances was limited to only one year's operation. The information thus obtained is reported here in the hope that it may be of help to farmers who are considering the purchase of a conditioner.

Size of Tractor Used to Pull Conditioner

The power required to pull any piece of farm machinery varies with many factors. The topography, the operation involved, and the type of machine all contribute to the power requirements. Farmers who operated hay conditioners were asked what size tractor they used to pull their conditioner. The tractors used varied from 1- to 4-plow size. In general, 2- or 3-plow tractors were used.

TABLE 8. SIZE OF TRACTOR USED TO PULL CONDITIONER
 91 Hay Conditioners, New York, 1957

Size of Tractor	Crimpers	Crushers	Combinations
1-plow	3	0	0
2-plow	36	10	8
3-plow	13	9	12

Several farmers indicated that they could use almost any tractor or could use either a 2- or 3-plow tractor. It was impossible to determine whether a certain size tractor was essential or whether it was used since it was the one available. In general, however, farmers who pulled conditioners used mostly 2- or 3-plow tractors. The most frequent comment made was that any tractor ordinarily found on the farm could pull the conditioner. Topography is undoubtedly important in determining the size of tractor for the job.

With the combination mower and conditioner, a larger percentage of farmers used 3-plow tractors. This seems logical since two operations (mowing and conditioning) are performed simultaneously. The pros and cons of one versus two operations, size of tractors, and the manpower involved will be discussed later in this report.

Speed of Mowing and Conditioning

Most of the farmers interviewed reported mowing between 1.5 and 3 acres per hour. All farmers operating crimpers indicated that they could condition as fast or faster than they could mow. Farmers operating crushers in general indicated the same thing, though several said they could not condition as fast as they could mow.

One question frequently asked by farmers is, "Does mowing and conditioning at the same time require one to mow more slowly?" Farmers with mower-crusher combinations were equally divided on this question. Half indicated that one operation mowing and conditioning required them to mow more slowly. The other half indicated that they could mow just as quickly with a conditioner and mower combination as with a mowing machine alone. The difference of opinion is no doubt related to the size of tractor used, the topography, type of hay, yield of hay per acre, and other conditions in the field.

Time and Speed of Conditioning

Most of the farmers who conditioned in a separate operation reported that it was essential to condition immediately after mowing. Many indicated that it was essential to follow no more than two or three swaths behind the mower, although several indicated that no problems were encountered by conditioning an hour or so after mowing. This view of conditioning as soon as possible is backed up by research results from several experiment stations.

There was no general agreement among the 91 farmers on the speed of conditioning. Some indicated the faster the better. Others said that the important thing was to have a steady volume of hay going through the conditioner so as to keep the rollers or crimpers full of hay.

Time Saved by Using Hay Conditioner

The farmers interviewed were in general agreement that use of the conditioner speeded curing time. Ninety per cent indicated that they saved at least a day. The reported time saved ranged from four hours to several days.

The majority of farmers also indicated that the time saved varied with early cut, late cut, and second cut hay. Sixty-three said that there was less advantage with late cut hay than early cut hay, while sixteen said that the amount of time saved and the advantage of conditioning held whenever the hay was cut. The rest indicated that they had had no experience with cutting hay at different times.

The general feeling was that about half as much time was saved with late cut hay (after July 1st) as with early cut hay. In other words, farmers indicated that if they saved one day in June, that the saving was reduced to half a day in July. The comment most frequently made was "It's not worth the time on late cut hay". It seems reasonable that with the usually better haying weather in July and more mature hay the conditioner would be less effective later in the season. This may have been particularly true with the good curing weather in 1957.

Farmers were equally split on the value of conditioning second cutting hay. This difference of opinion was likely related to the weather at the time of harvesting, how late in summer second cut was harvested, and how heavy the second crop was. On some farms, second cut is relatively light. However, 84 per cent of the farmers reported they conditioned some second cutting.

Effect of Rain on Conditioned Hay

Questions commonly asked by dairymen are: What effect does rain have on conditioned hay? Is it lower in value than hay that is not conditioned and is rained on? Does conditioned hay that is rained on dry slower or faster than rained-on non-conditioned hay? In an attempt to answer these questions, farmers were asked to indicate their experience with conditioned hay that had been rained on.

Seventy-two of the 91 farmers reported that they had had conditioned hay rained on. Their opinions on the effect of rained-on conditioned hay varied. (Table 9.)

TABLE 9. FARMERS' EXPERIENCE WITH RAIN ON CONDITIONED HAY
72 Farmers With Hay Conditioners, New York, 1957

Effect reported	Number of farmers reporting
No different than unconditioned hay	19
Dries faster than unconditioned hay	22
Advantages of conditioned hay still there	17
Takes no longer to dry	4
Takes longer to dry	3
Leaches more, discolors more, worth less than unconditioned hay	16
No comment	4

Eighty per cent of the farmers said that conditioned hay that is rained on is at least no worse than regular hay that gets wet. About 20 per cent indicated that rained on conditioned hay leaches and discolors more, and takes longer to dry, and is worth less than rained-on unconditioned hay.

Since rain damage is usually dependent on the extent to which hay is already cured, this difference of opinion may be partly explained by the stage at which hay was rained on.

Based on these farmers' experiences, if conditioned hay does take up more water, it apparently also loses it again just as fast when the rain is over.

Type of Hay and Effectiveness of the Conditioner

The conditioners were used on many different types of hay ranging from almost straight alfalfa to all grass hay. The types of mixtures reported by farmers are shown below:

TABLE 10. FARMERS' REPORTS ON TYPES OF HAY CONDITIONED
91 Farmers With Hay Conditioners, New York, 1957

Type of hay	Number of farmers reporting
Grass hay	22
Alfalfa-timothy	53
Alfalfa-broome	26
Legume-grass	13
Mixed hay	25
Alfalfa	13
Trefoil-grass	8
Oat hay	2
Sudan hay	1
Mammoth clover	1

Farmers were asked whether the conditioner did a more effective job on a particular type of hay. Of those who had conditioned several kinds of hay, almost 60 per cent indicated that the conditioner had done a more effective job on a particular type of hay (table 11). Farmers' experiences indicate that conditioning was most effective on legume and coarse heavy hay. Only a few farmers indicated that benefits were as great from conditioning grass mixtures.

TABLE 11. EFFECTIVENESS OF CONDITIONER ON DIFFERENT TYPES OF HAY
56 Farmers With Hay Conditioners, New York, 1957

Conditioner most effective on:	Number of farmers reporting
Alfalfa	24
Legume mixtures	18
Clover	5
Coarse, weedy, heavy hay	6
Other	3

Time of Harvesting Hay

Weatherwise, 1957 was a good hay year with excellent curing conditions in June and July.

Eighty-three per cent of the farmers with conditioners reported that they started haying in 1957 before the middle of June. One-fourth started June first or before. About a third started haying the second week in June.

Seventy-two completed harvesting the first cutting before the middle of July. Thirteen per cent were done before June 30.

Another rough guide as to how quickly haying was accomplished is to figure the length of the haying season in days (excluding Sundays) and divide by the acres of first cutting harvested. The haying season averaged 25 days on all farms visited and ranged from 8 to 49 days. Sixty per cent of the farmers spent between 15 and 30 days to harvest their hay crop. As a whole, the group harvested just a little less than four acres per day. Sixty-four per cent harvested one to four acres a day.

No information was available as to how quickly farmers without conditioners were able to harvest their hay. Perhaps in 1957, the difference would not have shown up because of the good curing weather. Nevertheless, the dates of haying and length of time to harvest the crop do indicate that even with the conditioner many farmers are still harvesting their hay crop past the stage of maximum feeding value.

Method of Harvesting Hay

Almost all farmers in the survey baled their hay. Two chopped all their hay and two put up the majority of their hay loose with a little hay baled by a custom machine operator.

About half of the farmers field-cured all their hay. The other half used varying proportions of field-curing, mow-drying, and heat-drying. Seven farmers used a forced-air mow drier to cure all their hay. Another seven used heat driers for part of their hay crop.

Custom Work With Conditioner

Fourteen of the farmers interviewed indicated that they did work off the farm with their hay conditioners. In many cases, this amounted to exchange work or a loan to the neighbor to "try it out", rather than custom work for pay. The amount of work off the farm with the conditioner for these 14 farmers ranged from 6 to 120 acres.

The Conditioner and The Grass Silage Operation

Only one farmer indicated that he used his conditioner in his grass silage operation. He indicated that he used it to "wilt it a bit". Thirty-one per cent of the farmers in this survey did not put up grass silage at all.

Farmers Opinions of Hay Conditioners

All but one of the farmers were enthusiastic about their hay conditioners. Comments ranged from "the machine for farmers to have", "would not consider haying without a conditioner", to "one is a fool if he doesn't have one". Only one farmer felt that it was not absolutely necessary to have a conditioner and thought that "it was not worth the money".

Advantages - Farmers were asked what advantages, if any, there was to having a hay conditioner. The most frequently mentioned advantage in owning a conditioner was that it speeds curing time (table 12). The next three most common reasons were that it made better quality hay, saved leaves, and that the cows ate more hay and wasted less. Almost without exception, therefore, farmers indicated that their conditioners allowed them to speed curing time and harvest better quality hay.

TABLE 12. ADVANTAGES OF HAY CONDITIONERS AS REPORTED BY FARMERS
91 Farmers With Conditioners, New York, 1957

Advantage reported	Number of farmers reporting
Speeds curing time	89
Makes better quality hay	40
Saves leaves	27
Cows eat more hay, waste less	15
Increases palatability of hay	8
Can start haying earlier	7
Shortens haying season	5
Reduces weather hazard	3

Disadvantages - Farmers also were asked to indicate any disadvantages they had found with the hay conditioner. The most commonly mentioned disadvantages are listed below (table 13). About one-half with separate operation crushers and crimpers listed the additional operation as a disadvantage. A frequent comment was that it tied up an extra man and tractor. Several mentioned that under their set up, the extra operation conflicted with other things such as cultivating corn.

TABLE 13. DISADVANTAGES OF HAY CONDITIONERS AS REPORTED BY FARMERS
91 Farmers With Conditioners, New York, 1957

Disadvantages reported	Number of farmers reporting
Additional operation involved	41
Slows haying operation	10
Operational problems	9
Requires skilled operator	9
Extra investment and extra cost	6
Takes a bigger tractor	3
None	27

On the other side, several farmers felt that the extra operation was discounted by the fact that hay rarely got wet and no tedding or turning of hay was necessary. Many farmers also felt that the extra operation involved was no disadvantage since they had sufficient labor on their farm (usually the family) and the extra tractor was available.

Some farmers said that the use of the conditioner slowed the haying operation. In general, these farmers had very large acreages of first and second cutting hay.

About one-third of the farmers said they had encountered no disadvantages.

Operational Problems - Half of the farmers said they had no operational problems in the use of their conditioners. The most frequently occurring operating difficulties encountered by farmers are listed below (table 14).

TABLE 14. OPERATIONAL PROBLEMS WITH HAY CONDITIONERS
AS REPORTED BY FARMERS
91 Farmers With Conditioners, New York, 1957

Problem	Number of farmers reporting
Mechanical trouble and adjustment	16
Winding and wrapping in rolls	10
Stones	6
Woodchuck holes	5
Operational skill	5
None	46

Stones getting in the rolls and woodchuck holes seemed to cause some farmers problems. The majority of operational problems, however, seemed to be mechanical and adjustment.

Ten farmers reported winding and wrapping of hay around the rolls. One indicated that this problem required him to go slower.

Mechanical problems were varied. Several farmers indicated that the machine was not built heavy enough. One had hookup problems with the power take-off. With the crusher, pickup trouble was also indicated. Adjustments to prevent winding, wrapping, and overcrushing were also indicated as problems.

SOME CONSIDERATIONS IN DECIDING ON THE PURCHASE OF A HAY CONDITIONER

A farmer contemplating the purchase of a hay conditioner is faced with the problem of deciding whether this piece of equipment is the right one for his farm.

Can I Justify A Conditioner?

Based on this study and the principles of good farm management, a farmer should consider the following questions before purchasing a hay conditioner:

1. Do I have sufficient acreage to justify owning a conditioner?
Farmers in this study who conditioned less than 50 acres had high conditioning costs per acre and per ton.
2. Do I have the man and tractor power needed to operate a conditioner?
One of the most frequently listed disadvantages of the conditioner (those where mowing and conditioning were separate operations) was that an extra man and extra tractor were required. Whether this is a disadvantage depends on the individual farmer's power and labor situation.
3. Could the money required for a conditioner be used more wisely elsewhere in my farm business? The purchase of a conditioner requires an additional investment of between \$800 and \$1,200. A farmer must weigh the benefits of owning the conditioner against the benefits from investing his money in other machinery, more cows, or in other areas of his farm business.
4. Will the improved quality of hay justify the cost of conditioning?
In deciding on whether to invest in a hay conditioner, the costs must be compared with the increased value of hay. Research indicates that early harvest is essential for top quality hay. Cornell studies showed that hay cut early in June produced one-fourth more milk than hay cut in early July. Considering the cost of operating the conditioner, and the extra labor and tractor power involved, a farmer can expect a cost of \$1.00 to \$1.50 per ton to condition his hay.

If the use of a conditioner allows a farmer to harvest early cut, good quality hay where he otherwise would be unable to do so, the additional benefits will likely be greater than the additional cost of \$1.00 to \$1.50 per ton for conditioning.

The saving of one day in field curing time may make the difference between good hay and just ordinary hay. However, many farmers with conditioners are still harvesting their hay crop past the stage of maximum feeding value.

Mower-Crusher Combination versus Separate Operation Conditioners

Several considerations are involved in deciding on whether to purchase a combination mower and crusher or a separate operation type conditioner. A major disadvantage of conditioning hay in a separate operation may be the extra labor and tractor power required.

On the other hand, the combination mower and crusher may require a larger tractor for most satisfactory operation. Also, the combination requires a larger investment. In general, the difference in cost between the combination mower and crusher and the separate operation type conditioner is approximately the cost of the mowing machine. If a farmer already has a good mowing machine and it is not adaptable to the type of conditioner he contemplates purchasing, the investment in a combination mower and conditioner may be excessive. On the other hand, if a farmer is at the point where he has to buy a new mower anyway, the purchase of a combination mower-crusher may be the wisest move if labor and tractor power are available.

Crimper versus Crusher

Only a few of the farmers visited had owned two types of conditioners. Therefore, no information was available on farmer experiences with different types of conditioners. Research results from several experiment stations indicate that crushed hay tends to dry a little quicker than the crimped hay. However, more research is needed on this subject.