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4-H Spring Small Grain production and Marketing Club Manual : Extension Circular 1-11-2

L. F. Sheffield

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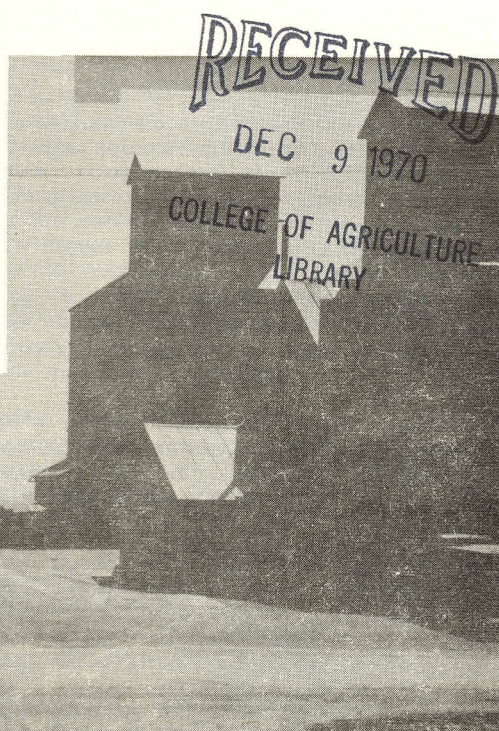
1955

EC 1-11-2

4-H Spring Small Grain

PRODUCTION AND MARKETING

CLUB MANUAL



EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE
AND U. S. DEPARTMENT OF AGRICULTURE
COOPERATING
W. V. LAMBERT, DIRECTOR

4-H Spring Small Grain Production And Marketing

L. F. Sheffield

Explanation Of The Project

Club members enrolled in a 4-H Spring Small Grain Project may choose either oats, barley, or spring wheat for their crop project. Each member should take into consideration the adaptation and market demand of the crop along with local conditions before deciding which crop he wishes to grow. His father, club leader, or the County Agricultural Agent will be glad to discuss with him the advantages and disadvantages in growing and marketing each of the three spring small grain crops in his area. His decision will also be guided by the final use for the crop, that is, whether it will be fed to animals on the home farm, marketed locally through an elevator or certified and sold as certified seed.

Work Out Crop Production Agreement

Another important decision is the size of the project. This may vary from one club member to another, depending upon the size of the farm and other individual conditions. Each club member should work out an agreement with his parents specifying just how big the project will be, where it will be located on the farm, and how the project is to be handled from seed bed preparation to the final disposal of the crop. He should work out arrangements for the machinery and power he will need to carry on the project. On page 8 you will find a tabulation of machinery, labor, and power costs. He will also need to make arrangements about paying for the use of machinery, the land, crop insurance, etc. If these arrangements are made at the beginning of the project, there will be no doubt later on about how the project is to be handled.

Select Variety and Seed Source

The next step is the selection of the variety and the purchase of certified seed or good commercial seed for the project. Further information about the selection of variety, sources and prices of seed, seed bed preparation, tillage, harvesting, and marketing will be taken up at club meetings throughout the year.

Carrying On The 4-H Small Grain Club Work

It is presumed that the club has been organized early enough in the year to permit club members to discuss each phase of the project at a club meeting before the job is to be done. Club members will get more out of the club program by looking ahead. It is better not to make a mistake rather than to try and correct a mistake after it has been made. Planning ahead and talking about the jobs and activities the club members expect to do should not only help to insure better results for each club member but also to make the whole club program more interesting to the club leader, the club members, the parents of club members and to other people of the community.

The club, as a group, may want to plan some special activities in connection with the club program. Activities should be planned long enough in advance to permit everything to be in readiness so that everyone interested can take part. "Last minute" planning usually is too late to accomplish a good job.

As the seasons progress, there will be other things of importance to consider. The element of time is important. The most successful farmers always plan considerably ahead of the jobs they have to do on the farm. This is a good practice for all club members to follow regardless of whether or not all of them intend to become farmers.

If the club has been organized a little late, it may be necessary to hold two meetings a month in order to properly plan for the things that will need to be done before the crop is planted. Later, probably one meeting a month will be enough to discuss the things necessary to properly care for the club projects.

In addition to the club meetings, each club member will need to find out for himself some things about the job undertaken. Club members will want to talk things over with their parents, their club leaders, and successful neighbor farmers. They may want to call on the County Agricultural Agent for some information. Perhaps they will want to get some circulars from him that will give them more information than was given in the club manual on a particular subject.

Some Suggested Activities

Group Activities, in which the entire club takes part and in which some or all of the parents might also be interested, can be worked into the club program in a manner to build interest and enthusiasm. One of the requirements for satisfactory completion of the Spring Small Grain Project is to tour one of the facilities connected with grain marketing. This should be planned well in advance in order to get the most benefit from the tour. Usually those in charge of such facilities will welcome visits by 4-H Clubs, but they also would appreciate some advance notice and planning.

Some crops judging and demonstration work is also required of each member. Numerous grain judging contests are held in county, regional, and state fairs as well as state-wide grain shows.

Club members will have opportunities to exhibit samples of their grain at county, regional, and state fairs and other grain shows. The club member should take pride in his grain and enter an exhibit at one or more of the fairs and grain shows during the year.

The following suggested activities are offered. The club may think of others to add to the list.

A. Tours

1. Grain fields nearing maturity, observe plant characteristics, estimate yields and check the results.
2. Local elevator.
3. Terminal elevator and facilities.
4. Terminal grain market and grain exchange.
5. Grain processing plant (feed and flour mills, breakfast food plant, seed processing plant, etc).

6. Local bakery.
7. Federal inspection of grain on railroad cars.

B. Demonstrations

1. Cleaning seed.
2. Treating seed.
3. Reading and explaining a Certified Seed Tag.
4. Benefits of the State Seed Law.
5. Comparing different fertilizers.
6. How to grade grain.
7. Preventing weevil and insect damage of stored grain.
8. Keeping grain free from rodent contamination.
9. Grain moisture content as it affects grain storage.
10. The importance of proper ventilation in grain storage.
11. Field demonstration to show the benefits of planting cleaned and treated seed as compared to uncleaned and untreated seed.

C. Individual Activities and Studies

1. Trace a carload of grain shipped from a local elevator.
2. How grain is financed as it is moved through market channels. (Particularly locally).
3. Uses of futures market.
4. Purpose and operation of terminal grain markets--cash and futures.
5. Make a report on grain marketing in radio interview or talk.
6. Chart market price trends of members crop project for the period of the club project.
7. Take part in seed grading and variety identification schools and contests.

D. Group Activities

1. Show and see slides, slide films, and movies on grain production and marketing.
2. Give a panel discussion, play or other presentation which stress grain marketing.
3. Prepare a report on participation by the club and its members in marketing the grain from 4-H projects.

4. Invite representatives from different types of grain marketing enterprises to talk at meetings of the 4-H Club.
5. Have someone from a farmers cooperative grain marketing organization tell the club about how the cooperatives market the farmers grain.

IMPORTANCE OF SPRING SMALL GRAINS

Oats, barley and spring wheat are the only spring small grain crops of any importance in Nebraska. Of these crops more acres are seeded to oats than barley, the less acres are used for spring wheat than for barley. This has been the situation for many years. Oats are grown rather generally throughout the state. Barley has come to be fairly restricted to central and western counties because of the susceptibility of the crop to damage by chinch bugs. Spring wheat is limited largely to the northwest, having been replaced in most other parts of the state by the better yielding winter varieties.

Oats and barley are usually less profitable than other grains as a cash crop but they do have special value as feed for livestock. They are also valuable to use as rotation crops in bringing about the change from corn or sorghum crops to winter wheat. It is also customary to use them as "nurse" or companion crops for new seedlings of alfalfa, red clover, or sweet clover which almost universally are sown in the spring.

Because of the importance of spring small grains in the agricultural production of Nebraska, 4-H Club members can well afford to grow one or more of these crops as a project. In this manner they can learn by experience many of the practices that should later help them to become more successful farmers. There are several objectives to keep in mind when producing, storing, and marketing these crops, if the club member is to "learn by doing" the many practices that have proved successful.

What Might Be Expected In Yields

In an eleven-year experimental test at Lincoln involving oats, barley, and spring wheat grown in a series of usual crop rotations, the following per acre yields were obtained: Oats, 42.1 bushels; barley, 18.4 bushels; and spring wheat, 11.4 bushels. Since the per bushel weights of these grains differ, the pounds of hull-free grain produced per acre by these crops in this same series of experimental tests were: Oats, 943 pounds; barley, 751 pounds; and spring wheat, 684 pounds.

Experimental testing done by the University of Nebraska at North Platte has shown that barley yielded more than oats at North Platte by 32 per cent, and at Alliance by 43 per cent. This is on the basis of hull-free grain. The variety plots at North Platte and Lincoln have usually been planted on land previously planted to corn. Those at Alliance are grown on summer fallowed land.

These are the results obtained by growing the crops without irrigation. Under irrigation at experiment stations in other parts of the state, considerably higher yields are obtained, but the comparative ranking remains practically the same as those indicated above. Throughout the many years these crops have been grown in Nebraska they have shown large annual and farm-to-farm

fluctuations in yields. These fluctuations have resulted from variations in weather, diseases, insects, cultural practices, soil fertility, and differences in varieties planted.

According to official estimates of the State-Federal division of Agricultural Statistics, during the twelve-year period of 1939 to 1950 inclusive, average per acre yields for the entire state were: Oats, 26.1 bushels and barley, 18.4 bushels.

No report on the state yield for spring wheat is available since this crop is grown in a rather limited area of the state. For the area where grown, it averages about 14 bushels per acre.

Quality Of Seed

Regardless of the crop you select for your spring small grain project it is important to use only seed of the best quality. For this reason, the club member is advised to use certified seed when planting his project. This is the surest way of knowing that one is getting the best possible seed. Certified seed is true to variety and is free from noxious and other objectionable weed seeds. Often non-certified seed will contain a high percentage of weed seeds. Some of them may be noxious weeds, which, once introduced on the farm, may become a serious weed pest because they are so difficult to eradicate.

Certified seed can be purchased direct from a certified seed grower or from a local seed dealer who handles certified seed. If the 4-H Club member uses certified seed for his project, he should be sure to save the official certification tag and attach it to his project record book. He will also need it if he is to apply for certification of his crop.

The development of a new crop variety, and how selected farmers may take a limited amount of the new variety that is released by the plant breeders and grow it to increase the amount of seed for distribution to other farmers, will be an interesting topic for the club to discuss at one of its meetings. The club may need to call on the county agricultural agent or some local grower of certified seed for additional information on this subject.

Since certified seed is usually cleaned before it is sold, there usually is no need for recleaning seed which already meets certification specifications. The certified seed may or may not have been treated with a disinfectant chemical. One of the recommended seed treatment chemicals should be used to treat the seed if this has not been done.

The results of several drillbox surveys in different counties show the need for cleaning and treating seed. A rather high percentage of farmers plant small grain seed that contains many weed seeds. The average of the surveys showed that farmers were planting 167 weed seeds of different kinds per pound of grain seed. In one case, a farmer was planting oats which contained 11,700 weed seeds per pound. Farmers cannot expect to obtain the best yields from grains contaminated with a high percentage of unwanted weed seeds. Club members can check the purity and germination of their seed by sending a sample to the State Seed Laboratory, State Capitol Building, Lincoln, Nebraska. There is a small charge made to cover the cost of analysis. (Ask your county extension agent for further information about seed testing.)

Spring Grain Diseases

Several different diseases affect the spring small grains. Considerable research work has been done in developing varieties of crops that show resistance to the most common diseases. Some otherwise promising varieties have not had sufficient disease resistance and have been discarded. Many of the recommended varieties are resistant to some of the most important diseases affecting the particular crop. However, in the case of certain diseases, no source of resistance or immunity has been located, therefore, these diseases must be controlled by means other than resistant varieties.

There are four primary means of controlling crop diseases: (1) Planting good, bright, disease free seed (preferably certified seed); (2) Treating the seed before planting with a good disinfectant; (3) Rotation of crops; and (4) Using varieties that have some resistance to the more serious diseases. The recommended varieties have shown favorable characteristics relative to disease resistance in most cases.

Some of the serious diseases of spring small grains are: Crown rust and Victoria blight of oats, scab of barley; the stem rusts; and covered and loose smuts of all three of the grain crops. Losses from crown and stem rust, and Victoria blight are best controlled by the use of resistant varieties and good cultural practices. Seed treatment is highly recommended for the control of both loose and covered smut of oats, scab of barley, and covered smut of barley and spring wheat. Stands of spring small grains often are improved by seed treatment since the chemical protects the seed and seedling from certain seed rot and seedling blight organisms. The organic mercury compounds such as Ceresan, Panogen and Agrox, have proved to be the most effective seed treatment chemicals. Care must be exercised in using these chemicals and the user should always follow the manufacturer's recommendations.

Selecting The Variety

Club members will want to decide early about the crop variety they will grow. This will enable them to make the necessary arrangements to get the seed and have it on hand so there will be no delay when the time comes to plant. It is advisable to plant recommended varieties that have proved most suitable for the particular cropping district. This information has been determined by variety tests at the Experiment Station, at agricultural sub-stations, on various farms by the Outstate Testing Project and by successful local farmers. For crop testing and varietal recommendation purposes the state has been divided into eight cropping districts.

Since spring small grain variety recommendations often change from year to year no attempt will be made to list recommended varieties for each district in this manual. To obtain the latest recommendations for any cropping district, ask your county extension agent for a copy of the most recent Outstate Testing Circular on "Nebraska Spring Small Grain Variety Tests". This publication is issued each fall and contains a listing of the recommended spring small grain varieties along with the results of varietal tests conducted that year in each cropping district.

Club members should keep in mind that any one variety will vary in performance from year to year. Average yields over a number of years are a better measure of value than are the results of a single year. However, the choice of a variety is an extremely important decision

since different varieties within the same crop often vary considerably. These variations are found in the ability to yield, drought resistance, strength of straw, and insect and disease resistance. In many cases the quality of the grain may also be affected by the variety and quality usually is an important factor in establishing the market price.

Local conditions such as soil type and the eventual use of the grain should be considered also when selecting the variety.

Planning The Rotation And Fertilizers

Two very important factors which are closely associated with the yield and quality of the crop are the rotation in which the crop is grown and the general fertility of the soil.

Crop rotations vary considerably depending upon the location in the state, the amount of rainfall received, and the type of soil.

The crop rotation used for a particular field determines to a large degree, the general tilth of the soil, the organic matter content, and the over-all fertility of the field. The rotation also has an important effect on soil and water conservation and the possibility of wind erosion.

Soil fertility has come to be of increasing importance since many good yields of crops have been harvested in recent years. In many cases the fertility level of the soil has decreased to the extent that the highest possible yields can no longer be obtained without the addition of needed plant food materials or fertilizers. The spring small grain crops respond to favorable soil fertility as do other crops. For example, oats in a nine-year period yielded 9.8 bushels more per acre when grown in the second year after sweet clover than when grown in the fifth year after sweet clover. Since most farmers grow the spring small grains at or near the end of a rotation cycle in order to again get the land ready for the growing of a soil-building crop, it will usually pay to use a supplementary commercial fertilizer to furnish the needed plant food materials.

In Central Nebraska barley responds well to nitrogen fertilizer alone, but makes a larger yield when phosphate fertilizer is added. An application of from 20 to 40 pounds of available nitrogen per acre materially increased the yields. When 30 pounds of available phosphate was added, there was an increase of 3 to 4 bushels more per acre.

Results of spring wheat experiments in Western Nebraska indicate a three-bushel increase when 20 pounds of nitrogen fertilizer per acre is applied. Larger amounts made no material difference.

At current prices, the application of nitrogen fertilizer to spring small grains is generally a profitable practice in Eastern Nebraska. For example, when oats are used as a nurse crop (for legumes), an application of from 20 to 30 pounds of available nitrogen per acre is recommended. In this situation it is also recommended that there be added about 40 to 80 pounds of available phosphate (P_2O_5) per acre. If oats are seeded alone, then the amount of available phosphate added can be reduced to 20 to 30 pounds per acre. The mixed fertilizer of straight phosphate fertilizer should be applied with a combination fertilizer -- grain drill at the time of planting. If such a drill is not available, the mixed fertilizer or phosphate

fertilizer should be disked in before seeding. If nitrogen alone is used, it may be applied as a top dressing after planting at any time before the crop is six inches tall.

Additional information can be obtained from the County Agricultural Agent, the club leader, neighborhood farmers who have had considerable experience with fertilizers or local fertilizer dealers.

Club members who are in doubt about the fertility needs of the lands they intend to use for their crop can send a representative soil sample to the Soil Testing Service, College of Agriculture, Lincoln, Nebraska, for testing. There is a small charge for this test. The sample should be sent in eight to ten weeks before the results are needed in order to allow time for completion of the laboratory work and preparation of the report. Club members interested in having their soil tested should ask their county agent for a soil sample carton, a soil test information sheet and instructions on how to take the soil sample.

Seed Bed Preparation And Planting Suggestions

Three methods of preparing the seed bed for small grains have been compared by experiment station work over a period of several years. In an eight-year test there was very little difference in yield per acre whether the cornstalk land to be planted to oats or barley was prepared by double-disking, plowing and disk, or plowing and harrowing. Double-disking yielded 29.0 bushels per acre as compared to 28.9 and 28.5 bushels per acre for the plowed land. For barley the yields were 21.4 bushels per acre for the double-disked land as compared to 20.3 bushels and 19.9 bushels per acre for the plowed land. Like experiments have not been made for spring wheat, although farmers usually follow the same seed bed preparation for all three of the spring small grains where they are grown. In the spring wheat area of the state more of the land for spring wheat is sub-tilled or plowed, disked and harrowed and often planted on winter wheat land where the winter wheat has killed out.

Whatever seed bed preparation is followed, it is well to prepare the land as early in the spring as possible. Weather conditions often cause delay but soil temperatures, moisture holding ability, run-off, killing new weed growth and soil conditioning are all affected by seed bed preparation. Time is required to do a good job. Good seed deserves every possible chance and thorough seed bed preparation will result in better yields of higher quality grains.

Manner Of Planting

In Nebraska, spring small grains are planted by either drilling or broadcasting. A considerable acreage of oats is seeded each year by broadcasting whereas very little barley is seeded in this manner. Spring wheat is seldom planted by broadcasting. Broadcasting is most common in northeastern Nebraska. Drilling is the most common practice in other parts of the state.

For oats it is customary to plant an extra half bushel of seed if it is broadcast and disked in, as compared to oats which is drilled. The extra half bushel of barley seed when planted broadcast does not seem to be necessary. Broadcasted seed is often imperfectly covered

and this results in poor emergence and reduced stands. Broadcasting on unprepared ground and then covering the seed by double-disking is not as good as drilling the seed on a prepared seed bed.

For oats, experiments have shown no difference in yield when planted by surface drilling in seven inch or fourteen inch rows. Surface and furrow-drilling in fourteen inch rows did not result in any material differences in yield.

The best depth of planting seems to be when the seeds are covered from 1 1/2 to 2 inches. This applies to all three of the spring grains. Soil moisture conditions and soil type will make some difference in depth of seeding and this should be taken into consideration.

Time of Planting

The yield and successful production of spring grains is closely related to the time of planting. This has been tested experimentally with oats over a period of 34 years at Lincoln. The highest yields were obtained in 28 of 34 years when planting was done by March 31. This is considered as early. In four of the years the highest yields were from a medium early date; which was April 10. In only two years were late plantings (April 20) the highest. Average yields for these three plantings were: Early, 47.4 bushels; medium early, 42.4 bushels; and late, 35.1 bushels per acre respectively. An average of a 19-year test shows that an extra early date (March 21) resulted in a yield of 49.7 bushels per acre.

Planting dates for spring small grains are earlier in Eastern Nebraska than Western Nebraska because of the difference in the growing season. It is best to follow local planting dates, remembering that in most years early seeding will result in higher yields.

Rate of Planting

A uniform stand is important for the best yields of the small grain crops. Recommended rates of planting for eastern Nebraska are 2 to 2 1/2 bushels of oats and barley and 1 1/2 bushels of spring wheat per acre.

These rates should be reduced gradually westward in the state to about one-half of these amounts on dry land in the far west. If grown as a nurse crop for sweet clover or red clover, only about three-fourths of the normal rate should be used. Experiments have shown there is little difference between yields for plantings of six to ten pecks of oats or barley per acre although one usually gets more than the extra seed back when planting up to about ten pecks per acre. More than ten pecks of barley or oats planted per acre yielded less than when ten pecks were planted.

Controlling Weeds

A good job of preparing the seed bed usually is of great help in keeping weeds from getting ahead of the grain crop. If the grain is planted shortly after the seed bed is prepared, there should not be much competition from weeds. Sometimes weather conditions are such that weeds do get a good start along with the grain crop and in that case they may compete with the planted crop for moisture and nutrients. If not controlled, weeds may reduce the crop yield considerably. Also green parts of weeds in the harvested grain crop affect the keeping quality of the grain when it is stored. Weed seeds, stems or leaves in the grain will lower the value of the crop on the market.

As a general rule machine tillage of small grain crops is not practical. Weeds in growing small grain crops can be controlled by the use of chemical weed killers. Broadleaved weeds can be killed or stunted by spraying with 2, 4-D at the proper time. In many cases, proper application of weed chemicals has saved crops that otherwise might have been lost. To avoid injury to the oat crop spraying should not be done before the boot stage. From this stage of growth until maturity it is safe to spray with 1/4 to 1/2 pound of 2, 4-D per acre in the ester form to 1/2 to one pound per acre of the amine form. Use the lower rates of chemical when good growing conditions exist and the higher rate when poor growing conditions prevail. The same treatments can be used on barley or spring wheat except that the spraying should be done before the boot stage, preferably between the fully-tillered and early boot stages.

If small grains are used as a nurse crop for sweet clover, red clover or other legumes, then a spray should not be used since 2, 4-D will kill the legumes.

Insect Pests Of The Growing Crops

Insect pests reduce the yield of crops, lower the quality, increase the cost of production and harvesting, and require cash outlays for materials and equipment to apply control measures. The amount of damage done by any one kind of insect differs from year to year and from one area to another. The most common insect pests of spring small grains in Nebraska include green bugs or aphids, chinch bugs, army worms, and grasshoppers. The club member is advised to make frequent observations of his growing crop to see whether or not damaging insects are present. If any are found, club members are advised to see their county agricultural agent about control measures.

Poisoned baits will control army worms and grasshoppers used in time. The control of chinch bugs by chemical sprays or dusts is possible but expensive. Few Nebraska farmers have considered these control measures to be practical. The most effective chemicals presently available for this purpose are dangerous to handle and only trained men should apply them. Spraying or dusting for green bug or chinch bug control is usually done with an airplane.

Greenbug damage to wheat and oats growing on land of high fertility is less than in fields of low fertility. Spring wheat, oats, and barley especially should be grown on fertile soil or in fields to which nitrogen has been applied.

Certifying Spring Small Grains

Crop seed certification in Nebraska is handled by the Nebraska Crop Improvement Association. Seed certification was officially authorized by the legislature in 1931 when the Certified Seed Law was passed. Under this law the Dean of the College of Agriculture at the University of Nebraska is chairman of a committee to administer the law. This committee has selected the Nebraska Crop Improvement Association to do the certification work of field crops throughout the state. The certification program assures farmers of a constant supply of pure seed of adapted varieties.

Under the seed certification plan, the original or foundation seed of new varieties is distributed only to a

few farmers who agree to produce seed under the rules and regulations provided by the seed certification program. These farmers usually are selected to increase the supply of the new seed before it is released for general distribution. It is necessary to keep the new seed free from contaminating crops to prevent mixtures. It must also be kept free of noxious as well as other objectionable weed seeds.

A person growing a crop for certification must send an application to the Nebraska Crop Improvement Association asking for field inspection of the crop before harvest. Samples of the harvested grain must also undergo rigid laboratory examination and germination tests before final approval is given. The association charges a fee for the certification service. The application must be sent to the Nebraska Crop Improvement Association by a stated time. The field inspection work is done by men trained in this type of work and the laboratory examinations and germination tests are also done by trained people. After inspections are completed, a list of growers whose fields and seed meet inspection requirements, is prepared and made available to prospective buyers. Final certification is not approved until all of the requirements have been met.

Those 4-H Club members who expect to complete certification of their crop must plant certified seed and meet other requirements specified by the Nebraska Crop Improvement Association. The Certified Seed Handbook, issued each year, outlines the certification requirements for each crop. Seed certification of crops corresponds to registration of pure-bred livestock.

Harvesting And Storing The Crop

Careful harvesting and good storage of the grain are essential to obtain the greatest value from the crop. Careful harvesting involves cutting the grain with a well adjusted machine (in most cases with a combine) at the right stage of maturity and moisture content. Grain harvested with a high moisture content means storage problems and consequent losses in grain condition and quality. Although grain containing thirteen per cent moisture normally is considered safe for storage, it is advisable to have the moisture content lower if possible. If grain contains more than thirteen per cent moisture when harvested, the grain should be run through a dryer to insure safe storage. The 4-H Club member can easily check the moisture content of his grain by taking a sample to the local elevator for a moisture test. This should be done with the first grain harvested.

Normally, oats will ripen in about 24 days after it has headed out. Barley and spring wheat take two or three days longer. This time may vary a number of days according to seasonal weather and soil conditions. When first ripe, the grain contains around thirty per cent moisture and this is the proper stage of maturity to harvest with a small grain binder or with a windrower. In either case, threshing with a stationary separator or a pick-up combine must be delayed until the crop is well cured and the kernel moisture is down to thirteen per cent or less, to insure safe storage.

Most farmers who harvest with a combine let the grain stand in the field until dry enough for direct combining. Recent developments in grain drying have made it possible for grain to be harvested at a higher moisture content. The grain can then be dried before or during storage, depending upon the type of equipment available. The added cost of drying is often repaid by lower field

and harvesting losses and improved storage condition of the grain.

Other good principles of storage include placing the grain in a good tight bin which has been well cleaned and sprayed with a residual insecticide two or three weeks before filling to control stored grain insects that may be present. Among the most effective insecticides for this purpose are DDT, Methoxychlor, Lindane and activated pyrethrum. Control of rats and mice around the farmstead is another important step in good grain storage. Club members are urged to undertake a year around rodent control program on their farms if such a program is not now in operation.

Stored grain should be checked periodically to make certain that it is not going out of condition. The best way to check stored grain is to take samples with a grain probe at several locations in the bin. This permits careful checking of the condition of grain as well as for the presence of stored grain insects at various levels in the bin.

Marketing Or Disposing Of The Crop

Grain crops are grown for use by the farmer on his own farm or for sale. Farmers usually sell the surplus grain they do not need for their own use as human food, livestock feed, and for seed. What they have to sell may go to a neighboring farmer, to a seed dealer, to a cereal or flour mill, or be sold on the open market through grain dealers and grain marketing organizations. The grower may sell all or part of his grain at the time of harvest, or may store the grain on his own farm or in a grain storage warehouse to be sold or fed later as he chooses.

Very few farmers now process in their own homes, any of the grain they produce. If they do so, the amount is very small. Much of the oats and barley which farmers produce is used to feed to their livestock and furnish seed for the next crop. The amount used for livestock feed by an individual farmer depends upon the type and number of livestock he maintains on his farm. Most of the grain sold by farmers is marketed through country grain elevators. This is referred to as selling on the open market.

Many people take for granted the grain marketing system which has been developed in the United States. It is the finest and most efficient grain marketing system in the world. It provides the maximum of service for a minimum cost and in an efficient manner. Local grain dealers can give 4-H Club members additional information about the grain marketing processes. A visit by the club to a local country elevator, a terminal elevator, a feed or flour mill or to a grain exchange should be of interest to the members and their parents.

The marketing of grain produced in the United States is a big, well organized business. The study of grain marketing is a subject that in itself would take considerable time and observation. It is too large a subject to discuss fully in a manual of this nature. For a more detailed study of the subject, 4-H Club members are referred to publications that are listed among the references at the end of the discussions in this manual.

When the producer delivers his grain to the local elevator he either sells it or places it in storage. He may ask the dealer to send it on to a terminal market for storage. The grain remains the property of the producer until he directs that it be sold. Over a period of years it will pay the producer to provide storage space equal to one year's normal crop production on the farm.

After grain is sold from the farm through the open market it may be bought and sold many times without actual delivery of the grain having taken place between all the buyers and sellers. This is possible because of the futures market provided in major grain markets to facilitate orderly marketing of grain throughout the year. Very careful records of the transactions are made and furnished to the parties concerned in the transactions. The last buyer, of course, will have the grain delivered to him for his use in manufacturing it into food, feed, or other products.

Grain Exchanges or Boards of Trade have been established in some of the larger cities of the producing states, especially where good rail and water transportation facilities are available. These exchanges are places where commission firms buy and sell grains consigned to them for a fixed charge per bushel. They are the business agents for those who have the grain for sale or those who may want to buy grain. At most grain exchanges there is a large room called the trading floor where the representatives of buyers and sellers get together at specified hours of the days when the market exchanges are open for business. They buy and sell the grain based on samples of the actual grain offered for sale which has been graded by Federally licensed inspectors. These inspectors sample and grade the grain from the car, ship, or other container in which the grain is shipped to market.

Some grain markets such as the Omaha Grain Exchange maintain facilities for cash-grain handling only, while others such as Chicago, Kansas City, and Minneapolis have facilities for both cash and futures trading. The grain exchanges do not buy, sell, nor own any grain. They merely provide the facilities where the buyers and sellers meet to do business. Grain is bought and sold at the exchanges for "cash" which means for immediate delivery to the buyer; or as "futures" meaning that the grain is to be delivered at a certain time in the future. Through the complex grain marketing system which has been established and proved through the years, buyers from any place in the world may place orders for immediate or future delivery. This aids in maintaining a more constant market for the producer.

Farmers selling their grain through the open markets are usually paid for the grain on the basis of grade. Grains of different grades bring different prices. While local grain dealers, usually the first purchasers of the grain, are not required to employ Federally licensed inspectors to inspect and grade the grain they buy, it is bought on the basis of grade as determined by the elevator operator's own inspection. The local grading is usually done on the basis of weight per bushel and moisture content, although other factors may be considered. Federally licensed inspectors consider several other characteristics of the grain in doing their grain grading work. Country buyers and shippers of grain try to pay premium prices for grain of superior quality. In order to buy grain fairly it is necessary to recognize its quality at the time the purchase is made. Through practice and experience country grain dealers are able to do a very good job of grading grains they buy and sell so that their grades will conform with the official grading standards.

The Grain Standards Act of Congress provides in part that all grain must be officially inspected and graded if it is to be sold by grade when shipped from one state to another or to foreign countries or to or from a point at which an inspector licensed under the act is located. Buying and selling grain by grade makes it possible for the parties involved in a transaction to know the quality of the grain they are buying or selling without having to actually have in their possession sample lots of the grain.

Grain grading also permits the storing of like quality of grain together in the large terminal elevators without the danger and risk of lowering the value of a high quality grain by mixing in grain of a lower grade.

Some of the tests of grain quality that producers and consumers have always considered important are tests for plumpness, soundness, cleanliness, dryness, purity of types and the general condition of the grain.

"Condition" is a general term and refers to whether the grain is in good keeping quality or poor keeping quality. Grain which goes out of condition usually heats and may become musty or sour. Condition is also indicated by such designations as "smutty", "garlicky", "weevily", "bright", "stained", "tough", or "treated". These terms describe various conditions in which grain is sometimes found.

Where To Get More Information

The informational material in this manual is rather briefly stated. 4-H Club members and leaders wishing more detailed information are referred to the following publications and sources of information:

Selecting varieties and growing the crops:

OATS

Oats in Nebraska - Bulletin No. 408
Published by the Nebraska Experiment Station - 1951

Nebraska Spring Small Grain Variety Tests - Outstate Testing Circular issued each year by the Nebraska Agricultural Experiment Station

BARLEY

Barley in Nebraska - Bulletin No. 423
Published by the University of Nebraska

Nebraska Spring Small Grain Variety Tests - Outstate Testing Circular issued each year by the Nebraska Agricultural Experiment Station

OATS - BARLEY - SPRING WHEAT

Production Practices for Spring Small Grains
Bulletin No. 406. Published by the University of Nebraska (Note: Much of the information in this handbook was obtained from this bulletin.)

Nebraska Spring Small Grain Variety Tests - Outstate Testing Circular issued each year by the Nebraska Agricultural Experiment Station

SEED TREATMENTS

The Whys and Hows of Cereal Seed Treatment - Extension Circular 1809

Seed Treatment for Cereals - Extension Circular 148

FERTILIZERS

Outstate Testing Circular - Commercial Fertilizer Results with Oats, Barley, and Spring Wheat. Outstate Testing Circular issued each year by the Nebraska Agricultural Experiment Station

Machinery, Labor, And Power Costs

This table will serve as a guide for figuring a fair charge for the use of Machinery. One column is included here for labor in operating the machine. Another column lists approximate costs of getting the equipment ready and servicing it. If you rent the equipment enter the rental fee in the "cash expense" column on the "Expense" page. If you use Dad's machinery and tractor at no cash cost to you then, on the basis of costs listed below, make an entry in the "non-cash expense" column on the Expense page.

Cost per acre of doing work with various types of tractor-drawn equipment, Nebraska, 1951 (Power and Labor Costs are included.) From Nebraska Bulletin 413.

Kind of Machine	Size	Acres per/hr	Use of Machine	Power	Labor at .90 p/hr	Prel. Prep.	Total
<u>Land preparation and tillage equipment</u>							
Disk, single	12 foot	3.5	.14	.28	.26	.13	.81
Disk, single	15 foot	4.3	.14	.29	.20	.12	.75
Disk, tandem	8 foot	2.4	.20	.40	.37	.19	1.16
Disk, tandem	10 foot	3.1	.21	.40	.29	.17	1.07
Harrow, spike-tooth	18 foot	5.1	.05	.19	.18	.08	.50
Harrow, spike-tooth	24 foot	7.8	.05	.12	.12	.06	.35
Harrow, spring-tooth	12 foot	4.7	.06	.21	.19	.09	.55
Harrow, spring-tooth	18 foot	6.3	.05	.19	.14	.08	.46
One-way disk	8 foot	2.9	.17	.42	.31	.18	1.08
One-way disk	10 foot	3.5	.16	.40	.26	.16	.98
Plow, gang	2-16 inch	1.1	.37	.88	.82	.41	2.48
Plow, gang, two-way	2-14 inch	.8	.79	1.21	1.13	.62	3.75
Rod weeder	12 foot	4.5	.06	.28	.19	.11	.64
Rod weeder	16 foot	6.6	.06	.18	.14	.08	.46
Rotary hoe	7 foot	2.9	.22	.29	.31	.17	.99
Stalk cutter	2 row	2.8	.18	.30	.32	.16	.96
Subsurface tiller	10 foot	3.0	.20	.41	.29	.18	1.08
<u>Seeding Equipment</u>							
Grain drill, press	10 foot	2.9	.33	.34	.31	.20	1.18
Grain drill, press	12 foot	3.3	.32	.37	.27	.19	1.15
Grain drill, press	14 foot	4.9	.32	.25	.18	.15	.90
Grain drill, semi-furrow	14 foot	5.0	.32	.24	.18	.15	.89
<u>*Harvesting Equipment</u>							
Combine, without motor	6 foot	1.4	1.41	.69	.64	.55	3.29
Combine, with motor	6 foot	1.4	1.96	.69	.64	.66	3.95
Combine, with motor, 2 men	12 foot	2.7	1.96	.62	.90	.70	4.18
Combine, self-propelled	14 foot	3.6	2.21	--	.25	.49	2.95
Grain binder, 2 men	10 foot	2.4	.84	.40	.75	.40	2.38
Mower, mounted	7 foot	2.4	.36	.36	.37	.22	1.31

Anhydrous Ammonia, A Good Nitrogen Fertilizer - Extension Circular No. 193

General Fertilizer Recommendations for Eastern Nebraska - CC 105

General Fertilizer Recommendations for Central Nebraska - CC 106

General Fertilizer Recommendations for Western Nebraska - CC 107

SEED CERTIFICATION

Nebraska Certified Seed Handbook - Published annually by the Nebraska Crop Improvement Association, College of Agriculture, Lincoln, Nebraska

INSECT AND RODENT CONTROL

The Army Worm and Its Control - Farmers Bulletin 1850

Green Bugs and Their Control - Extension Circular 1560

Grasshopper Control - P A 149 - USDA Publication

Insects in Farm Stored Wheat - Leaflet No. 345

Grain is Food, Keep it Clean - CC 114

Grain is Food, Keep out Insects - CC 115

Rat Control on Nebraska Farms - Extension Circular 1562

GRAIN RUSTS

Stem Rust of Wheat, Oats, Barley and Rye - CC 1802

WEED CONTROL

2, 4-D for Weed Control in Field Crops - Extension Circular 198

Spray Equipment for Weed Control - Extension Circular 174

MACHINERY COSTS

Cost of operating Farm Machinery on Nebraska Farms Bulletin 413

GRAIN DRYING AND STORAGE

You Can Store Grain Safely On the Farm - USDA Farmers Bulletin 2071

Grain Drying - Leaflet 332, 334

Storage of Small Grains and Shelled Corn on the Farm
USDA Farmers Bulletin 2009

GRAIN MARKETING

Grain Grading Primer - Misc. Publication - USDA 325

The Story of Grain From Farm to You - Published by the Omaha Grain Exchange, Omaha 2, Nebraska.

Important Facts About the Grain Exchange - Published by the Board of Trade, 141 West Jackson Blvd., Chicago, Illinois.

Marketing Grain Through A Grain Exchange - Published by the Chicago Board of Trade, Chicago, Illinois

Hedging--An Insurance Medium in Marketing Agricultural Commodities - Published by the Chicago Board of Trade, Chicago, Illinois

4-H Grain Grading Demonstrations - Misc. Extension Publication No. 62 - USDA

Course of Study in Grain Grading - Published by Seedburs Equipment Company, 618-626 West Jackson Blvd., Chicago 6, Illinois

Most of the above references may be obtained through the office of the County Agricultural Agent. Other publications may be obtained by writing the publishers named.

It is suggested that the leader be responsible for obtaining copies of the publications wanted so they can be used by the members at club meetings in discussing problems involved.
