
MANITOBA AGRICULTURAL COLLEGE

EXTENSION SERVICE

The Plowing Match



Part I.—Organizing for the Plowing Match.

T. J. HARRISON, B.S.A., Professor of Field Husbandry.

Part II.—Field Work of the Plowing Match.

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MANITOBA AGRICULTURAL COLLEGE

Winnipeg, Canada.

PART I.

Organizing for the Plowing Match

By T. J. HARRISON, B.S.A.

Grain growing is, at present, and will be for some years, the most important branch of farming in Manitoba. If it is to remain as profitable in the future as it has been in the past, it is necessary to use every means possible to maintain or increase the production. The yield per acre is decreasing on the old land because of weeds, injurious insects and exhausted soil. The only means of overcoming this difficulty, and still producing grain, is by the adoption of more scientific methods of soil cultivation. "As you cultivate, so shall be your harvest," is an axiom that is as true in Manitoba as in any other place on earth. In years of favorable weather conditions, the advantage of good cultivation is not so noticeable; but, in an adverse season, the method of cultivation often means a complete crop failure or a profitable crop.

Plowing is the most important operation in soil tillage, because, first, if it is not properly done, no other process of cultivation will



The Oldest Plow Used in Ancient Asia



Ancient East Indian Plow



HEBREW PLOW, BIBLE TIMES

Fig. 1.—Prehistoric types of Plows.



ANCIENT EGYPTIAN PLOW.



PERSIAN PLOW.



ANCIENT ROMAN PLOW.

Fig. 2.—Plows of the Classic Period.

put the soil in good condition; and, second, it is the most expensive operation on the farm.

Evolution of the Plow.

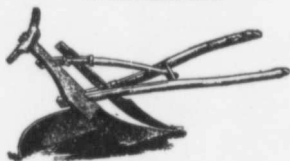
The importance of the plow in the cultivation of the soil is readily seen if we make a study of the history of the plow. On the evolution of this implement is based the physical history of agriculture; and this evolution may be divided into four stages:—

Prehistoric.—The plows of this age consisted of a hooked stick, usually made from the trunk and branch of a small tree, and drawn either by hand or by oxen.

Classic.—During this period the hooked stick developed into the Egyptian and Roman plow, constructed on the principle of a double wedge tipped with metal. One angle of the wedge gradually developed into the share and the other into the coulter of the modern plow.



ANCIENT SAXON FLOW.



NORTH RUSSIAN FLOW "KOSOCLIA"



ITALIAN FLOW FROM LOMBARDY PLAINS.



EAST LOTHIAN FLOW

FIG. 3.—Plows of the Mediaeval Period.

Mediaeval.—At this time the idea of turning the full slice upside down brought about the invention of the mould-board. This was at first a crude wooden affair, but its introduction was the beginning of a new type of plowing.

Modern.—During this period, which dates only from about the middle of the 18th century, the greatest improvements have been brought about. The transformation during this period is characterized by the perfection of the mould-board, and the substitution of iron and then steel in the construction of both the share and the mould-board. The early implements were all single furrow, walking plows; but, as the prairies of the West came under cultivation the soft centre, steel, mould-board, high-lift gang and the large engine plows have been evolved. Within recent years it was found that in some small districts

the mould-board plow was not a success, because it would not scour; so the disc plow was invented, and is recommended for these districts.

MODERN TYPES OF PLOWS

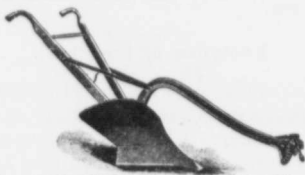


Fig. 4—The Modern Stubble Walking Plow.



Fig. 5—Two-Bottom Gang.

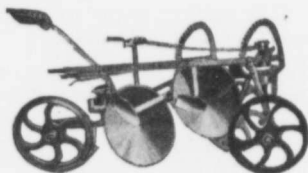


Fig. 6—Spalding Deep Tillage Machine.

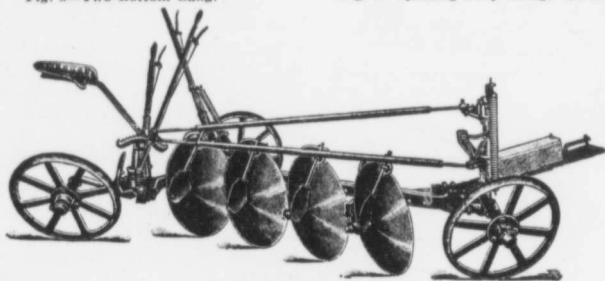


Fig. 7—Four Plow Disc Gang.



Fig. 8—The Engine Gang.

Object of Plowing.

The object of cultivation is to put the soil in the best possible condition for the growth of crops. If a study is made of the requirements of the soil for plant growth, a better understanding can be obtained of the use of the plow.

Essential Factors in Plant Growth.

The essential factors in plant growth are: First, space; second, moisture; third, heat; fourth, air; fifth, available plant food.

Space.—If the plant is to make the best growth, it must have considerable space on the surface of the soil. For this reason it is necessary to prevent the growth of all other plants or weeds. The plow is one of the most efficient implements in the destruction of weed growth. This is accomplished in three ways: First, by turning under the half grown weeds where they will easily rot; second, by burying weed seeds so deeply that they will not come up; third, by putting the soil in ideal condition for surface cultivation, which will induce the germination of the seeds near the surface and permit the cultivator to kill them along with any perennial weeds.

Moisture.—The conservation of moisture is important even in districts of considerable rainfall. The plow leaves the soil so that it will conserve the largest amount of moisture. This is brought about, first, by opening the soil to a good depth, so that it will catch and absorb all the moisture that falls, thus preventing run off; second, it breaks the capillary action and prevents evaporation.

Heat.—The plow turns under the stubble and other rubbish and allows the sun's rays to have direct access to the soil, heating it up more quickly in the spring.

Air.—If the seed is to germinate and the roots make their best growth, a large amount of air is necessary in the soil. The plow, loosening the soil to a depth of from four to nine inches, allows this to become aerated better than by the action of any other implement.

Available Plant Food.—There is a large amount of plant food even in many of our so-called exhausted soils, but the difficulty is to change this food from insoluble to soluble form. This is brought about by the action of the sun, frost and air as well as through the work of bacteria. The plow turns the soil up to the sun and puts it in the best possible condition for bacteria to act upon it.

The Advantage of Good Plowing.

If the above conditions are to be obtained, the plowing must be well done. Poor plowing not only fails to bring about the desirable conditions, but, in some cases, makes them worse.

To encourage good plowing, the plowing match was inaugurated. Men in all walks of life enjoy a contest and will practice or train

for some time before entering the competition. This is also true in farm operations, so the plowing match has become a recognized factor in the improvement not only of plowing, but of other methods of cultivation.

Organization to Carry on a Plowing Match.

The plowing match in Manitoba should be organized under the Agricultural Society or Farmers' Institute. When thus organized, the Manitoba Department of Agriculture will give a grant of 60 per cent. of the amount actually paid out in cash prizes to assist in financing the project. All that is necessary is for the directors of the Society to pass a resolution deciding to put on one of these competitions, secure the prizes, prepare a prize list and advertise the match.

Suggestions to Directors.

Hold the match some time during the month of June.

Have the competitors plow stubble land. Stubble land plowing in Manitoba is more important than sod plowing.

Prepare a prize list in which a large number of good prizes are offered.

Persuade the local men to put up good special prizes, and have these prizes on exhibition in the town so their display will fully advertise the match.

Advertise the match thoroughly by means of the local paper, posters, circular letters and personal endeavor.

Arrange to have some activity or attraction for the ladies while the match is going on. This might be a demonstration by some of the Home Economics teachers.

As soon as the plowing is finished, have a speaker give an address on plowing, while the judges are coming to a decision. When the judges have decided upon the winners, they should be announced at this meeting, and, if possible, have the prizes presented.

Suggested Prize List.

The following is suggested as a basis for preparing the prize list.

	1st	2nd	3rd	4th	5th
CLASS 1.—WALKING PLOWS.					
Sec. A.—Men (over 18)	\$10.00	\$8.00	\$6.00	\$4.00	\$2.00
" B.—Boys between 14 and 18	8.00	6.00	4.00	2.00	1.00
" C.—Boys under 14	6.00	4.00	2.00	1.00	..
CLASS 2.—SULKY PLOWS.					
Sec. A.—Men (over 18)	\$12.00	\$10.00	\$8.00	\$6.00	\$4.00
" B.—Boys between 14 and 18	10.00	8.00	6.00	4.00	2.00
" C.—Boys under 14	8.00	6.00	4.00	2.00	1.00
CLASS 3.—GANG PLOWS (two furrows).					
Sec. A.—Men (over 18)	\$15.00	\$12.00	\$9.00	\$6.00	\$4.00
" B.—Boys between 14 and 18	12.00	9.00	6.00	4.00	2.00
" C.—Boys under 14	10.00	8.00	6.00	4.00	2.00

SPECIAL PRIZES.

Best Crown (first 5 visible rounds)	\$2.00
Best Finish.....	2.00
Best Covering of Weeds.....	2.00
Best Plow Team (Grooming and Handling to count 50%)	
1 Walking Plow Team.....	5.00
2 Sulky Plow Team.....	5.00
3 Gang Plow Team.....	\$7.00

Where there are more than eight contestants in one section, prizes will be increased 25%. Where there are three or less contestants in one section, prizes will be decreased 25%.

Some societies make separate classes for 12 inch and 14 inch plows, but for the small Society this is not advisable, as there would be, in many cases, very little competition in the different sections.

PART II.

Field Work of the Plowing Match

By F. F. PARKINSON, B.S.A.

The first essential in holding a plowing match, naturally, is a field in which to plow. The usual practice is to use a field intended for summer fallow, and progressive farmers can usually be found who will offer such a field.

Selecting the Field.

There are two or three things to look for in selecting the field:

It should be as **centrally located** as possible, so that competitors and spectators can easily reach the place. I have in mind one plowing match that was held seven miles from the town, which was the central point of the district, with the result that several would-be competitors were unable to compete because of the greater distance they would have had to take their teams and plows.

The land should be such that it will **plow nicely**. While each competitor has an equal chance when plowing in heavy clay land, much better work can be done in a sandy loam soil; so, if possible, secure this type of land. It is best to avoid land where there are stones, stumps, scrub, etc., or uneven, hilly land. The work of the plowing match is judged by the spectators largely by the appearance of the finished job, so the better the land, and fewer the obstacles, the more easily it will be to compare the merits of the plowing.

Allotting the Lands.

After selecting the field, lay it out into small plots or "lands" for the plowmen. The amount plowed varies in different districts,

but the usual amounts are: For hand plows, $\frac{1}{2}$ to $\frac{3}{4}$ acre; for sulkies, $\frac{3}{4}$ to 1 acre; for gang plows, 1 to $1\frac{1}{2}$ acres. If possible, it is advisable to make the lands about 40 rods long. By making them this length, we get a wider land than if a longer piece of land is laid out. Consequently, there are more rounds of plowing to be done, and the more rounds to be plowed the better the test of the plowmen.

These lands should be measured off a day or two before the match by the directors in charge. Small stakes, say 12 inches long, made of lath, should be set at the ends of the lands and numbered. As the gang plows have to plow just twice as much as the hand plows, it is a very simple matter to measure the land for these. For instance, the field is 40 rods long, and the hand plows have half an acre and gang plows one acre. Start by running a scratch furrow at each end of the field, leaving a thirty-foot headland. Then start in at one side and set the stakes thirty-three feet apart, numbering both ends of the field the same. This leaves half an acre in each land.

The lands are allotted on the morning of the match, when the plowmen draw their numbers by lot. By allotting the hand plows first, giving them the lands as they come, they will each get half an acre. Then the gang-plow men will each take two lands, thus getting one acre apiece. For instance, if there are five hand-plows, they will take Nos. 1, 2, 3, 4, 5; then the gang-plows will take Nos. 6 and 7, 8 and 9, 10 and 11, 12 and 13, etc.

If there are sulky plows competing, lands of suitable widths can be quickly measured off after the gang plows are supplied, or lands can be measured off for them at one side of the field beforehand.

The Team.

On the team used at the match depends largely the success or failure of the plowman. Whether for the hand plow or gang plow, the team should be steady and well trained. A well trained team is a source of pleasure during the whole season, and the perfection attained in the training of a good team is one of the many benefits derived from the plowing match.

The Plow.

The plow is the next consideration, and it is one of considerable importance too. Different plows are suited to different soil conditions, and the plowman should choose one that is adapted to his particular conditions. He should know his plow, through practice, so that he can adjust it to give the best results possible with the lightest possible draft. To be able to do this properly is even more important for the every-day work on the farm than it is for the plowing match.

Adjusting the Plow.

The main points in adjusting a plow are:

1. To get the draft in line and at the proper height;
2. To adjust the plow wheels to carry the plow properly and to hold the edge of the furrow;
3. To set the coulters properly.

Adjusting the Draft.—The line of draft for any plow comes much nearer the landside than the wing. That is, there is much more pressure on the share and mould-board at that point than nearer the outside, so if we want a hitch to pull the plow straight we must hitch directly in the line of draft. This line of draft will be found to be between 2 and 3 inches from the landside of the plow. (Fig. 9.) In the case of a gang plow turning two furrows, the proper place to hitch is just half-way between the line of draft for each of the plows. If we hitch at this point, the plows will pull straight without setting the wheels at an angle to force them to travel straight.



Fig. 9—The white line stretching forward over the top of the beam shows the line of draft.

To adjust the draft for height, we must again look at the plow and ascertain the line of draft. We find that the line of draft strikes just above the share, in the throat of the mould-board. (Fig. 10.) To operate with the least possible draft, we must have the line of draft from the plow to the horses' hames as straight as possible, as any deviation from the straight line means that we are losing power through working against some other force.

If the line of draft from the plow to the hames is straight, the plow will ride steadily and hold to the ground with a minimum draft.

If the draft is high on the bridle of the plow, the tendency is to cause the plow to dip in, and, to keep the proper depth, the wheels must be made to hold the front of the plow up to the proper height. This added weight on the front wheels causes much heavier draft. In some cases, where the ground is very hard and dry, we can hold the plow in the ground by hitching high on the bridle, but this practice should be avoided unless absolutely necessary.

On the other hand, hitching low on the bridle tends to lift the plow out of the ground; consequently we have to depend on the weight of the plow frame to hold the plow in the ground. This

means that the horses are carrying a part of the weight of the plow on their traces instead of its being carried on the wheels. This method of hitching may be used where the land is soft, allowing the plow to draw too deeply into the soil, but otherwise should be avoided.

Adjusting the Wheels.—Of the three wheels on the ordinary gang-plow, two require adjusting—the front furrow wheel and the rear wheel. The front wheel is adjusted for depth by the lever, but must be adjusted for width otherwise. Some plows allow the casting that carries the axle to slide in or out on the frame to give different widths. The main thing to look for with this adjustment is to see that it is set close enough in that the share cuts all the land. In setting the wheel for direction, if the hitch is in the proper place the wheel should run straight up the furrow, without any “draw” either way. The straighter this wheel is set, the straighter the plowing can be done.

The rear wheel has two adjustments—one for height and the other for width. The first-mentioned adjustment consists in raising or lowering the back of the frame on the stem of the axle. By raising the back of the frame, the point of the plow is thrown down, giving it more “suction.” Care must be taken not to raise the frame too much—just enough that the wheel is carrying the weight of the plow, instead of letting the weight come on the landside. This adjustment is locked by means of a wedge bolt or set screws.

The other adjustment, sidewise, is taken care of by two set screws, one on each side, so that the wheel will follow close in to the corner of the furrow, or out further, as desired. By setting the

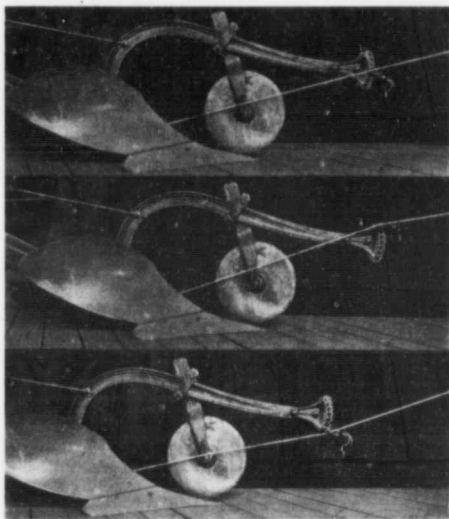


Fig. 10—The white lines indicate lines of draft. The point of hitching to the plow should be exactly in a direct line between the place where the traces attach to the hames and the centre of draft in the working parts of the plow. The top picture shows the draft correctly adjusted; the centre picture shows too high a hitch, and the lower picture too low a hitch.

wheel to run straight with the furrow, and to run close in the corner of the furrow, it will hold the plow steadier and straighter.

Adjusting the Coulter.—The setting of the coulter is another important part of plow adjustment. There are three kinds of coulters used at the present time: the "fin" coulter, the "knife" coulter, and the "rolling" coulter.

1. **The Fin Coulter** is bolted to the landside of the share, and is really a part of the share, so very little adjustment is required for it other than having it properly lined with the share when it is put on. These coulters are very handy for breaking or for plowing in trashy ground, as they will not clog up easily with rubbish.

2. **The Knife Coulter** is not used to any great extent except on scrub plows. This type of coulter is bolted or clamped to the plow beam and comes down to the point of the share, giving great strength and rigidity to the coulter. In adjusting this coulter, care must be taken to give it all the slope possible without taking off the "suction" of the point, and also to have it set straight with the plow, so that it will not draw the plow out of line, either wide or narrow. This is done by using blocks or wedges under the clamp holding the stem of the coulter to the beam, to give the proper set.

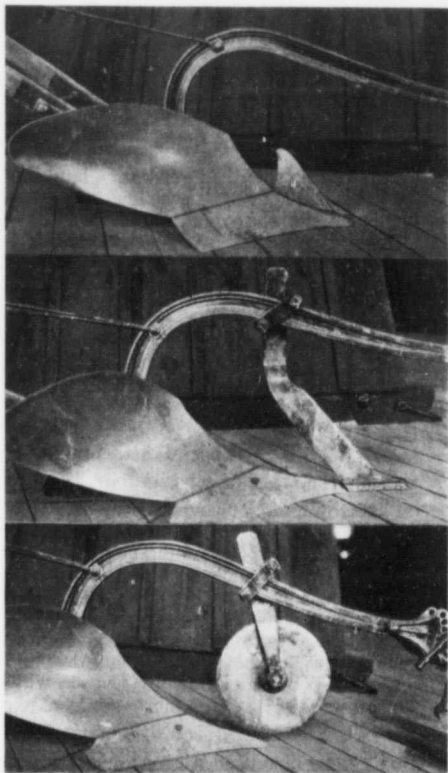


Fig. 11—The top picture shows the Fin Coulter, the centre picture the Knife Coulter, and the bottom picture the Rolling Coulter.

3. **The third style of coulter, the Rolling Coulter, is**

used to a very great extent at the present time. Where it can be used, it gives much better satisfaction than either of the others. The rolling coulter is made with two kinds of stems, the solid flat stem which will not allow the blade to swing sidewise, and the swivel stem that will allow it to swing. The latter kind is preferable for ordinary use.

The rolling coulter should be set to cut about a quarter of an inch outside the landside.

With the solid stem coulter, the adjusting is done by means of blocks and wedges, or even short strips of leather, under the stem and clamp, arranged in such a way as to give the proper line. If this coulter does not run straight with the plow it will draw the plow out of line, because the solid stem will not allow the blade to line itself.

The swivel-stemmed coulter is much easier to adjust, as the blade will swing into line with the stem, so all we have to do is to set the stem to draw the blade at the proper width.

In setting for depth, in ordinary land free from roots, etc., the coulter should be set so that the lowest point of the blade just clears the inside of the share and comes just back of the point of the share about two inches. In trashy ground, where there are roots, the coulter should be set further ahead and raised a little, so that the roots will not jam between the blade and the share.

Other Adjustments.—Besides the adjustments discussed above, adjustments are made with the levers for depth while running. Care must be taken to see that both plows are cutting the same width and depth, or the furrows will not be even and the plowing will look rough.

Special Attachments.

Special Devices for Covering Weeds.—There are a number of special attachments for covering weeds. The most common one is the **Jointer**, or "Skim Coulter." This jointer is really a miniature plow running close to the rolling coulter, which cuts the edge of the furrow and turns it back so that the weeds will be covered in the bottom of the furrow rather than left sticking up at the edge. When set properly, the jointer gives very good satisfaction, but care should be taken not to set it too deep—not over one and one-quarter inches. If the jointer is run deeper than this, the edge of the furrow will be cut so deeply that it will leave a hollow where the furrows meet, leaving more surface exposed to the sun for evaporation.

Chains are also used a great deal for covering weeds. There are two ways of attaching these, both giving fairly good satisfaction. The more common way is to hang the chain to form a loop on the surface of the furrow as it is turning. One end is attached

to the beam and the other is attached to the back of the front plow, so that the loop will pull the long weeds down into the bottom of the furrow. When attaching the chain to the front plow, fasten one end to the beam and the other end to the axle of the front wheel. These loops must be short enough that they cannot run back under the furrow after it is turned.

The other way of attaching the chain is to fasten one end to the beam and let the other end run back under the turned furrow for a foot or fifteen inches. The weight of the furrow on the end of the chain will hold the chain firm enough to pull the weeds under.

Some men use a heavy wire instead of a chain, with good results. This is attached either to the beam or to the stem of the coulter, and run back under the furrow. The wire should be six or seven feet long, and fairly heavy, to be sure of getting the weeds under.



Fig. 12.—Illustrating the Feering. Notice that stubble and weeds are merely cut, not deep enough to turn. In the Feering, the first 2 furrows are thrown outward at the point which afterward, by the soil being turned back again, becomes the centre of the crown. Photo taken at Provincial Match, Portage la Prairie, June 27, 1916.

Operating the Plow.

Feering.—When the time to begin plowing comes, the first thing to do is to set the stakes for the “feering” or “strike-out.” The two end stakes are set at the small number stakes which mark the land, and the rest are lined by these two. In feering, the land must all be cut, so the first round is plowed very light, opening out the furrows as shown in Fig. 12. These furrows should be as shallow as possible, just enough to cut the weeds, and not necessarily deep enough to turn properly.

The next round is plowed to the centre, care being taken not to plow too deeply, as that would raise the feering higher than the body of the plowing. Fig. 13 shows the second round on the feering with the gang-plow.

Crown.—The crown consists of the first five visible rounds; that is, the first ten visible furrows with a single plow, and the first twenty with a gang plow. Each man plows the five rounds on his own crown, and then “haws” to his neighbor’s crown, until he finishes the land, thus getting one strike-out and one finish.

Finish.—In finishing a land properly, the furrows must be straight and parallel, to be sure of getting a clean finish. The

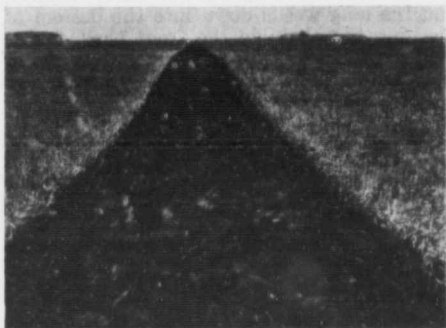


Fig. 13—Feering closed in. Note the level top, all furrows being of equal height and middle pair same distance apart as outside pairs.

last two furrows should be a little shallower than the body of the plowing, so that the finish will not leave too much of a ditch. Fig. 14 shows a land in good shape for a clean finish, the strip of stubble left being just about two inches narrower than the width of the two full furrows.

Points to Look For in Good Plowing.

The following score card will give a fairly

good outline of the points looked for in good plowing, with their relative importance:—

	Points
Crown	15
Straightness	15
In and out of ends	5
Depth and width of furrow	15
Evenness of top of land	10
Finish	15
Covering of weeds	25
Total	100

Crown.—The crown should be straight, level on top, with all the weeds cut in the middle. The crown consists of the first five visible rounds.

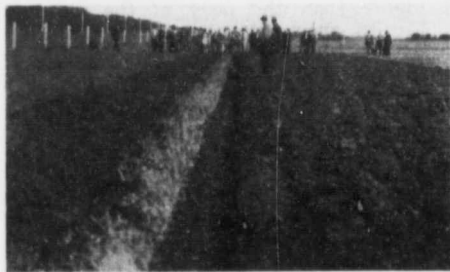


Fig. 14—"Land" in good shape for a nice finish. Note straightness of furrows and levelness of top of plowing. Photo taken at plowing demonstration held at Killarney, June 26, 1916.

Straightness.—Not all good plowing is straight, nor is all straight plowing good plowing; but the man who endeavors to plow straight is much more likely to do a good job than the man who makes crooked furrows. The importance is shown on the score card by giving fifteen points for straightness.

In and Out of Ends.—By this is meant that all furrows should begin and end in a straight line across the end of the field. Where a light scratch furrow is run along the headland, it is much easier to keep the ends of the furrows even.

Depth and Width of Furrow.—Under this heading we look for uniformity of depth and width of furrow. When the depth or width varies, we can see it quickly in the unevenness of the plowing; but if the depth and width are right, every furrow will look the same.

Evenness of Top of Land.—If the plowing is not even on top, with some heavy, high furrows, and some light furrows, we have a condition that is hard to overcome when working the land down either for summer-fallow or for a seed-bed; so we must have the top as even as possible. In Eastern Canada, where there is plenty of rainfall, the practice in plowing is to set the furrows up on edge, putting a "comb" on them. This method will not be satisfactory under our Manitoba conditions with our light rainfall. The more the furrows are set up on edge, the more air will be left in the soil to dry it out; and the more ridge there is on the top of the furrow, the more surface there is exposed to the sun to evaporate the moisture. Hence for Western conditions we aim to get a fairly flat furrow, well packed, with a minimum of air space in the soil and a minimum of exposed surface, so that the loss of moisture will be as small as possible.

Finish.—In finishing a land, there should be a strip of unturned land a little narrower than the plow for the last furrow. By having the strip a trifle narrow, a good clean finish can be made, with everything cut clean and turned. No sole furrow should be lifted.

Covering Weeds.—The number of points allowed on the score card for covering of weeds shows that this is the most important point. There are two reasons for this. First, many weeds will mature if the tops are left exposed; thus the plowing has practically no effect upon them. Second, every weed or stubble left exposed is acting as a pump to draw the moisture from the soil and give it off into the air.

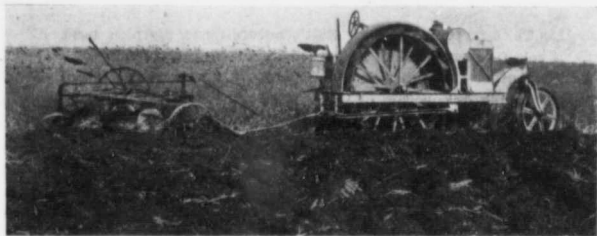


Fig. 15.—Field of Sow Thistles being very poorly covered. These Thistles will mature almost as readily as though untouched. While doing so, they are rapidly drying out the soil



Fig. 16—One of the competitors at the Plowing Match at Ericksdale, Man. He won first prize in his class.

Rules and Regulations.

The following rules have been adopted by the Manitoba Agricultural College Extension Service for use in plowing matches held under its supervision:—

1. No person will be allowed to interfere with the plowman except in the setting and removal of stakes, and no person will be allowed to accompany the plowman.
2. Land to be plowed will approximate $\frac{1}{4}$ acre for single furrowed plows and 1 acre for gangs.
3. Lands must be measured out and numbered consecutively before the time set for the match to commence.
4. Plowman must be on the grounds before 10 a.m., at which hour lots will be drawn and stakes set. Plowman must finish by 4 p.m.
5. Each plowman will have one strike-out and one finish.
6. In the strike-out all lands must be opened and all weeds cut.
7. Stakes must be set only once for the strike-out.
8. Five rounds complete the crown. The stake bearing the land number must be replaced as soon as the crown is finished.
9. The first two rounds thrown to the adjoining land are not judged. In case the neighbor's crown is crooked or otherwise defective, it is not necessary to conform to it.
10. Depth of furrow, 5 inches; width, according to the plow used.
11. A sole furrow must not be turned in finishing the land.
12. The use of gauge wheels and skimmers is permitted.
13. No pulling or covering of weeds with either hand or foot or tramping of the land with the feet will be allowed. A man in each class will see that every plowman conforms with the above rule. Every one not conforming thereto will be reduced one point for each offence.
14. Judges have the right to withhold a prize if they consider the work deficient in merit.
15. All protests must be in writing, accompanied by a fee of \$2.00, and lodged with the Secretary before 6 p.m. on the day of the match.
16. Plowmen who do not conform with the above rules will be disqualified.