

## SELECTED ARTICLES.

### AGRICULTURAL IMPLEMENTS SUITABLE FOR THE USE OF THE INDIAN CULTIVATOR.\*

#### THE PLOUGH.

**P**EOPLE who work much among the cultivators generally understand that the Indian plough bullock always turns to the left and never to the right. This is one of the apparently simple obstacles one meets and dismisses lightly, but can never surmount; because, no matter how well trained our farm bullocks and ploughmen are, nor how well, under our eye, the cattle turn right or left as required, no sooner do the men and cattle get away to their own or a cultivator's field than they turn left at once and all the time. On our land the responsibility is ours and the danger also; but on their own land they take no risks, but believe in "safety first" and their cattle turn only to the left.

In small plots with cattle turning left, inevitably ploughing is done from the outside to the middle if the plough allows; and a mouldboard that throws to the right not only allows but encourages this. So Indian cattle and a right-hand throwing plough plough the fields outwards time after time, till the centre is a hollow and the edge a containing rim; and the consequent water-logging and deterioration of the soil is laid at the door of the English plough, and we are told in all seriousness that an English plough spoils the land.

This is one of the eastern customs which many have tried to break and all have failed and will fail, at any rate for a few more centuries, and the only sound way to deal with it at present is to accept it and supply a plough to suit it. As far as I know, there is no difference whatever between a plough throwing right and the same plough built to throw left. Produced on the same scale, one is as cheap as the other; and the work done by both is the same, if equally intelligently used. But with bullocks that turn to the left, a right-throwing plough is never intelligently used; while a left-throwing one can only with difficulty be used otherwise. For India, therefore, all mouldboard ploughs supplied should be left-handed, to turn earth to the left; and with them the ryot will find it very difficult to do other than plough his plots up to the middle, with consequent improvement of drainage and crop bearing capacity. This is the first and fundamental consideration to be kept in mind.

The second is the necessity for some form of compensation for the difference between the furrow width and the draught width. We all know that ploughing is a slow, laborious process, that costs heavily in proportion to other agricultural operations; but that if done thoroughly, it is well worth while because at one operation the whole bulk of earth to the depth we are working is cut off from below, thoroughly shaken and broken, and turned over on the top of weeds and rubbish. One ploughing is the equivalent of 6 or 8 "chases" with the country plough or of 2 or 3 cultivations. But only if it is done properly.

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\* Extract of an article on "Agricultural Implements suitable for the use of the Indian Cultivator" by A. P. Cliff, B.A., Deputy Director of Agriculture, Western North Behar Range, in *The Agricultural Journal of India*, Vol. XXIII, No. 2, March, 1928.

For a mouldboard plough to plough properly it must tend to run with its share flat across the bottom of the furrow being cut, at an even depth, and in a direction parallel to the last furrow, at a distance generally of 7 or 8 inches from it. For work with cattle in small plots we have already decided (vide *Agri. Journal of India*, Vol. XXII, Part IV, pages 288-289) that short pole draft is essential; so that little steering control is possible without sideways tilting; and such tilting must be avoided if feasible, as only when the plough is running flat and true is it doing its proper work. The first step obviously is to get the cattle to move in exactly the right direction and parallel to our furrow. There is only one line to guide them and that is the last furrow. On one side of that is a mass of clods and loose earth over which the bullock will wander in any direction but the right one, and on the other is the unploughed surface, generally a mass of weeds and rubbish. We must therefore make one bullock go in the furrow, when the other will keep his distance on the unploughed land. Any plough bullock will go quietly along a furrow with very little coaxing, though I defy anyone to drive a pair of ryot's bullocks straight along a given line, without that furrow to guide them.

The common plough yoke of India is 4 to 5 ft. long and the common distance between the necks of the bullocks is 40 to 48 inches. Half that, which is the distance from the neck of the furrow bullock to the centre of yoke, where the plough is hitched, is 20 to 24 inches. But a plough furrow is only 7 inches to 8 inches, rarely 9 inches wide; so that though the hitch is 20 inches away from the last furrow, the plough must not be more than 9 inches, a difference of 11 inches between draft width and furrow width. In western ploughs this difference is taken up partly by the length of beam and chain, and partly by the hake set across the end of the beam; but our draft must be a short pole and the hitch on the yoke only 6 or 7 feet from the plough.

There is commonly used on Behar plantations a cheap copy of the old Hindustan plough which has short pole draught and of which the pole is directly over the landslide of the plough. When the bullock is in the furrow the plough tries to be 18 inches away, and is forced back to the furrow by tilting it over on to its landslide, to the detriment of the ploughing. Then the bullock swings away on to the land and the plough comes back into the last furrow. Not for two minutes together is the plough running square and true in its proper place and doing its proper work, because when the bullock is in the furrow, the only guiding line, the plough is too far away from it.

Some simple form of offset device is required on the plough, so that the pole is attached 8 to 9 inches sideways from the landslide.

The bullock is in the last furrow, the yoke hitch is 18 inches to the right, the pole is parallel to the work, and the plough 9 inches to the left of the base of the pole, is in its true position for easy and proper work. Without some such offset no mouldboard plough with short pole draught can be made to do good work; and ploughing, unless reasonably well done, is not worth doing. A few cultivations are simpler and cheaper.

It is possible to take up this difference between ploughing width and draft width by setting the pole at a small angle to the line of the plough; but this method is unsound because a lengthening or shortening of the hitch on the pole, to suit higher or lower bullocks or to plough deeper or shallower, alters also the width of furrow taken; and with large bullocks a narrower furrow is taken than with small ones, the reverse of what would be desirable. The pole should be parallel to the line of the plough, but 9 inches to the side of it; and it is desirable to make this offset simply adjustable so that for transport along roads, the offset can be closed up, the yoke brought back along the pole to lift the share and point off the ground, and the plough slid home on its heel lying snugly between the heels of the bullocks.

It is most important to make the offset attachment an integral part of the body of the plough. Normally, all such ploughs are sold in the *Dehat* without woodwork, and the construction of the plough body should be such that the pole can only be attached in one obvious way; as, if the ryot is left any choice as to how the pole can be attached, he is certain to make the wrong choice. One cannot be too careful to make such a device absolutely foolproof, as even on Government farms it is common for an implement to be put together wrongly if such a course is possible, and then it is often condemned without a fair trial.

It will be remembered that in discussing the ridge plough I suggested that such a plough might be sold, without handles or pole, to be fastened to the front vertical column of the Behar 3/5-tined cultivator. Similarly, the single mouldboard plough might well be constructed to bolt firmly to the left side bar of the frame of that cultivator. Two holes in the plough frame in a horizontal line, to register with two corresponding holes in the cultivator frame side member, and an extra vertical piece bolted firmly to the body of the plough and passing up and in, to the bolt where the pole and handles cross, provide an attachment rigid vertically and longitudinally. The cultivator frame itself provides the required offset. I have tested thoroughly such a plough and find it quite a practical outfit; and again it is thought that the saving of pole and handles so possible, would be thoroughly appreciated by the ryot.

A final point apparently not generally appreciated is that the downward pressure on a plough point, *i.e.*, the pressure that makes the point dig itself into the ground, is less when the plough has short pole draft than when it has the usual beam and chain draft. To compensate for this, in any plough sold for use with short pole draft, the angle which the share and point makes with the line of the bottom of the plough, generally the lower side of the landslide, should be very appreciably greater than is usually the case; otherwise the plough must be run on its nose, and the tail of the landslide and the rear of the mouldboard will be up out of the earth and the plough will not sit in the furrow securely nor turn the earth properly.

The writer advocates the following essentials for any plough to be marketed for the use of the Indian ryot:—

- (1) Cheapness to be obtained by the use of light castings throughout.
- (2) A detachable, invertible slip-in cast point.
- (3) Pole drift.
- (4) Left hand throw.
- (5) An offset device either (a) integral to the body of the plough whereby the pole is attached parallel to the line of the plough but 8 or 9 inches to the right of the landslide, or (b) obtained by bolting the plough rigidly to the left side bar of the Behar 3/5-tined cultivator.
- (6) An abnormally steep set of share and point.

Apart from these, such a plough should be of the short-breasted, wide-throwing, breaking type, capable of ploughing reasonably well any class of land from sandy loam to heavy clay, and it will be then met sufficiently well the requirements of the whole country. Two sizes are advisable:—

- (1) About the size of the Punjab plough for tracts where bullocks are large and for estates, Government farms, etc.
- (2) About like the Meston, for the paddy tracts and other areas where bullocks are small.

No. 1 would plough 6 or 7 inches deep and 8 or 9 inches wide and No. 2 about 4 to 5 inches deep and 5 or 6 inches wide, but the same body, offset and landslide, and point would suit both, the only difference being that No. 2 would require a narrower share and correspondingly narrower, though just as wide throwing, mouldboard,