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# **The Human Factor in Agricultural Management**

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## Time-sheets as the Manager's Tool for Revealing Spare Labour

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Agricultural time-sheets were elaborated in their initial form by T. Tomaszewski in 1926. Later for practical purposes they were corrected by F. Zoll. In its new form they were applied on a number of larger farms until the Second World War. At present, if my information is correct, they are used only on several experimental farms. The time-sheets illustrate by diagrams the sequence of various field works on particular fields. Each field has a column on the diagram of a width corresponding to the size of the field (2 mm/1 ha.). One line (1 cm) corresponds to one day.

The labour force (men, horses, tractors) are shown in colours divided into different operations such as: soil cultivation, sowing or planting, cultivation of crops, harvesting or digging, cowshed or hopyard work, threshing, work in a barn or in storehouse or clamps, collections and deliveries, administration, meadows and pastures, and those not working through being sick or on leave.

Each group is shown in a different colour.

Each line (day) shows the date and the weather indexes (indicated by special figures), the temperature, the force and direction of the wind, precipitation and cloud cover (see Fig. 1).

The time-sheets serve for the current recording of work on the farm, and also as a tool for revealing reserves in labour resources. These can exist in various forms even while all the labour is engaged in work.

Below are a number of characteristic examples of the wasted reserves which can be easily discovered by analysing the time-sheet.

(1) Performing an operation after the optimal period has passed makes it necessary to apply measures which will consume more labour later. For instance, neglecting the freshening of the soil by a broom drag or a brush harrow in early spring makes it necessary on heavy soils to apply more labour-consuming cultivation by a cultivator and heavy harrows, and sometimes even by roller (see Fig. 2).

(2) Neglecting the use of draught power, by tractor or otherwise, for the first ploughing just after harvest, makes it necessary on a dried-out soil to plough more deeply. Such cultivation is less effective and more labour consuming because, after the plough, it is necessary to harrow twice and to roll with a *grasquil*, whereas early first ploughing between the shocks followed by a single harrowing is sufficient, and on the strips when

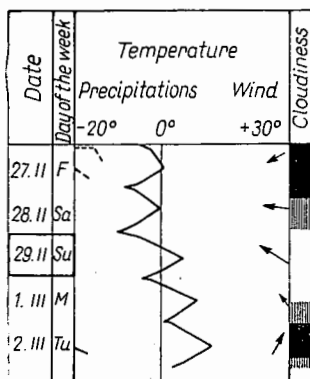


Fig. 1. Initial column: Dates and climate. In small column, date (date and month indicated by numbers), the week day marked by one or two letters. In the small column showing temperature the following temperatures are noted: minimum of the past night, the morning, noon and evening temperatures. Rainfall ——— snowfall — — — or hail □ are indicated across. The horizontal magnitude indicates the precipitation in mm, while the vertical one the time of precipitation. The force and the direction of wind as well as the state of cloud cover is also marked here. Code (to all figures): b — brush harrowing, f — fertilizing, h — harrowing, sh — light harrowing, sp — sowing or planting, c — cultivating, c + h — cultivating with harrowing, hm — hand mowing, bm — mowing with binder, sk — skimming, r Cro — Crosquil roller, r Cam — Campbell roller, rs — smooth roller, m — transporting and spreading yard manure, p — ploughing, pt — ploughing by tractor, p + b — ploughing with brush harrowing, ps — stooking, rh — removing harvested cereals from the field.

the crop is removed after the first ploughing only one harrowing is needed (see Fig. 3).

(3) A job on one field left unfinished on one day makes it necessary to return the next day. Passing from one field to another during the working day is a waste of time especially if they are distant from each other.

(4) Consecutive operations badly planned can result in more operations and the use of more labour later on. For instance, if when ploughing in farmyard manure a Campbell roller is immediately applied all the rest of the work will be less than it would be if the roller is not used (see Fig. 4).

(5) Combining implements (a brush harrow after the plough, a harrow after the cultivator, a drill with covering and pressing wheels, a weeder with rolls to press the rows of beets or carrots) results not only in economy of draught power but also in a decrease of damage to the soil by horse hoofs or tractor wheels (see Fig. 5).

These are some examples of hidden reserves which could not be revealed by a daily analysis of reports. It would be necessary to observe the course of the work continuously if the reserves were to be disclosed as they are on a diagram. Even after only a few years the time-sheets comprise a clear and instructive picture of a situation which changes from day to day in the field-work, and in the distribution of manual work,

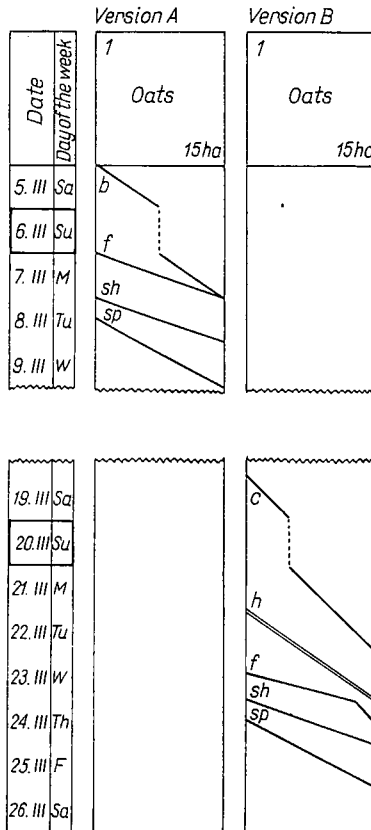


Fig. 2. The column of the field 15 ha. in size where oats are cultivated. The cultivation is represented in version A a favourable one, because cultivation started as early as the 5th March, and version B unfavourable because it started as late as the 19th March. In version A a brush harrow, fertilizers, harrow and sowing were sufficient. In version B a hardened soil had to be treated with a cultivator and then twice with a harrow. Only then was it possible to broadcast fertilizers, harrow them and sow grain. A break of work on a holiday should be noted.

draught power and machine work. If one were to call the daily report a photograph of the day's work, the diagram is like a film illustrating current changes.

An appropriate or inappropriate utilization of labour forces can be noted very strikingly when comparing the fulfilment of the timetable with that elaborated while planning the operations. The plan time-sheet should be

drafted on transparent paper. It is impossible to apply here the Gantt diagram (thin lines of the plan and thick ones for its fulfilment on the same diagram) because the operations in the field depend upon climatic changes which make it necessary to alter the planned time for starting the work.

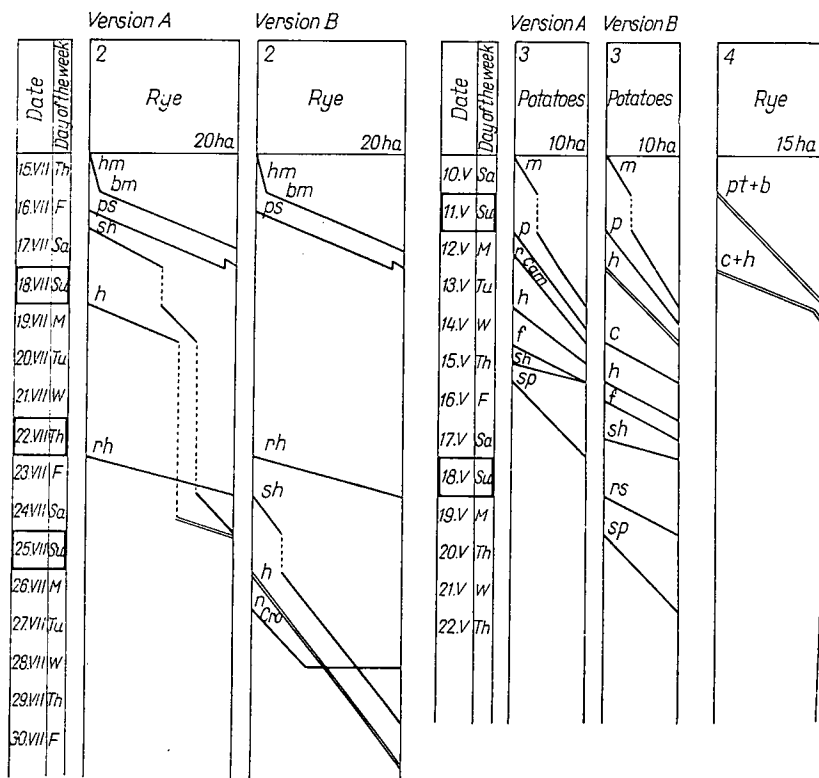


Fig. 3. Column of field No. 2, 20 ha. from which rye was harvested on the 15 th July, the field was mown round to enable a binder to work. In the afternoon a group of workers started to stook. This group did not finish the job on the second day (Saturday) as the work was shortened by 2 hr. The diagram shows this. In version A the next day, after the sheaves were collected, the skimming was begun. It ended after 3 days (2 days between sheaves and on the 3rd day on strips after the crop was removed). In version B the skimming owing to the drying of the soil had to be deeper and lasted 5 days. In this version a twofold harrowing of the whole field had to be applied (in version A—only the the strips where the sheaves were standing. Moreover on 8 ha. the clods of soil had to be broken by use of a Crosquil roller).

Fig. 4. The column of the field No. 3, 10 ha. under potatoes. Transportation and spreading of manure is identical in both versions. The difference appears when a Campbell roller was applied after which the final seed bed preparation was much easier than in version B.

Fig. 5. The column of the field No. 4. Under rye. A method of linked-up implements is shown. It can be seen that cultivation with a harrow was done much more slowly on the second day than on the first, the reason being that the preparatory and final operations held up the relatively small main work to a great extent. If the first working day had been prolonged by 2 hr, the field would have been cultivated entirely on that day. On the second day it took 4 hr.

In addition to the various uses of the time-sheet already mentioned one can add the great advantage it gives in elaborating the orders for the next day, because all the work initiated and not finished can be easily seen. It makes the work of management more efficient and prevents the giving of inappropriate orders leading to waste of labour resources.

On the right side of the time-sheet there are columns illustrating by colours the resources with which the work was done. From these columns it is possible easily to make various combinations, by a quick and simple summary on a paper band, without computations. One end of the band is held close to the starting point of a given column and its width marked with a pencil (the number of workers). Then the band is shifted to the beginning of the next day's column, and the mark is made again, and so on. This makes it possible to use the diagram for different analytical combinations and helps to show up any wrongly utilized labour resources.

A disadvantage of the time-sheet is that it reveals unutilized reserves only after the fact. Even so, it is important, because it indicates how to avoid mistakes in the future. And the future can be soon when one passes in similar conditions from one field to another. The time-sheet enables the farm supervisor at any time to realize in an easy and quick way what is done and what is not done. To analyse daily reports he would have to spend many hours and still not be able to see those things which are shown distinctly by the time-sheet.