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Draught Horses in Market Gardening

Investigations on Time Requirements for Hoeing

The “Gärtnerei am Bauerngut”, a market gardening enterprise in eastern Brandenburg (Germany), cultivates vegetables for the organic food wholesale in Berlin. The farm has 9 ha of fields and additionally 3000 m² under glass and plastic. Since 2006 two draught horses have been used for hoeing work in the fields, in addition to a tractor. In 2007, as a project for a bachelor’s thesis, the working times for hoeing with horses and tractor were recorded and compared. There are significant differences in the preparation times for horses and tractor, although operation times in the field are comparable.

For some years in Germany, as well as in Europe as a whole, a resurgence in the use of draught horses is to be noted. The foundation of the German Draught Horse Association (Interessengemeinschaft Zugpferde e.V., IGZ) in 1992, as well as the amalgamation of nine European Associations dedicated to the preservation and use of draught animals as FECTU, the European Draught Horse Federation (Fédération Européenne du Cheval de Trait pour la promotion de son Utilisation) shows that very clearly. The FECTU has existed since 2003 [1] and now includes 15 organizations with more than 3,500 members all together (www.lectu.org). Investigations of IGZ led to the result that in Germany today at least 73 farms are using draught horses in agriculture [2]. Also the “Gärtnerei am Bauerngut”, situated in the eastern part of Brandenburg at the edge of the marshland of the river Oder, has used two draught horses since 2006. The Demeter market garden working in accordance with the bio-dynamic principles has existed since 1992, and is run by two managers as a GbR (civil law association). They produce vegetables for the organic food wholesale trade in Berlin on 9 ha open beds and 3,000 m² under glass and plastic, additionally.

Draught horse use at the “Gärtnerei am Bauerngut”

The use of draught horses at the Gärtnerei am Bauerngut started in 2006 as an experiment to test if and where draught horses could be used in the market garden. Meanwhile, two additional, young draught horses have been bought that are trained by the teamster of the farm staff. One of the main fields of work for the horses is the hoeing of the one-, three- and four-row plantations, which is done using a hoe made by I&J, USA (Fig. 1).

The hoe was originally designed as a two-row maize-hoe, but was changed for use as a multiple-use row-crop-tool. Now, a 45 mm steel bar can be used as an interchangeable hoe. The implement is equipped with a seat placed in such a way that the teamster sits be-

hind the shares having a good overview. The steering of the hoe’s axle is done by feet (Fig. 2). The hoe is designed for use with a team of two horses.

In 2007, almost half of the hoeing work in the one-, three- and four-row plantations was done with the horse-drawn hoe, the rest by tractor. The tractor is a Fendt tool carrier 231 GTS with 32 hp. The used hoes were fixed between the axles and were combined with a currycomb or a track-opener, both attached in the three-point hydraulics in the back of the tractor, if required.

Investigations of time requirements for hoeing

Current calculation data for the use of draught horses in vegetable-growing are not available. This was the reason for the measuring of time requirements for hoeing with horses and tractor respectively [3]. During the study the time requirements for most of the necessary hoeing-work in the one-, three- and four-row plantations have been recorded and compared. During the study the teamster and the tractor driver respectively measured the “preparation time” before and after hoeing, the “travelling-time” needed to get to the field and back, and the “operation time” on the bed, using a stop-watch. Work-time in this case means the whole time from the beginning of hoeing on the bed just after the arrival, until the end of hoeing just before starting to leave the bed. It includes time needed for turnings at the end of the furrows as well as lost-time which may occur (e.g. due to necessary cleaning of shares). In order to achieve comparability, the size of the worked beds was measured for every hoeing. The average bed on the farm was sized 30 m • 70 m (= 2,100 m²). As the measured work-time included the time needed for turnings at the end of the furrows, only the results of beds of similar length (grouped into classes of bed-length) could be compared.

Results

The analysis of measured “preparation-times” showed for the horses 16 capacity of

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Draught horses, market gardening, hoeing, measuring of working time



Fig. 1: Hoeing in four-row crops

work-min. (0.27 Akh; Akh means capacity of work-hours) before as well as 7 capacity of work-min. (0.12 Akh) after work. Not included is the preparation-time for the implement before and after work, i.e. the time needed to get the implement ready for use before work and the time for cleaning and for putting away the implement afterwards. For the tractor the values are clearly lower, 6 capacity of work-min. (0.1 Akh) before and 1 capacity of work-min. (0.02 Akh) after work respectively, already including the preparation-time for the implement. Very often the tractor was just parked after work so that no preparation-time after work occurred. The results make clear that the preparation of the horses, i.e. brushing, haltering, harnessing and hitching before and after work, in every case takes more time than the preparation of the tractor. Nevertheless one has to consider that preparation-time is less crucial when working as many beds as possible one after another with the same implement. That means that a good organization and planning of work can make preparation-time an increasingly less important factor.

The results for the travelling-time needed to get to the beds show that the tractor needed slightly less time for the same distance than the horses. The average speed was 10.4 km/h (Ø 2 capacity of work-min./journey) for the tractor and 4.4 km/h (Ø 4 capacity of work-min./journey) for the horses. The studied farm is totally reorganised, so the author estimates that travelling-time doesn't really play a role in all-day work-routine. But if farms are not reorganised, the difference in travelling speed might be more important.

The measured "operation time" has been evaluated separately for the used hoeing implements (e.g three-row-hoeing, with or without currycomb) and the different lengths of beds. The results show values of similar scale for the tractor and the horses. For example, the average work-time in three-row plantations having a bed length between 50 m and 90 m was 3.1 Akh/ha for the hor-

ses and 3.2 Akh/ha for the tractor. In four-row plantations of the same bed length the average work-time was 2.9 Akh/ha for the horses and 3.0 Akh/ha for the tractor. The work results of hoeing were comparably good for tractor and horses; although no examination of the effect on the soil structure of the two different systems was carried out. For forest-soils [4] as well as for soils in agricultural use [5, 6, 7] it has been certainly proven that the use of horses instead of tractors results in significantly lower soil compaction.

Extension of horse use

Altogether, the use of horses on the examined farm must be seen as a success. The managers therefore have decided to go on with and extend the use of horses by supporting the training of another team of younger horses on the farm. In future, the younger team shall be able to take over even the harder types of work like cultivation. Harrowing as well as drilling of green manure has already completely been done by the established team of horses in 2007, the year of the study. In future, the firming of the seedbeds as well as the application of the bio-dynamic sprays shall be done by the horses, additionally.

In these plans the horses are not only favoured for the presumed advantages with regard to soil structure and yields, but also because of their potential in saving fossil energy, as well as producing manure very worthwhile for the farm. At least, using horses on the farm is very popular with the public. They have a great deal of interest and sympathy with working horses and this encourages them to buy produce from this farm as well as promoting the use of draught animals in general. The work of the staff is of a higher quality and of greater interest and all these factors should not be underestimated.

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Fig. 2: Modern horse-drawn hoe with foot control