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Production costs in pastoral farming

The part-project „Technique, machinery and plants/farm building systems for pastoral farming with livestock production in disadvantaged areas" of the special research division 299 concentrated on pasture production. This report aims to answer questions regarding production costs in such enterprises. As far as fieldwork was concerned, alongside the recording of costs for all important production phases in pastoral farming, the extent to which such costs alter when field size grows, steading-field distance decreases or the machinery exploitation is increased, was to be explored.

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Keywords

Pastoral farming, mechanisation, field size, steading-field distance, production costs

Literature details are available from the publishers under LT 00314 or via Internet at http://www.landwirtschaftsverlag.com/landtech/local/fliteratur.htm

The investigation reported here was carried out within the framework of the special research area (SFB) 299''Land-use concepts for disadvantages regions". The aim of this interdisciplinarian research project including 18 different part-projects is the recording and evaluation of different options for land usage in disadvantaged regions.

The region where the investigation took place is the Lahn-Dill-Bergland, a rural region with very small farm infrastructure characterised by a high proportion of part-time farms.

Labour costs

For investigating the current situation in the area of forage harvesting labour input was recorded by the part-time method [1] during pasture care and harvesting. The timing took place according to work done in the individual production phases. For the determination of the distances and average speeds involved, a hand GPS (Global Positioning System) was used.

To investigate the influence of field size and steading-field distances on working time, model calculations with VERKOST [1] used on-farm recorded, work-organisation dependant and fieldwork phase appropriate parameters which simulated the production and determined the working time requirement. The calculations of the cost inputs were carried out for all important production phases in pastoral agriculture over a year. They were investigated and calculated for field sizes from 0.5 ha to 10 ha with respective steading-field distances (HFE) from 0.5 to 10 km with regard to working time requirements.

The determination of work costs took place through multiplication of the determined working time with opportunity labour costs of 25.00 DM per hour.

Machinery costs

Alongside the work costs, the machinery costs have to be calculated as a proportion of the production costs. With this, the following cost comparisons were established:

- the current situation on the farm (costs for used machinery, farm-specific capacity utilisation)
- machinery costs in the case of new machinery investments and the farm-specific capacity utilisation
- machinery costs with new machinery and 100% capacity utilisation
- machinery costs where work is carried out through ÜMV

Firstly, the mechanisation on the farms was determined. The value from the inventory list of the farms gave the current situation.

The capital costs were written-in with an interest of 8% on half the purchase price. Writing-off costs were calculated (according to the machine, from 10 to 14 years). Insurance and variable costs (repairs, fuels/lubricants) were included in the cost calculations according to KTBL (MAKOST). The annual utilisation was accounted for in the calculations of the machinery costs according to the exploitation of the machines (h/year or ha/year) on the test farms of the Lahn-Dill-Bergland.

In a further calculation, the machinery

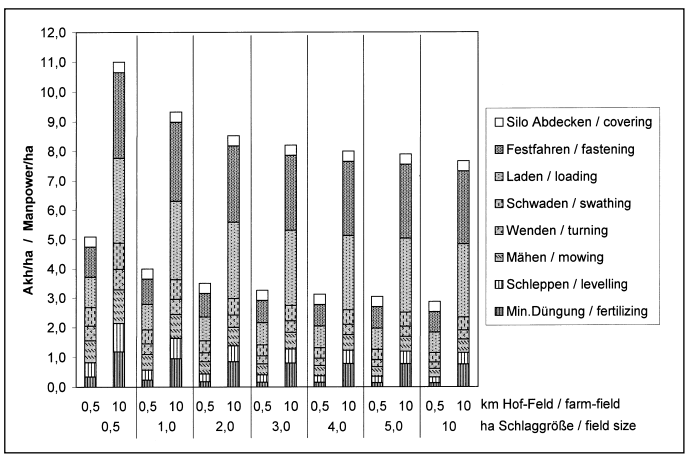

Fig. 1: Working time requirement (MP/ha) for wilted silage at different field sizes and farm-field distances

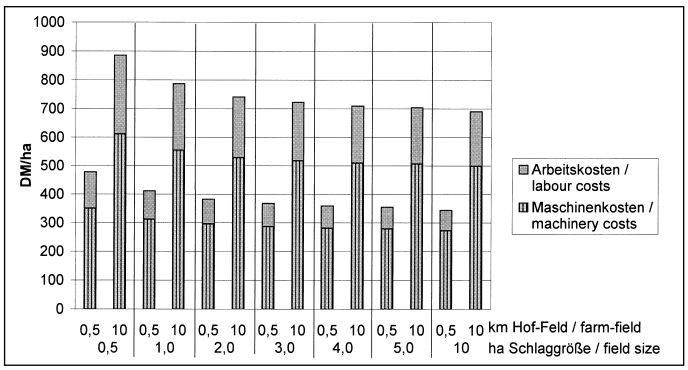

Fig. 2: Working and machinery costs (DM/ha) for wilted silage (new machines, capacity utilization 100%)

new value according to KTBL data [2] was entered as purchase price.

In addition to farm-specific capacity utilisation of machinery, a further calculation variant featuring 100% capacity utilisation was considered.

In the cost calculation for machinery application over several farms (ÜMV), the on-farm machinery was replaced with ÜMV including driver costs. The costs for this were taken from ÜMV tariffs in Hessen [7].

Thus, for every work operation the time-dependent costs (man hours/ha • 25 DM per man hour) and material costs (fixed and variable costs in DM/ha) were determined. From this resulted a relative parameter with a key figure for total costs in DM/ha.

The results from an example farm, a milking herd with year-round inside feeding, are given below. This farm comprised 172 ha including around 77 ha pasture and comprised extreme area division with 183 separate fields (strips) having an average size of 0.42 ha. The farm is divided over eleven local districts. Through compilation of fields lying in the immediate locality, or of those split by arable land, ways or streams, the average field size is raised to 1.28 ha, for example through an expedited farmland rearrangement process or voluntary land exchange. The average steading-field distance (HFE) is 2.8 km.

Results

In *fig. 1* the work time requirements are given in Akh/ha (man hours/ha) with increasing field size and for, in each case, 0.5 and 10 km HFE for all phases of the production (pasture care, mowing and harvesting of forage). The total production is divided into the tasks fertilising, levelling of molehills, etc, before grass growth begins, forage cutting, and forage retrieval with self-loading wagon as well as emptying, consolidation (rolling) of clamp at the steading (including waiting times) and covering of the clamp.

The forage retrieval, transport back to the steading, and consolidating of the clamp represents up to 50% of the total time requirements.

With an HFE of 0.5 km, the total working time requirement, dependent on the field size, lay between 5.1 and 2.9 man hours; with 10 km distance, between 11 and 7.7 man hours. With an HFE of 0.5 km and an increase in the field size of 0.5 to 10 ha a reduction in working time requirement of 43% could be achieved. Where the distance was 10 km, the saving effect would represent 30%.

A comparison of the machinery and labour costs (DM/ha) with different field sizes or HFEs where an investment in new machinery and a capacity utilisation of 100% is assumed, indicates that the machinery costs represent around 70 to 80% of the total costs (*fig. 2*). Through an increase in field size of 0.5 to 10 ha, there were savings in total costs of up to 25% to be expected for larger, as well as smaller, HFEs.

According to the mechanisation form, and field size the costs of silage production were between 410 and 1055 DM (*fig. 3*).

The utilisation of own machinery with used equipment (current situation) with 0.5 km HFE on very small fields resulted in costs of 580 DM/ha. Increasing the field size to 10 ha lead to a cost reduction of 130 DM/ha. A smaller field size and an HFE of 10 km (not uncommon for the trial area) led, on the other hand, to a cost increase of 370 DM/ha.

In comparison to the current situation, buying machinery new and utilising the capacity 100% was associated with a cost saving of around 50 DM/ha.

Through the application of ÜMV instead of own machinery (current situation), and where the HFE was small, there was almost no alteration in the costs. But machinery used on several farms (ÜMV) proved inefficient where the steading-field distance was high, this variant being responsible for higher costs of up to 110 DM/ha and therefore similar to the situation where new machinery was purchased with farm-specific utilisation.

Also to be taken into consideration by the total evaluation of production costs in silage production is the energy units (MJ NEL/ha) in the resultant silage.

On the test farm the first cut silage contained 15848 MJ NEL/ha [4]. This meant production costs for the field sizes investigated and HFEs were between 0.26 and 0.67 DM/10 MJ NEL. The comparatively small yield which, among other things, was caused by reduced fertiliser application within the requirements of extensification programmes caused higher costs as a direct result.

Conclusion

Farms in disadvantaged areas (as well as in traditionally divided areas) have an inefficient field structure and have therefore high production costs. The production costs for the use of self-loading silage wagons on farms with 1000 ha area in Brandenburg and Mecklenburg-Vorpommern lie, in comparison, at around 325 DM/ha including the costs for the withdrawal of silage from the clamp [5]. These costs were reached on the test farm with 100% capacity utilisation of machinery, 0.5 km HFE and 10 ha average field size (without withdrawal of silage from the clamp). Where the HFE is greater, or the field size smaller, the costs rise up to around 1000 DM/ha, therefore around 675 DM/ha higher.

With working time requirement calculations and, from these, the labour costs, it was demonstrated that considerable rationalisation advantages could be won through structural reorganisation.

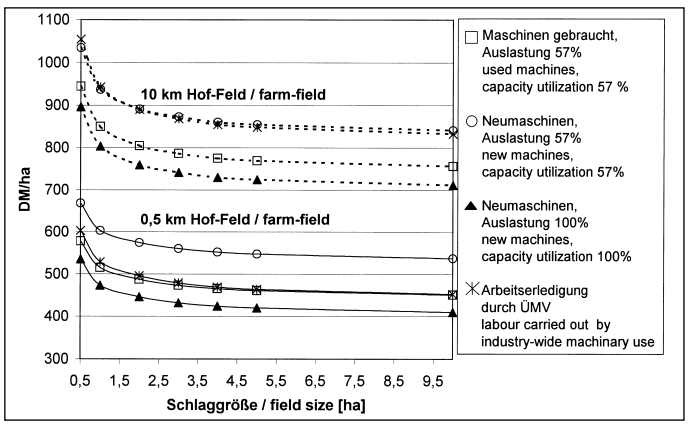

Fig.3: Comparing process costs of wilted silage for various forms of mechanisation