Labour productivity comparison of milking worker’s operation between German and Czech farms

Porovnání produktivity práce pracovníka při operaci dojení na německých a českých farmách

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INTRODUCTION

Czech agriculture is accompanied by a continuous performance growth (production, machinery). The result of this growth is the decline of the agricultural workers number, which is accompanied by labour productivity increase. This trend can be mentioned in all developed countries.

Productivity is a source of all economic value. There are mostly matched four crucial resources: time, capital, material activity, knowledge as a base of economic value growth. Their usage shall be consistently and thoroughly managed from the productivity point of view. Each group of resources has to be managed separately and in a different way with mutual co-ordination in the framework of the existing system. Beside increase of productivity (profitability) of capital (financial resources), it is necessary to increase live labour productivity (human) when using production means (assets) and in particular human knowledge in the optimal way. On these bases, there could be established even correct business strategy, which should respect time savings, costs decrease and production quality rises. Such a strategy leads through productivity increase to assuring the future business existence.

Labour productivity is, in general, expressed by the ratio, where the product (production) is measured with the volume of consumed work. Volume of production and consumed work can be measured by different ways in accordance with the level of the followed indicator. Worker production or production in connection with time unit is the most frequently followed on the corporate level.

Worker’s labour productivity in working process shall be understood as the effectiveness of the given human potential utilisation in working process at the expected conditions (working time duration, human physical and psychical abilities, working conditions, etc.).

New technology establishment, used technologies and work organisation improvement have a significant influence on labour productivity increase in the agricultural sector. In particular, working method, labour intensity and utilisation of working time (which create the basis of working processes organisation) could be assumed as the elements influencing the level of labour productivity. These elements are hardly mutually comparable, however, they can significantly influence the result of worker’s labour productivity. We are unable to reach good productivity result when using incorrect working method (working procedure, etc.) even if there is high working intensity and high working time utilisation.

OBJECTIVES

This contribution objective is worker’s milking operation labour productivity comparison on the basis of time norms and results of live work time consumption analysis comparison in Germany and the Czech Republic. Basic measures for comparison of labour productivity are time use and working procedure.

MATERIAL AND METHODOLOGY

Results of measuring the live work time consumption on milking operation at the family farm of Mr. Partoschek in the area of Hessen in Germany were starting information for comparing the labor productivity. There were used data from the collection of norms for the Czech Republic, elaborated by the Department of Agricultural Marketing and Management of the Faculty of Economics and management of the Czech University of Agriculture in Prague.

Data about live work time consumption on milking operation were acquired on the basis of five time surveys of working operation. There was used a digital seconds counter. When performing the time measurements, there was also viewed the level of work organisation – working procedure, location of control elements, etc. There were used statistical methods in purpose of the measured data evaluation and the results were elaborated in forms of tables. The resultant values were consequently compared with data from the collection of time norms for animal production.
RESULTS AND DISCUSSION

Primary data for comparing labour productivity were acquired through measurement at the farm of Mr. Pastochek. The family farm operates the area of 85 ha and the structure of agricultural area is accommodated to milk production. There are 85 heads of the Holstein Black-brindled milk-cows. The average performance per one dairy cow is 8,000 l of milk per year (lactation). Dairy cows are housed in the stable, which includes the area for milk house of the type Westfalia MA 2 x 5, PPS I 200 l/min. – herringbone arrangement. The technological performance is recorded to be 55–60 heads of dairy cows per hour. Milking is performed twice a day. In average, there are milked 55 heads of dairy cows. One milking corresponds to 701 l of milk. Milking operation is performed by the farm owner with the help of his wife.

There were elaborated synthetic results from the time surveys analysis results. They are mentioned in Table 1. The resulting times are recalculated at basic unit (one dairy cow).

The data mentioned in the table imply that the crucial live work time consumption is dedicated to the group of activities, which concern milking, i.e. 64.84%, which means 1.247 min/head*milking. Crucial time consumption in the milking group of activities is dedicated to the following activities:

- spraying + washing udder 0.360 min/head*milking, i.e. 28.85%
- machinery milking 0.255 min/head*milking, i.e. 20.45%
- setting teatcups on 0.221 min/head*milking, i.e. 17.71%

The following groups of activities are dedicated to other regular and irregular activities, which are realised when milking takes place:

- driving dairy cows to and away from milking house 0.082 min/head*milking, i.e. 4.28%
- other work when milking 0.114 min/head*milking, i.e. 5.97%

The above-mentioned groups of activities could be assumed to form the basic file of working procedure when milking in the herringbone-milking house (except the activities, which are connected with preparation of milk for calves and interview). If we compare the dosed data with the time norm mentioned in the collection of time norms for the mentioned milking house types, we find the following results:

- measured time consumption 1.443 min/head*milking for activities creating working procedure, when milking
- time norm for the herringbone milking houses (Westfalia, resp. 1.00 min. DZD 2x5, Agromilk)

It results from the comparison that the measurement results show a higher time consumption than the time norm. The reasons could be seen in the fact that the performance of dairy cows at the farm is higher than the average performance in Czech conditions. Also some activities as teats disinfections after milking and machinery milking were realised very accurately. If we eliminate two activities (which are mentioned above and are not directly connected with milking), then the resultant time consumption is 1.366 min/head*milking. Dairy cows’ presence duration in the milking house ranged from 10 to 12 minutes. Measurement results correspond with the hourly milker performance – 44 heads. The hourly performance in the time norms collection is 50–60 heads. The producer of the milking house type also mentions such performance.

As far as the preparation and cleaning of the milking house is concerned, the results in advance and after milking are the following:

- measured time consumption 24.221 min/head*milking
- time norm 43.000 min/head*milking

The difference, which benefits the followed milking house by 18.779 minutes, is predominantly given by the more adequate technological state and milking house arrangement – there are not installed the “driving corridors”. Dairy cows come directly from the stable to the milking house.

Consumption of the working time on milking operation was acquired from the results of the selected sample in German agriculture, which are as follows:

- Consumption of work time on milking 0.749 min/head*milking
- preparation of udder 0.367 min/head*milking
- setting teatcups on 0.333 min/head*milking
- machinery milking 0.033 min/head*milking
- taking teatcups off 0.008 min/head*milking
- control of udder 0.008 min/head*milking
- Consumption of time on other operations 0.701 min/head*milking
- driving dairy cows to and away 0.285 min/head*milking
- defect 0.017 min/head*milking
- waiting 0.333 min/head*milking
- special works 0.066 min/head*milking
- Total time consumption 1.450 min/head*milking

Comparison of this data with the collections of norms for the Czech Republic, elaborated by the Department of Agricultural Marketing and Management of the Faculty of Economics and Management, shows that in our conditions the consumption of working time is by 0.25 min per head*milking shorter.

In this case, there is reached a higher labour productivity of worker time in the surveys bases comparison in Czech conditions. It has to be noted that the difference is not significant. If we recalculate it in accordance with the performance, we reach the opposite results. Time consumption per 100 litres of milk was 9.757 minutes at the followed farm. Time consumption per 100 litres of milk was in Czech conditions, at 6,000 litres average performance and the mentioned time norm, 11.42 minutes. Then the difference in worker’s labour productivity in milking
Table 1. Results of live work time consumption

<table>
<thead>
<tr>
<th>Activity when milking</th>
<th>Measured time (minutes/shift)</th>
<th>Number of units/milking</th>
<th>Time consumption (minutes)</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Personal worker preparation</td>
<td>2.180</td>
<td>55</td>
<td>0.039</td>
<td>2.05</td>
</tr>
<tr>
<td>– before milking</td>
<td>1.030</td>
<td>55</td>
<td>0.018</td>
<td>1.030</td>
</tr>
<tr>
<td>– after milking</td>
<td>0.150</td>
<td>55</td>
<td>0.021</td>
<td>1.150</td>
</tr>
<tr>
<td>2. Driving dairy cows to and away, when milking</td>
<td>4.535</td>
<td>55</td>
<td>–</td>
<td>0.082</td>
</tr>
<tr>
<td>– driving dairy cows to milk house</td>
<td>2.390</td>
<td>55</td>
<td>111</td>
<td>0.043</td>
</tr>
<tr>
<td>– driving dairy cows away from milk house</td>
<td>2.145</td>
<td>55</td>
<td>11</td>
<td>0.039</td>
</tr>
<tr>
<td>3. Milking</td>
<td>68.622</td>
<td>55</td>
<td>–</td>
<td>1.247</td>
</tr>
<tr>
<td>– spraying udder</td>
<td>2.750</td>
<td>55</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>– spraying + washing udder</td>
<td>18.900</td>
<td>55</td>
<td>55</td>
<td>0.360</td>
</tr>
<tr>
<td>– changing over when washing udder</td>
<td>0.102</td>
<td>55</td>
<td>8</td>
<td>0.002</td>
</tr>
<tr>
<td>– setting teacups on</td>
<td>12.155</td>
<td>55</td>
<td>55</td>
<td>0.221</td>
</tr>
<tr>
<td>– milking control</td>
<td>12.135</td>
<td>55</td>
<td>23</td>
<td>0.220</td>
</tr>
<tr>
<td>– machinery milking</td>
<td>14.035</td>
<td>55</td>
<td>55</td>
<td>0.255</td>
</tr>
<tr>
<td>– teats disinfections</td>
<td>7.645</td>
<td>55</td>
<td>55</td>
<td>0.139</td>
</tr>
<tr>
<td>4. Other work when milking</td>
<td>6.315</td>
<td>55</td>
<td>–</td>
<td>0.114</td>
</tr>
<tr>
<td>– raking of excrements</td>
<td>0.495</td>
<td>55</td>
<td>7</td>
<td>0.009</td>
</tr>
<tr>
<td>– veterinary attendance</td>
<td>1.045</td>
<td>55</td>
<td>2</td>
<td>0.019</td>
</tr>
<tr>
<td>– preparing milk for calf breeding</td>
<td>3.300</td>
<td>55</td>
<td>1</td>
<td>0.060</td>
</tr>
<tr>
<td>– spraying floor in milkhouse</td>
<td>0.495</td>
<td>55</td>
<td>5</td>
<td>0.009</td>
</tr>
<tr>
<td>– interview</td>
<td>0.980</td>
<td>55</td>
<td>4</td>
<td>0.017</td>
</tr>
<tr>
<td>5. Milkhouse preparation and cleaning</td>
<td>24.221</td>
<td>55</td>
<td>–</td>
<td>0.440</td>
</tr>
<tr>
<td>– preparation work before milking (setting on a filter)</td>
<td>9.050</td>
<td>55</td>
<td>1</td>
<td>0.164</td>
</tr>
<tr>
<td>– washing milkhouse</td>
<td>10.330</td>
<td>55</td>
<td>1</td>
<td>0.187</td>
</tr>
<tr>
<td>– demounting filter in milk store room</td>
<td>0.656</td>
<td>55</td>
<td>1</td>
<td>0.012</td>
</tr>
<tr>
<td>– hanging up teacups</td>
<td>2.860</td>
<td>55</td>
<td>10</td>
<td>0.052</td>
</tr>
<tr>
<td>– putting the milkhouse on and off</td>
<td>1.050</td>
<td>55</td>
<td>2</td>
<td>0.019</td>
</tr>
<tr>
<td>– preparation of disinfection solution</td>
<td>0.275</td>
<td>55</td>
<td>1</td>
<td>0.005</td>
</tr>
<tr>
<td>6. Total time consumption</td>
<td>105.873</td>
<td>x</td>
<td>–</td>
<td>1.925</td>
</tr>
</tbody>
</table>

is 1.66 minutes, i.e. a lower labour productivity by 17%. It has to be emphasised that some working activities (teats disinfection, washing udder, etc.) were accurately followed at the farm.

Time is a significant measure when evaluating worker’s working activity. It has to be underlined that the time needed to perform a particular working operation could be different – workers reach different times when using the same working method and using the same working time and at the same working conditions. Human performance dispersion is known even in other industries, e.g. in sport. This dispersion in working conditions ranges in rate 1 : 1.5 to 1 : 2. There are known cases from practice, where this dispersion could be as much as 1 : 5–6. If we want to compare and to state labour productivity, we have to watch, next to working method and time consumption, also the performance parameter.

This parameter stating is the last data, where we can compare the watched object – workers mutually. With regard to this purpose, we have to state a limit, which shall
be the base for the comparison and which would meet
the value of prescribed performance, which is connected
with the working activity value. This performance could
be marked as the related performance – which corre-
sponds with the kinetic and tonic continuance, stated by
working method at the normative time. The related per-
formance could be also expressed in labour productivity
units, for e.g. number of heads/time.

The real performance of the followed worker corre-
sponds with the kinetic and tonic continuance stated by
the working method. It could be expressed in units of la-
bour productivity. The rate of real and related performance
expresses the performance level of the watched worker.

The performance level could be expressed in the form
of rate like an invariant or perceptual expression. Then
the value of performance level, which is lower than 100%,
resp. higher than 100% expresses the lower, resp. higher
real worker performance than the related performance.
There can be used a three-dimensional model of labour
productivity evaluation, which could be marked as “Pro-
ductivity Prism” for better understanding of the labour
productivity evaluation.

Productivity prism expresses the resultant reflection of
labour productivity without loosing information on par-
ticular elements values (see Figure 1).

CONCLUSION

The contribution is focused on labour productivity
comparison of milking worker’s operation. The labour
productivity is measured by time consumption on one
cow milking or worker’s hourly production. There were
used the results of live work time consumption measure-
ment at a family farm in Germany as the base of obser-
vation. There were used time norms from the collection
of norms elaborated by the Department of Agricultural
Marketing and Management of the Faculty of Econom-
ics and Management of the Czech University of Agri-
culture in Prague as a comparison base in Czech
conditions. We can assume, in accordance with the
comparison results, that there are no considerable dif-
fences in the level of labour productivity measured by
time consumption on one dairy cow between the men-
tioned German farm and Czech conditions. Lower time
consumption by about 0.166 min./head*shift resp. by
about 5 heads higher hourly performance is recorded in
Czech conditions. On this base, we can deduce a higher
labour productivity in Czech conditions (only from the
time consumption per head viewpoint). For more objec-
tive results, we should perform more measures at farms
in Germany.

REFERENCES

Sborník norem a normativů časů pro práce při ošetřování sko-

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