

THE DEVELOPMENT TRENDS OF THE FLEET OF TRACTORS ON THE FARMS OF LATVIA

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Summary

The article deals with the statistical indices which characterise the renewal rates of the tractor fleet in Latvia, changes in its structure, the quantity of tractors, and their energy intensity. Factors are shown that characterise different rates of the growth of the tractor fleet, the purchasing dynamics of new tractors which have the greatest specific weight among the purchased ones. There are perspectives of further formation of the fleet of tractors by reducing the quantity of tractors and increasing the number of energy intensive machines on the farms.

1. Introduction

In order to ensure economic efficiency of the fleet of tractors, great attention should be paid to correct formation of its structure, quantity and energy intensity. The topicality of this issue results also from the fact that the tractors make the main energetic basis on the farmers' homesteads, particularly, during the last few years when their prices and energy intensity has significantly grown. In parallel with this, the structure of the fleet of tractors should be formed to ensure economic efficiency of farms and their competitive ability. The farms of Latvia with the total area under crop from 20 to 50 ha have the following structure of tractor (by the engine power): 20 kW -13%; 32.5 kW - 19%; 50 kW- 25%; 80 kW- 35%; 100 kW-5%, the specific energy provision being 2.79 kW/ha. On the farms with the 200 - 300 ha total area under crop the structure of tractors (by the engine power) is the following: 20 kW- 7%; 32.5kW - 7%; 50 kW - 18%; 80 kW - 41% 100 kW- 25% (the year 2005) and the specific energy provision is 1.16 kW/ha.

2. Objects and methods

The object of this investigation is the fleet of tractors of Latvia. The applied methods are analysis and interpretation of the statistical data and the materials provided by other authors, prognostication of the development rates of production, the renewal of the fleet of tractors and the respective fleet of machines.

3. Results and discussion

Since 1997 to 2006 the number of the purchased new tractors in the fleet of tractors (76.7 thousand tractors) was 8345 tractors from which 73% belong to agriculture. The average annual absolute increase – the purchase of the tractors in the period mentioned above was 14.3 tractors. The average rate of the growth during this period was 2.7%. This shows how much the level of the new purchased tractors has increased in comparison with the previous year. The highest increase in the number of the purchased tractors (1086 tractors) was in 1998 in contrast to the year 1997. In many respects, this can be explained by the circumstance that more subsidies were allotted for the updating of agricultural technologies; in 1998 they constituted 35% of the total sum in the form of subsidies.

With the number of the tractors purchased every year growing, the value of the 1% of the increase in 1998 was 4.77 tractors but in 2006 – 12.23 tractors, i.e., 2.56 times more. The acquisition process of the fleet of tractors is characterised by great variety (fluctuations of absolute increases) caused by annual variations in the value of the allotted subsidies, the priority of purchasing modern energy intensive tractors (120...250 HP) in the recent years 2001...2006 the prices of which are 2...3.5 times higher in comparison with the prices of tractors purchased before the year 2001, as well as the tendency of the farms to increase their areas.

It should also be noted that the great fluctuations in the number of the purchased tractors by years have a negative impact on the prices of the supplied tractors. In case the number of (demand for) the supplied tractors is as prognosticated, their prices would fall by 10%, not less.

Figure 1 reflects the renewal dynamics of the fleet of tractors in the years 1997 – 2006 on the basis of analytical levelling as the time function $y=f(t)$, where y - the theoretical value of the number of the tractors purchased, t – the period of time (years), $t = 1..10$.

It is evident from Figure 1 that there is a variety in the acquisition of new tractors caused by amount of the allotted subsidies, or the financial support of another kind, changes in the structure of the new purchased tractors and the enlargement process of farms. The basic tendency of subsidising manifests itself with fluctuations, too, and is described by a 3rd order polynomial [$y = 0.1351x^3 - 1.5787x^2 + 5.1912x - 1.9501$, $R^2 = 0.9745$, where y - the sum of the granted subsidies for the purchase of the machinery, million Ls, X – the period of time (years), $X = 1..7$ (2000...2006)].

The equation obtained as a result of analytical equalisation also indicates that the renewal process of the fleet of tractors proceeds with variable acceleration. The coefficient which characterises acceleration ($a_4 = - 6.626$) of this process shows that it slows down because $a_4 < 0$.

The highest priority among the new purchased tractor is given to the energy intensive tractors which generally have a high price but the amount of the allotted subsidies, and their fluctuations do not allow the support of the required level of their acquisition for the renewal of the fleet of tractors to ensure high efficiency, the quality of the performed work and ecological requirements. The tractors turned out during the last six years constitute 5.6% of the fleet of tractors (the year 2005). The tractors which are older than 20 years constitute 42.8% of the fleet of tractors.

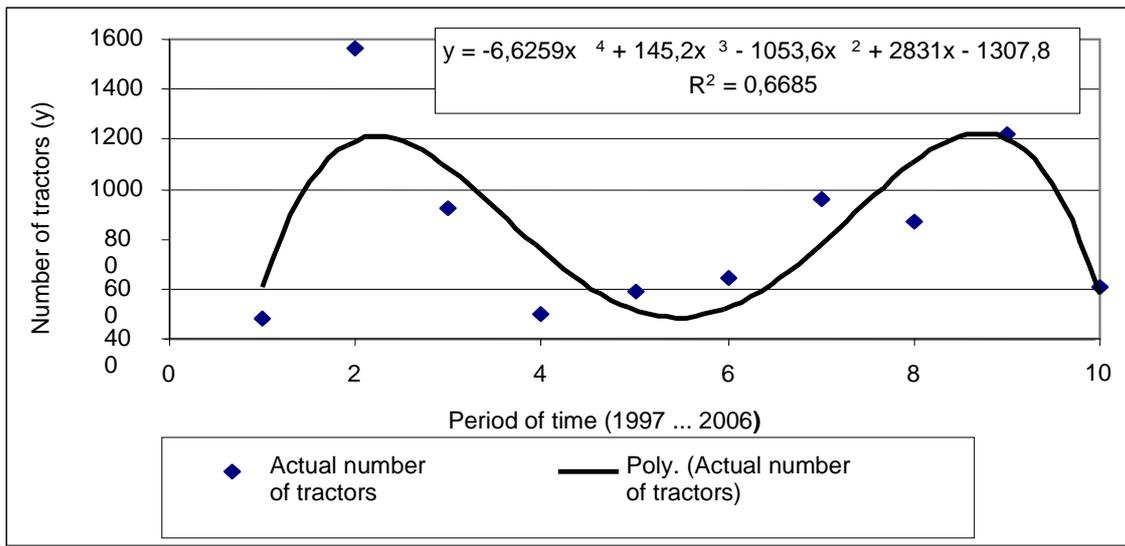


Fig. 1. Actual and theoretical renewal dynamics of the fleet of tractors

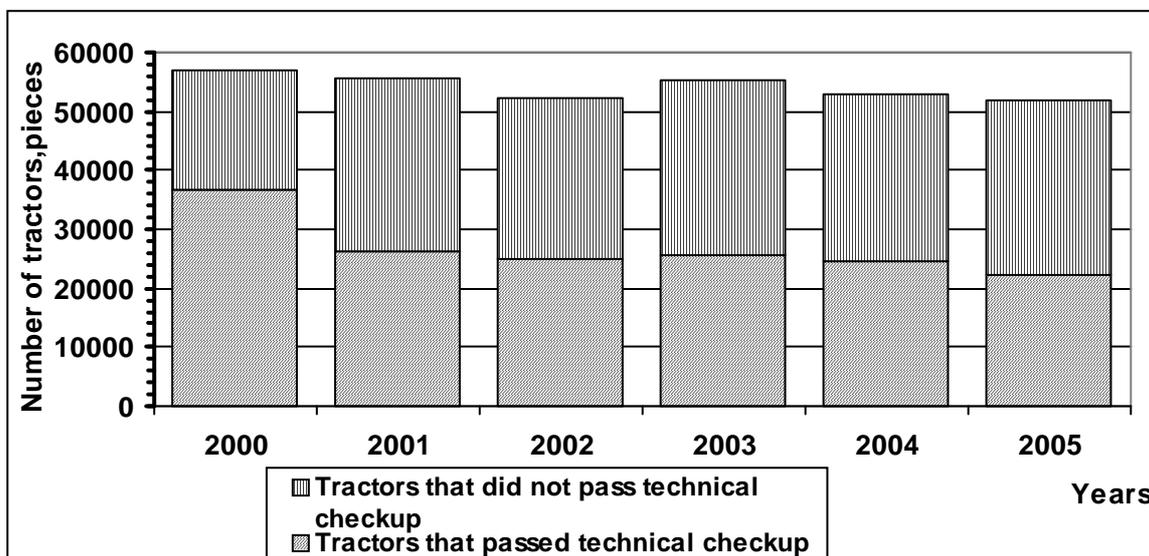


Fig. 2. Characteristics of the technical condition of tractors

Besides, the number of tractors that belong to the farms engaged in agricultural production makes 73% (56 thousand tractors) of all the tractors. The great number of tractors, in many respects, can be explained by the fact that their service life on the farms is continuous due to the intensity of their use during the year, the economic condition of the farmers, the prices of the new tractors, although they are in such a condition that the check-up is undertaken only for 41% of tractors.

The total number of tractors used in agriculture in the period 2001-2005 was 52-56.5 thousand with a tendency to decrease in number. However technically faultless tractors which can perform the work to a full extent does not reach even 50%. The total number of tractors and the number of the technically faultless ones are shown in Fig. 2. It is typical that the check-up has a tendency to decrease, which points to the aging of the fleet of tractors.

Figure 3 reflects variations in the structure of the fleet of tractors by the efficiency on the farms engaged in agricultural production in the years 2000-2005.

It is obvious from Figure 3 that there is a tendency for the number of the tractors of small efficiency to decrease and the number of highly efficient tractors to increase. Thus, in 2005 the total efficiency of the tractors increased by 6.5% (169970 kW) in contrast to the year 2000.

Figure 4 shows the distribution of the average efficiency of the tractor and the specific energy provision depending on the total area under crop.

It is evident from Fig. 4 that the average efficiency of the tractor increases when the total area under crop is increased, but the specific energy provision decreases. This witnesses that energy intensive tractors are generally used on large farms, which allows reaching high efficiency of the tractor aggregates, lowering the fuel consumption per hectare and lessening the negative impact on the natural environment. Thus the combined aggregates are efficiently used in soil preparation and sowing for the production of cereals. The high specific energy provision on the farms having small total areas under crop account for the great

number of tractors of low efficiency which are at their disposal. The data analysis shows that on the farms having more than 50 ha of the total areas under crop 53 ha fall on a tractor but on the farms with the areas under crop less than 50 ha only 11ha, the specific energy provision being respectively 1.47 kW/ha and 6.57 kW/ha. On the farms with the total areas under crop over 100-150 ha their energy provision is 1.65 kW/ha.

For comparison, in such industrial countries as Canada, the USA, Australia – 0.35 kW/ha, in the countries of Central and Eastern Europe – 1.06 kW/ha, on small farms of Western Europe and Japan – 9.18 kW/ha [8].

Figure 5 reflects the purchasing dynamics of the new priority brands of tractors having the greatest specific weight among the tractors acquired in the given period (years 2000...2006), except the tractors of the MTZ brand.

It is obvious from Figure 5 that the number of the purchased priority tractors has a high rate of increase. If the years 2000 and 2006 are contrasted, then the acquisition of the tractors of the Valmet brand increased 7.7 times, John Deere - 7.2 times, and Case – 13.2 times. Besides, the Valmet tractors have the highest value of the 1% -increase – 1.16 tractors, whereas Case - 0.79 tractors.

Tractors of the brand MTZ have the greatest specific weight among the annually purchased tractors. However the number of the MTZ tractors acquired in the respective years is decreasing with every year in contrast to all the other brands of tractors. Thus, in 2000 their proportion was 72%, in 2005 – already 50%, but in 2006 - 26%. The data show that among the tractors purchased since 2001 ever increasing preference is given to the following brands: Valmet (Valtra), John Deere, Case. This points to the fact that not only the price but also reliability, economy, energy intensity, possibilities of their efficient application, the degree of comfort and other characteristics play certain role in the renewal process of tractors.

The specific energy provision on large farms has fallen by 9% at the expense of the use of energy intensive machinery and the growing labour productivity. Such a trend is promoted by the enlargement process and specialisation of farms. This tendency towards the growth of energy intensive machinery on the farms allows prognostication of the number of tractors which may constitute 26-30 thousand in the future. At the present rate of such a renewal of the fleet of tractors it may be completed in every 15 years.

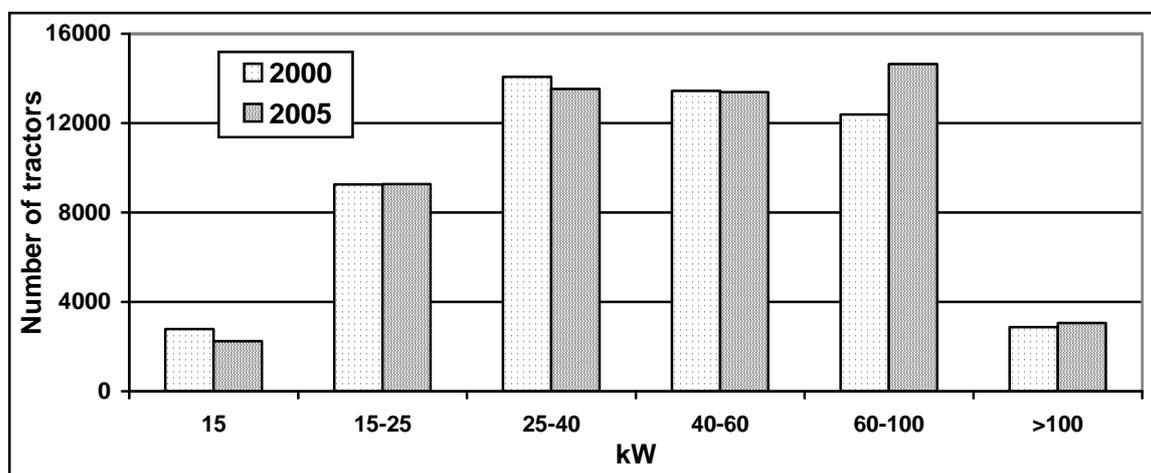
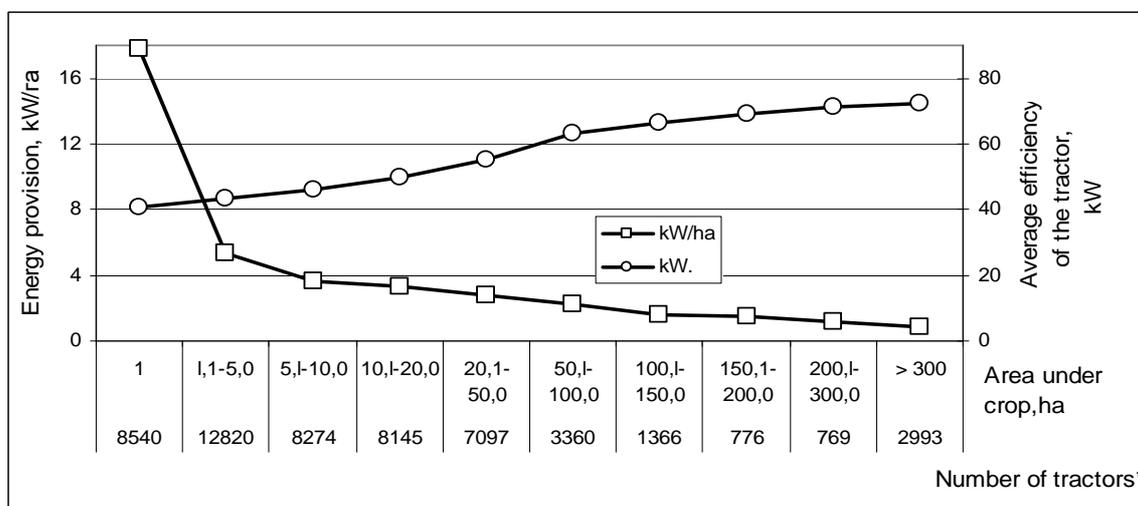


Fig. 3. The distribution structure of the fleet of tractors by the engine efficiency on the farms



* The number of tractors on the farms relates to the corresponding interval of the area under crop.

Fig. 4. Distribution of the average efficiency of the tractor and the specific energy provision depending on the total area under crop (in 2005)

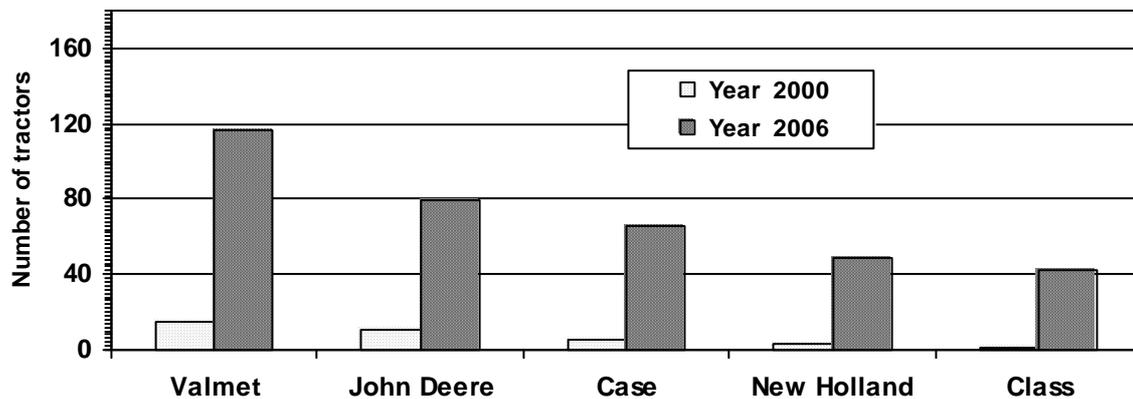


Fig. 5. Purchasing dynamics of the newest priority brands of tractors on the farms

4. Conclusions

The average growth of the number of the purchased new tractors is 2.7 % (the years 1997...2006); however, it is not satisfactory.

The priority of the tractors to be purchased has changed during the recent years in favour of the up-to-date and energy intensive ones (120...250 HP).

One of the reasons for the low renewal rate of the fleet of tractors is insufficient state support and its significant fluctuations by years.

The tendency in the growth of the number of energy intensive machinery and the renewal rates of the fleet of tractors with the reduction in their number allows prognostication that in the future the number of tractors will be 26-30 thousand.

5. References

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