

THE MAINTENANCE OF TRACTORS AND THE DEVELOPMENTS IN ESTONIA IN 2006

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ABSTRACT. *The problems connected to the maintenance of tractors in agricultural enterprises have not been studied in recent years. In this article an overview of what is the current situation with the diagnostics of tractors, repairs and maintenance works in reality is given. How they are actually organized, what are the future prospects and expenses in this field and how satisfied the workers are with the situation. As a separate part are discussed at the characteristics of the western tractors, their expenses connected to repair works and maintenance. The fuel consumption of Valmet, John Deere and New Holland tractors is compared. All the statistics are also compared to those of the Russian tractors.*

Keywords: *tractor, repairs, maintenance, diagnostics, maintenance costs.*

Introduction

From time to time every technical system needs some kind of diagnostics of its technical state, maintenance or repairs. This is necessary for being able to use the machine if needed and exploit all the resources of a machine's working life. During the past 15 years, no research has been done on machine maintenance in Estonia. Since the collapse of collective farming in the early 90's, there have been many changes in the agricultural sector, the main one being the fact that the state owned companies were turned into private enterprises. As a heritage from the Soviet era, we still have the old tractor park, but, compared to the modern technology, it has grown weaker and working with it is not in accordance with the elementary health regulations. Due to the aforementioned factors, there has been a considerable increase in the import of the western tractors. Still, we lack any data concerning the reliability of service and maintenance costs of the western tractors, neither has any comparison been made between the tractors that belong to the same class but come from different companies.

Sooner or later we will have to swap the Russian tractors with the western ones. The speed, extent and dynamics of this process have not been explored yet. Because of the recent changes in the agricultural sector with Estonia becoming one of the member states of the European Union, local enterprises have more possibilities for getting different subsidies, which has also brought about an increase in competition. Therefore, in accordance with market economy, those who survive will be the ones who can produce the best product at the lowest price. This means that production costs have to be under control and supervised on a regular basis. A farmer's work is very dynamic and in high season the maximum is taken from the tractors and, because of that, it is essential the maintenance of the machines be carried out with extreme caution and that the resources of tractors be diagnosed.

In 2005 there were 27 700 agricultural households in Estonia which is two times less than in the year 2001. The decrease is caused by the disappearance of smaller farms, as most of the farming is concentrated in the hands of large agricultural enterprises. Agricultural statistics divide agricultural producers into two: big agricultural enterprises, which give most of Estonian agricultural production, and small domestic farms, which have no relevant impact on production. The key emphasis has been put upon agricultural enterprises in this paper.

The number of small households that hold less than 10 ha of agricultural land has decreased by 23 700, but they still make up 65% of the total number of households. The number of medium sized households (10–50 ha) has also decreased since 2001. Large agricultural households (50 ha and more) are the only ones the numbers of which have increased (Klaus, 2006).

The total size of agricultural land has decreased only 5% between the years 2001–2005 (42 000 ha). This land has been redistributed between households of different sizes. The agricultural land of small and medium sized households has decreased 158 ha. Most of the agricultural land belongs to households that have more than 50 ha of arable land, although these households make only 8% of the total number of households in Estonia. These enterprises have increased their agricultural land by 11 6000 ha and they have 73% of the total amount of agricultural land. (In 2001 the same number was 56%). The average agricultural land has increased from 15.6 ha to 29.9 ha per household. Households having more than 50 ha of land have on average 268 ha of agricultural land (Klaus, 2006).

The tendency that most of the farmland is going to the hands of larger enterprises has been common to the European Union for some years now. The speed of this process in Estonia has been higher than the European average. After becoming a member of the European Union and due to getting help from different funds, Estonia's

farmers self financing ability has improved, but at the same time, the expenses have also gone up. Here we should add that for the next programme period, from 2007 to 2013, there will be also many regulations that will need big investments from the part of the farmers. For example, starting from the year 2007, they will have an obligation to use the best possible equipment (Maaelu arengu strateegia 2007...2013). For analyzing the profit of agricultural producers according to the type of production and size, a system called FADN (Farm Accountancy Data Network) is used. Coming from the aims of FADN, only professional business companies, whose income comes mostly from agricultural activities, will be included in the research database. For guaranteeing enough production per professional producer, there are minimum standards for economic size and the companies below that level will not be included in the database. Since 1998, the minimum economic size in Estonia has been 2 ESU (37550 EEK) (Eesti riiklik arengukava 2004...2006). This means that a company has to have approximately 20 ha of crops or 5 cows. According to the Statistical Office of Estonia there are 7970 companies here that correspond to the standards set by the FADN. More than a half (58%) of these producers fall into the smallest group of producers (2–4 ESU) (Eesti maaelu arengu strateegia 2007...2013, Eesti riiklik arengukava 2004...2006). Most of these producers grow crop, cattle or have mix enterprises. Not only the small companies but also the medium-sized ones need restructuring as making them stronger is essential for improving rural life and making it more competitive (Eesti maaelu arengu strateegia 2007...2013, Eesti riiklik arengukava 2004...2006).

Today, out of all the 46 000 tractors working in our fields, most (90%) are of Russian origin. To make things worse – they are not just Russian, but also very old and driven by old drivers. The problem is that there is no training for tractor drivers in our vocational training system, plus that young people are not interested in driving old Russian tractors, although, at the same time, they lack the skills and knowledge for driving the western machinery as well. A way out are the short trainings, offered by companies selling western tractors, but those usually expect prior experience with tractors (Traat, 2005). Neither is there any overview of the expenses and output of the western and Russian tractors nor any comparison made between the tractors and their importance in Estonia.

During this research we conducted an expert poll asking people, responsible for maintenance in different companies in Estonia, about their attitudes and opinions about their field and the company's future prospects. We also looked at the problems connected with the maintenance of tractors. In doing this, we differentiated the tractors coming from Russia or from the western countries. By the western we mean all the other countries except for the former Soviet Union. By "Russian" we mean the tractors that come from the Soviet Union or present Russia. The reason for making this division is that currently in Estonia most of the hard work (eg harvesting) is made by the western tractors and therefore they are treated as more special. This means, that they are diagnosed, repaired on a regular basis and maintenance is done in special service centres or, an expensive manufacturer's specialist is called. As the sums spent on those works are very high, the process is also looked at and controlled by many people. A tractor driver working on a Russian tractor usually knows for himself what to do and how to take care of the tractor.

Material and Methods

The purpose of this research is to get an idea of what experts think about the maintenance of tractors and how they evaluate the overall situation in agricultural companies. In order to get the answers, we performed the following questions and tasks:

- 1) what is the real situation in diagnostics, repairs, maintenance, *etc.*; how are those activities organized in practice, what are their prospects for the future; what are the expenses and how satisfied are people with the situation;
- 2) what are the utilization qualities and maintenance expenses of the western tractors;
- 3) how much and what kind of information can be possible to get from agricultural companies;
- 4) how is keeping track of expenses of the tractors organized in actuality.

We prepared and conducted an expert interview with heads of engineering departments. In addition to the above, we also investigated the roles of the main mechanics and main engineers in companies.

The gathered information was divided into objective and subjective: interviews being subjective and information from bookkeeping being objective. 51 companies altogether, out of which most had a total turnover of more than 1 million EEK, were investigated during this research. Larger companies were chosen because they are the main influencers of the agricultural cubage although proportionally they make up a small part of the total number of agricultural companies. When doing the interviews, we went to central and southern Estonia and also conducted interviews by mail. Among those interviewed were among others 10 companies which make the biggest turnover.

All the questioned experts had a very long working experience (10–15 years) working with tractors, their maintenance, etc. Most of the experts had higher education and they had also worked in collective farms during the Soviet Union and, therefore, they could give an opinion about the changes and differences of the situation now and back in the Soviet Union.

Results and discussion

In the enterprises under observation, the turnover per tractor was with even frequency between 400 000 EEK and 1 000 000 EEK, while 24% of the tractors had a turnover over 1 000 000 EEK and 17% of tractors had a turnover under 400 000 EEK (Figure 2). The very top of the turnover was not seen because we were not expecting such big numbers and therefore the questionnaire had 1 000 000 EEK as the maximum turnover. As can be seen from these numbers, the total turnovers vary substantially between companies. The main difference occurred from the fact that some companies had their non-working tractors also registered in their bookkeeping and therefore the usage costs per tractor were lower than in reality.

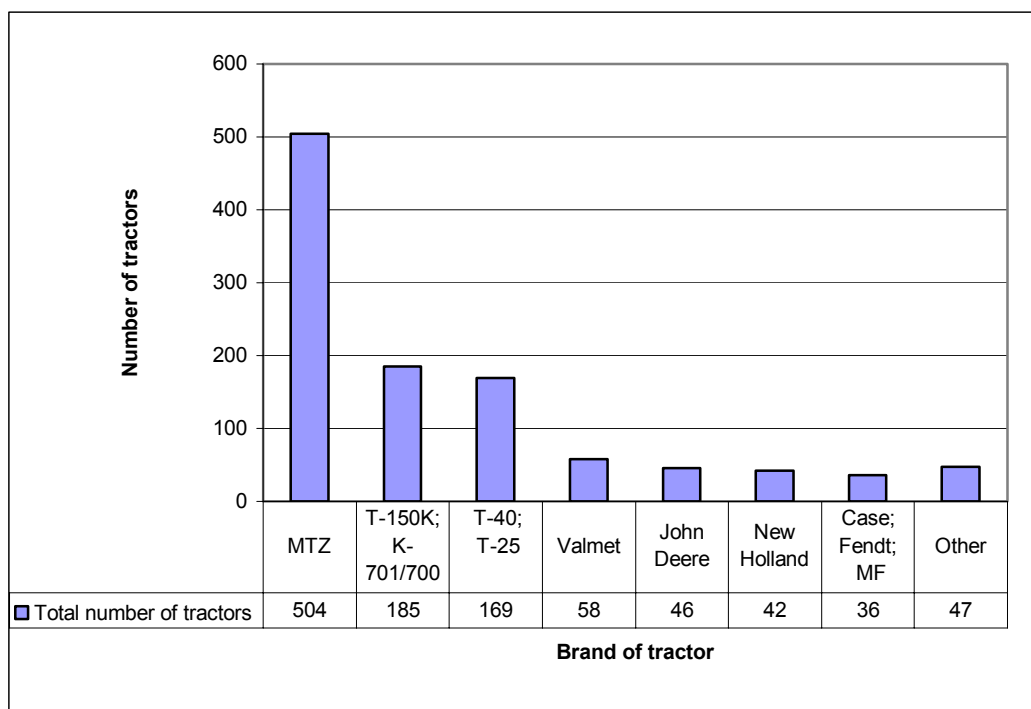


Figure 1. Number of tractors in the companies under investigation

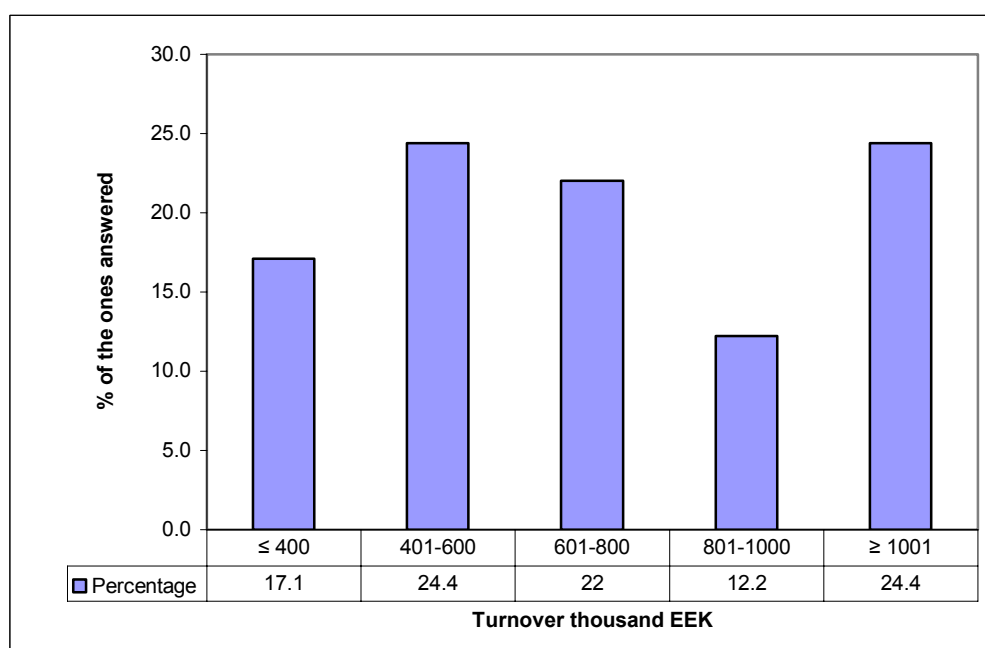


Figure 2. Distribution of enterprises according to the total turnover per tractor

Next, we studied how big share of the market was held by different western tractors selling companies. As we can see, the most popular brands in Estonia are Valtra and John Deere, holding 31 and 33% of the market respectively. These numbers indicate that the total number of 64% of the tractors come from these companies. New Holland is also quite close, having 18% of the market. Other brands are not playing a significant role in the market.

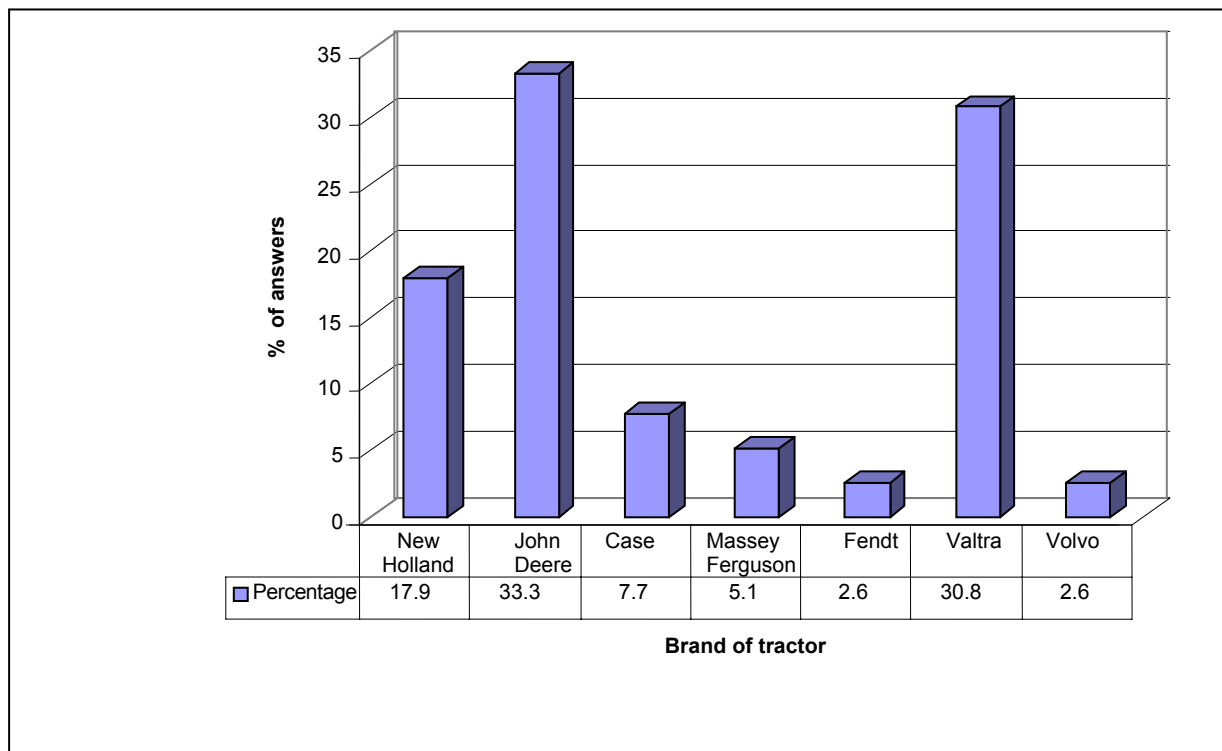


Figure 3. Most popular western tractor brands in Estonia

As a comparison we will look at the distribution by brands of newly registered tractors in the Estonian Motor Vehicle Registration Centre during the last six years (Figure 4).

When choosing the brand of tractor, 29% of the experts considered the price as the most important factor, 25% found good service as an important feature and 21% considered the distance to the service centre very important.

The experts questioned during this research worked for the companies which had over 1000 tractors altogether, out of which 231 were western-manufactured. The total amount of tractors is very hard to tell as the process of renewing the tractor park and selling the old tractors is continuous. Among the enterprises under observation, 71% had up to 20 tractors. Out of those 71% enterprises, 40% had up to 3 western tractors and 38% had 4–7 western tractors. Every year there is a gradual change caused by replacing Russian tractors with the western ones. The speed of this process depends mostly on the prosperity of the farmer. As mentioned before, the most popular brands are New Holland, John Deere and Valtra plus the only remaining Russian tractor MTZ. We can assume that these 4 brands do most of the agricultural work in Estonia. Most of the western tractors are quite new, as 70% of the enterprises have the western tractors which are less than 3 years old. The rest of the companies had the western tractors which were up to 7 years old and there were almost no companies having older (western) tractors. On the other hand, the Russian tractors being used were usually between 12–15 years old. 65% of the companies had less than 100 ha of arable land per tractor and 12% had more that 200 ha of arable land. In most companies the turnover per tractor varied between 400 000 and 1 000 000 EEK.

50% of the experts found that the technical state of Russian tractors was in an average condition. 35% of the experts were of the opinion that the tractors were in good condition and 13% thought that they were in a bad condition. 69% of the western tractors were according to the experts in a good condition and 20% of them were in a very good condition. As a result, we can conclude that most users found that the western tractors were in a better condition than the Russian ones.

In 68% of the enterprises the maintenance rooms were in good condition and in 26% in bad condition. The word "good" is of course relative, as the ones that were checked by the authors, could not have been considered "good" and neither did they correspond to any of the Euro regulations. Still, they were evidently recognized as customary.

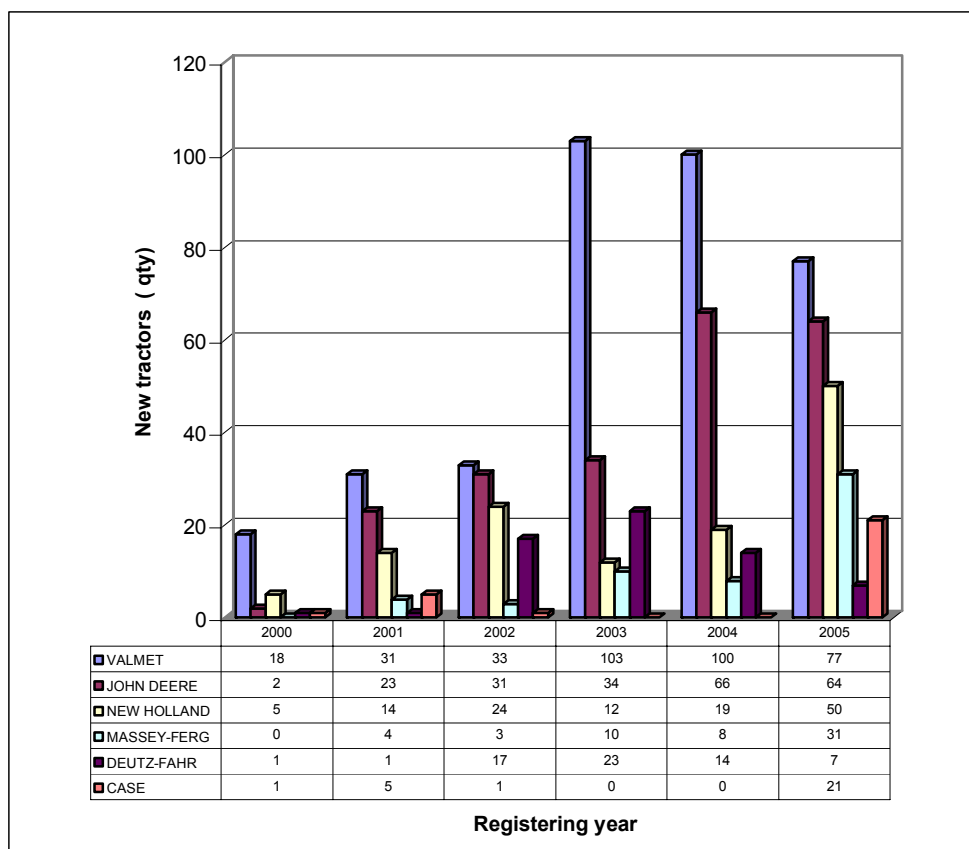


Figure 4. Distribution of the most imported tractors between the years 2000–2005 according to the Estonian Motor Vehicle Registration Centre

14% of the experts claimed that they had no trouble doing repairs on Russian tractors. 21% stated that they had problems repairing the hydraulic systems and the power take-off shaft. The main problems with the repairs of the western tractors included the engine (for 31% of the companies) and the power take-off shaft (for 23% of the companies) (Figure 5).

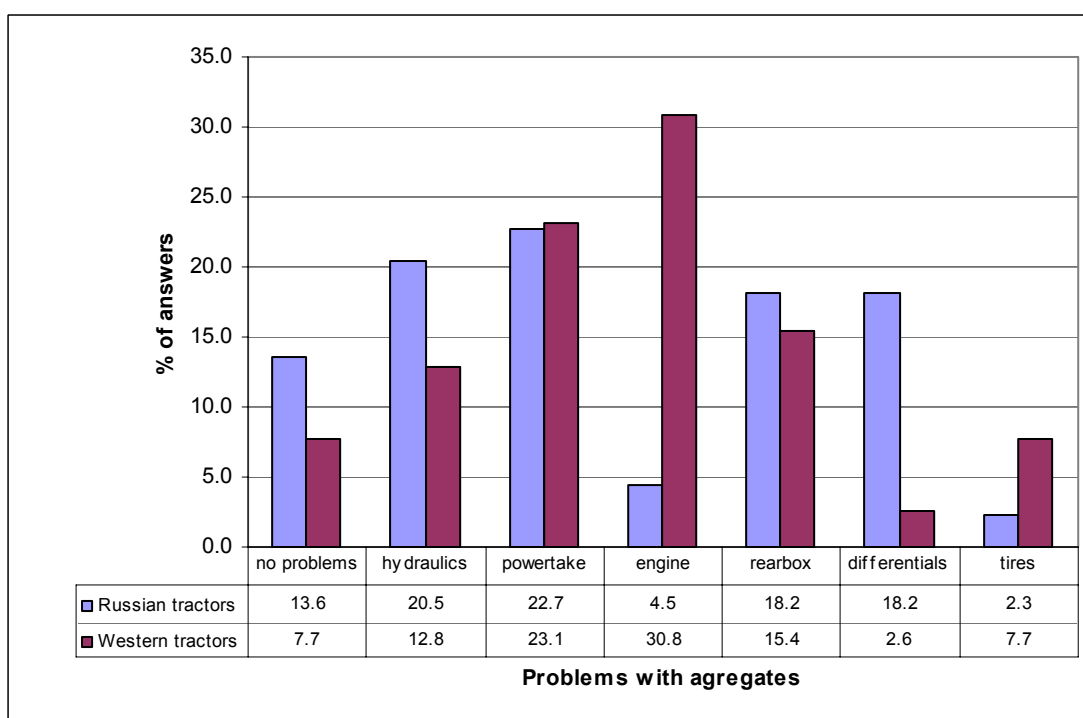


Figure 5. Expert evaluation of malfunctions of various aggregates

73% of the time, repairs on Russian tractors are done with internal resources, only sometimes using a bit of outside help. On the other hand, repairs on the western tractors are done only in 9% of the cases. 22% of the users do not do any repairs by themselves.

33% of the experts thought that the training of repairmen should be better. 21% thought that everything is in the best condition and 2% thought that everything connected to repairing should be changed. Half of the correspondence found that the repairs of the western tractors are too expensive. 13% found that the repairs are on average expensive. At the same time most experts noted, that the maintenance costs of Russian tractors are not expensive, while the maintenance of the western tractors was very expensive for 77% of the correspondence. So we can reason that the maintenance of Russian tractors is considered normal and of the western ones is considered rather expensive.

63% of the experts said that there rarely is a situation, where they can't diagnose the malfunction of a Russian tractor, while 13% of the correspondents said that this situation never happens. 4% said that they can almost never diagnose what is wrong with the tractor. With the western tractors, the situation is vice versa, as 27% of the time they are unable to diagnose the malfunction, and in only 7% of the cases they are able to do it right away. Seldom, if ever, they can't diagnose a malfunction in 34% of the time. Therefore, we can say, that it happens twice as often with the western tractors that they are unable to diagnose the malfunction. One third of the respondents said, that they have a good choice of tools for repairing Russian tractors while only 15% said that they had enough tools for repairing the western tractors. One third of the companies had satisfying monitoring devices for Russian tractors, whilst there was almost none of that equipment for the western tractors.

63% of companies keep track of fuel consumption, while 37% of companies do not do it. In some companies fuel was written off by the direct superior who was responsible for giving the task. Usually fuel consumption was written down to a special work sheet. In reality, the actual fuel consumption was smaller than indicated on the working sheet as it is almost impossible to prevent the stealing of gasoline and it is very hard to check small amounts of fuel used. There were also a few companies that did not have any system of keeping track of the consumption of fuel and it was just taken out of huge tanks, when needed.

47% of the experts claimed that the optimal working hours of a tractor per annum is at least 1500 hrs. One company suggested even that tractors should have around 2500 working hours per annum. But this was the extreme end and the average amount of working hours that was suggested, was around 1000–1500 hrs (36%). If a tractor works 2000 hours per year, this means that in 6 years it will have about 12 000 working hours, which is also considered the limit of a tractor's life expectancy, after which the repair costs rise substantially. 86% of the experts stated that the propelling force of the tractors that was needed in their companies, should be 160–190 hp. This shows that Russian tractors are not strong enough to perform the main jobs (Karjane, 2003; Karjane, 2005).

56% of the enterprises under observation had a special post for the main mechanic or a chief engineer, while 44% did not have any such position. Only about a quarter of the companies had a division mechanic and 34% of the companies had a chief of the repairs unit. The amount of personnel working with tractors was in direct correlation with the number of tractors and the size of the company. 61% of the enterprises had a position for a turner while 56% had a welder and a locksmith. 84% of the companies did not have a special position for a care and maintenance specialist. It is still advisable to investigate per how many tractors it is economically profitable for a company to have a special maintenance unit.

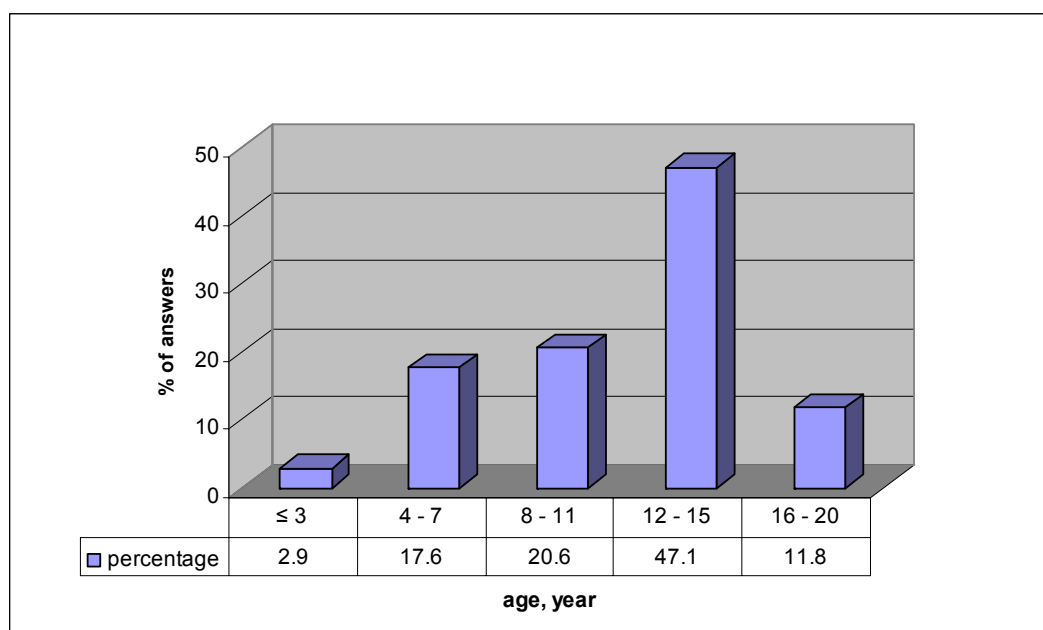


Figure 6. Distribution of companies according to the age of MTZ tractors

Next we looked at the maintenance costs of tractors during the last 2 years. The costs depend mainly on the age of the tractor, the tractor driver and how the tractor is being used. We looked at the average costs spent on repair materials and service fees for repairing. The amount of money spent on service fees is highly dependent of the type of malfunction and the extent of repairs. On the other hand, the time spent on repairs is dependent of the skills and experience of the tractor driver. This is mainly due to the fact that in most companies, tractor drivers are responsible for the repairs. The fee for repairing a Russian tractor equals to the minimum wage that was 17 EEK/h in 2005. The main reason for this is to have the drivers spend more time on the field than in the garage as they get 40 EEK/h for working in the fields.

Maintenance costs are formed during the regular maintenance sessions that are regulated by the manufacturer. Usually they consist of changing oils, filters, and sometimes bigger and longer checks.

The costs and expenses of different tractor brands have been indicated in the Compendious Table and Figure 8.

In order to compare the fuel consumption, we look how many litres are used because the price of fuel is constantly changing. We also have to take into account that most companies have more MTZ tractors than drivers which means that some tractors are not working and no fuel is spent on them. This explains why the data on the fuel consumption of the western tractors is more precise and seemingly higher.

Most of the companies repair their Russian tractors by themselves while western tractors are being repaired in service centres. Still, there are 7% of companies that try to do all the repairs by themselves, including the repairs of the western tractors. We can best understand a company's repairing policy by looking at the repairs of engines. None of the companies do repair works on the engines of the western tractors, whilst most would try to fix the engines of Russian tractors by themselves. The same applies for the repairing of gearboxes, where 97% of enterprises do not do these kinds of works on the western tractors, while only 6% would not try to do the same works on Russian tractors.

Maintenance care is organized in a similar way to the repairs. Most companies have the necessary equipment for repairing Russian tractors, but none have special tools for fixing the western ones. Soon enough we will witness the disappearance of both old retiring drivers and old tractors. In the future, if an agricultural enterprise needs to do any necessary maintenance or repair works, it will turn to special service centres. This system reminds a bit of the system which we experience nowadays with cars, when only the cleaning and an occasional oil check is done by the user himself. This kind of service centre system can only function well if there are enough service centres nearby. This is also the main problem of this system that tractors tend to break down simultaneously during the busiest period of work and the service centers get burdened and there will be huge queues. Habitually a tractor has to wait for weeks in a queue and when there is no service centre in the vicinity, the transportation could turn out quite expensive.

Some companies have diagnostic equipment for Russian tractors but none could afford such equipment for the western tractors mainly due to their high price. Most questioned experts claimed that another serious problem is the lack personnel to do such work. It is very expensive to find a good qualified worker for such a post and it is even more difficult to pay them a competitive wage that would motivate them to work and develop their skills in their field just like a worker who has to be able to do diagnostics on a daily basis. It must also be added that in order to make the diagnostics equipment profitable, it has to be working constantly. Despite this, most experts were satisfied with the organization of repairs.

From among the companies which had up to 10 tractors, 38% preferred John Deere, 31% Valtra, 19% New Holland and 13% Massey Ferguson tractors. From among the companies which had 11–20 tractors, 38% preferred New Holland. Valtra and John Deere were both preferred by 25% of the users and 13% preferred Case tractors. From among the companies which had 21–30 tractors, 67% used John Deere tractors and 33% Valtras. From among the companies having 31–40 tractors, 40% used Case tractors and others had equally John Deere, Valtra or Volvo tractors. From among the companies which had more than 40 tractors, 43% had Valtra tractors and 29% preferred the John Deere brand.

The companies that had up to 10 tractors, said in 32% of cases that the most important factor, when buying a tractor, is the price. The companies that had 31–40 tractors, on the other hand, found in 80% of cases that the most important factor is the location of the service centre.

From among the companies that had up to 10 tractors, 70% did not keep track of the tractors' expenses. 85% of the companies that had 11–20 tractors, did not keep track of the expenses of the tractors. 67% of the companies that had 21–30 tractors, kept track of the expenses, 60% of the companies that had 31–40 tractors, kept track and 83% of the companies having more than 40 tractors, kept track of different expenses connected with the tractors (Figure 7).

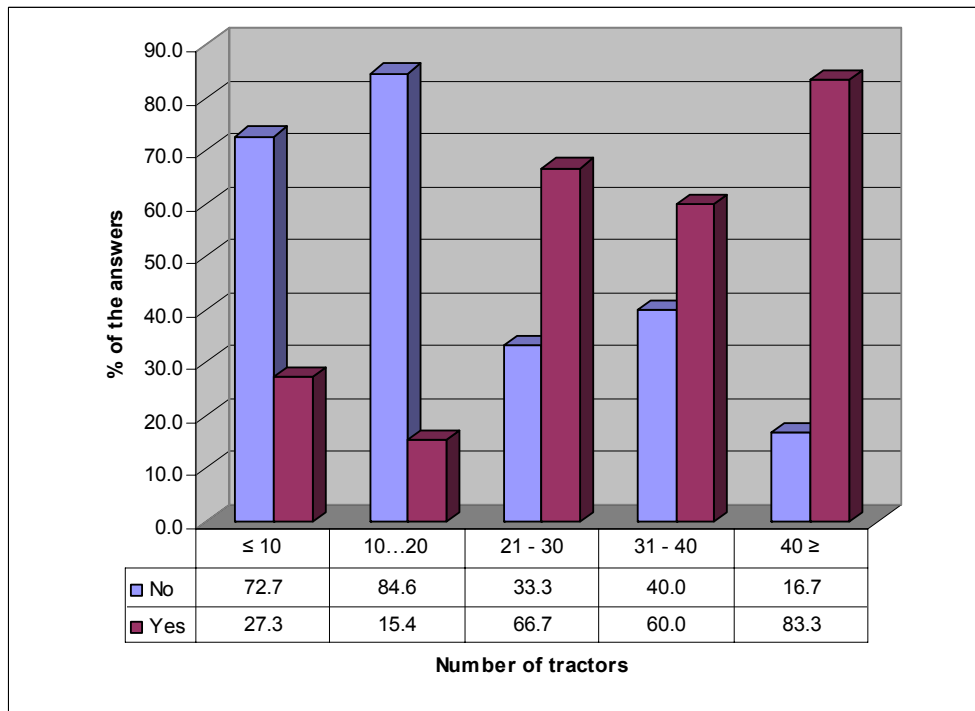


Figure 7. Keeping track of the expenses connected with the tractors is dependent of the number of tractors in the company

60% of the companies that have fewer than 10 tractors, do not keep any record of the expenses of the repairs and put them all under the heading "all tractors". 54% of the companies having 11–20 tractors, 67% of the companies having 21–30 tractors and 60% of the companies having 31–40 tractors keep a record of the expenses made for repairs. 67% of companies that have more than 40 tractors keep a record of the expenses of the repairs made on a monthly basis.

52% of the companies that have less than 10 tractors do not keep track of such expenses. The companies that have 11–20 tractors, keep track of the fuel consumption in 62% of cases and absolutely all the companies that have more than 40 tractors, keep track of the fuel consumption. The latter is explained by the fact that when fuel is consumed in large quantities, it would be impossible to trace any misuse and detect, who is stealing or using too much gasoline.

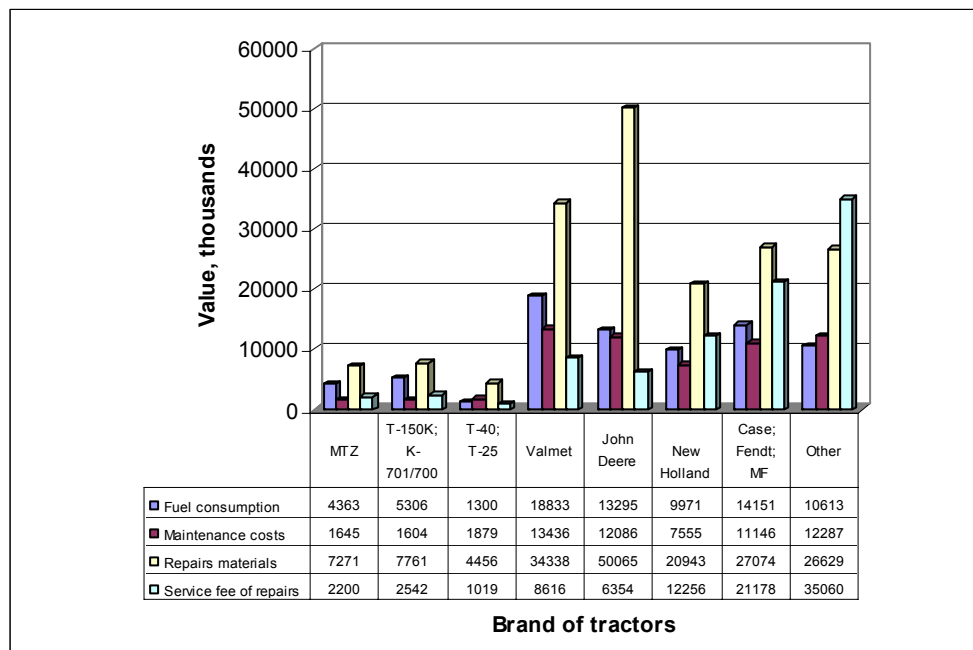


Figure 8. Indices of the usage and maintenance costs of different tractors

Table 1. The costs and expenses of different tractor brands

No	Index	Unit of measurement	MTZ	T-150K K-701/700	T-16 T-25 T-40	Valmet	John- Deere	New- Holland	Case; Fendt; MF	Other western tractor	
1.	Tractor	Registered in the bookkeeping, pieces	Pieces	X	74%	69%	38% 1; 56% 2	46%	25%	38%	48%
2.	The tractors age	Range	Year	50% – 12–15 years 60% more than 12 years	12–15	74% more than 12 years	100% up to 7 years	87% up to 3 years	67% up to 3 years	69% up to 3 years	≈ 50% up to 3 years
3.	Power		hp	80	150/280	15–40	120–190	150–185	190	150–200	100–150
4.	Consumption of diesel per tractor in a year	Range	Liter	3803– 5147	1073– 12920	172– 2148	10 091– 26 388	6981– 22432	4297– 17 501	2202– 37 447	167– 29 370
		Average	Liter	4363	5306	1300	18 833	13 295	9971	14 154	10 613
		Difference from MTZ	Times	×	1.2	0.3	4.3	3.0	2.3	3.2	2.4
5.	Repair materials (spare parts)	Range	EEK	3000– 11 000	1684– 18 808	766– 8106	1988– 81 063	4609– 152 752	5388– 33 407	2125– 82 911	2648– 56 653
		Average	EEK	7271	7761	4456	34 338	80 187	20 943	27 074	26 629
		Difference from MTZ	times	×	1.1	0.6	4.7	11.0	2.9	3.7	3.6
6.	Service fees of maintenance	Range	EEK	128–3625	830–4926	687–1391	–	–	–	2151–61 451	2057–100 942
		Average	EEK	2200	2542	1019	8616	6354	12 256	21 178	35 060
		Difference from MTZ	times	×	1.2	0.5	3.9	2.9	5.6	9.6	15.9
7.	Maintenance costs	Range	EEK	1124– 2165	1336– 2000	1265– 2374	7331– 24 857	–	–	6643– 15 099	771– 25 088
		Average	EEK	1645	1604	1879	13 436	12 086	7555	11 146	12 287
		Difference from MTZ	times	×	1.0	1.1	8.2	7.3	4.6	6.8	7.46
8.	Repairs and maintenance costs	Range	EEK	3325– 22 932	4828– 22 908	2210– 10 763	10 108– 88 581	4885– 207 525	5650– 111 551	13 813– 98 154	7748– 13 6217
		Average	EEK	11 225	12 173	7307	52 196	11 3851	60 958	56 270	45 942
		Difference from MTZ	times	×	1.1	0.6	4.6	10.1	5.4	5.0	4.1

Conclusion and suggestions

1. This article tackled the maintenance of tractors in 51 bigger agricultural enterprises in Estonia. In addition, an expert poll was conducted which included 225 different features. Altogether more than 1000 tractors were observed, among which 231 were of western origin.

2. The maintenance costs of the western tractors are very high, being 5–11 times higher than the corresponding costs of the Russian tractor MTZ. At the same time, the productivity of the formers is a lot bigger than that of the latter (up to 4 times) and, if one also includes the higher level of comfort, we can say, that the future is in the hands of the more efficient (over 180 hp) western tractors.

3. The maintenance costs of different western tractors vary a lot. It should be analyzed how this process of the expenses has developed.

4. The transition to the western tractors is affected by the big number of Russian tractors. The market now is divided between Valtra, John Deere, New Holland and MTZ. When buying a new tractor, most companies first consider the price and then the location of the service centre. Smaller companies prefer John Deere and bigger ones Valtra.

5. It is more and more common not to do the repairs and maintenance works on tractors by oneself but to hire a specialist from outside or perform the necessary operations in special service centres. The habit of repairing the tractors in one's own company is vanishing and it will disappear completely when the old tractor drivers retire and Russian tractors go out of use. It is not profitable any more to pay for such expensive work as tractor repairs which needs a high qualification.

6. As for Russian tractors, it is advisable to do all the possible maintenance and repair works by oneself, but before performing these operations on the western tractors, one should consider, whether one has the necessary equipment and enough qualified personnel or there is still the need to find and train them. The key factor here is the distance to the producer's service centre and its capacity to repair tractors and the approximate length of the waiting line.

7. In most companies, the first round of the resources of the western tractors (12 000 h) will expire in a year or two and the expenses of these tractors will go up which raises a question for the owners: at how high repair costs is it profitable to maintain a tractor.

8. It was found out that in some companies, especially in the small ones, there is no system of taking records of the expenses connected with tractors, which by the owners' opinion is not the right thing to do. For example, one company spent 2.2 million EEK on 32 tractors a year. This means that they spend 60 000 EEK per tractor every year. If you add another 324 730 EEK for the repairs and 72 000 EEK for the maintenance, you will get the approximate expenses of keeping a tractor park. The expenses on fuel are also an important factor when calculating the total expenses.

9. A typical agricultural enterprise looks like this: 20 tractors, 17 of them of Russian origin, 5 of which do not work, 3 western tractors that have been bought during the last 3 years, which makes one tractor a year. Most companies would buy more western tractors, but are not able to because of their lack of resources. The companies have on average 30 workers, with the management consisting of 3–5 persons. The production profile is cattle, crop or milk. There are 6–8 tractor drivers, who are perfectly capable of doing all the necessary works. Most of the employees are quite old, having a lot of experience, and there are hardly any young workers.

10. Bigger enterprises are more satisfied with their economic situation than the smaller ones.

11. There are not enough young educated men for repairing and driving the tractors. We are already facing the problem in some cases, that there is enough money to spend but not enough personnel for the job. Somehow we have to manage to make the tractor driver's job more attractive so that educated people would be interested in taking such jobs.

12. While calculating the cost price of agricultural products, we should add the cost of the tractors' maintenance, as it is also a very important factor.

13. The reorganization of repairs and maintenance, the disappearance and replacement of ferries with tractor transportation has led us to the situation where the role of the chief engineer has changed and this should be taken into account, when renewing the study programmes of EAU.

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