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ANALYSIS OF THE COMBINE HARVESTERS AND TRACTORS STRUCTURE ON FARMS IN THE CENTRAL EUROPE REGION

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Abstract. *The agricultural machinery in general is the main means of realizing the production plan on the farm. There is difference between big and small size farm in structure of agricultural machines use. It depended on utilization ratio and annual performance of the machines and on production structure. This study has been made for tractors and selfpropelled combine harvesters in the Czech Republic conditions. In the paper are evaluated numbers of machinery in agricultural sector in a last 20 years in Czech Republic.*

Keywords: *machines structure, tractor, market, combine harvester.*

Introduction

Agricultural machinery is one of the key elements ensuring and realizing the business plan in agricultural plant production. Renewal of the machines presents considerable investment demands, often and requires effort to be covering by high capital source. Investment to the machinery has a long-time payback period, and a bad decision could have negative impacts on the economic stability of the company. A lack of quality information and not well-established management of processes for decision-making often mark the renewal of agricultural machinery. Final decision is often made on intuitive base [1]. Level of technical equipment of agricultural machines on farms is not only the statement of economic prosperity of the agricultural sector, but also is affected by technical policies of the sector [2]. One of the main reasons is the high concentration of production in large-scale farms enabling the distribution of the fixed costs [3].

The process of mechanization of Czech agriculture was in the decisive sectors practically completed in the seventies with the effective support of machine investments in the form of subsidies made by state. Agricultural technical policy was based on the direct allocation of machine limits and direct investment subsidies [3]. The machines during that time come from east part of Europe. After political change in 1989 started increasing of the intensity of modernization process in whole agriculture sector and the high-speed renewal dynamics of the agricultural machinery fleet [4].

Materials and methods

Data evaluated in this article are collected form open databases and public sources – Czech Statistical Office, Czech Central Register of Mobile Machines and Association of Importers of Agricultural Machinery and from questionnaires answered by the dealers of machines. There are 16 seasons for evaluation. All data were processed by statistical analyses by ANOVA test in STATISTICA on level of relevance $\alpha=0.05$.

Results and discussion

Situation in central register is not corresponding to the current selling numbers of tractor. It is due to historical development of mayor using Zetor tractors. Lot of people in villages have their own old Zetor tractor at home for some hobby purposes – big garden, small-scale animal husbandry, etc. If we look at selling numbers of new tractors (Fig. 1), Zetor still has a dominant position on market, but in lower power classes of tractors. Year 2008 was significant due to the highest selling number of all machines. It is affected by level of subsidies and commodity prices. Zetor is leading brand in Czech market for many years. The number of sold tractors is decreasing from year 2011 until now. It is due to saturation of the market and higher efficiency and power of new tractors. Higher durability also affects longer time of utilization of machines and prolongation of renewing time.

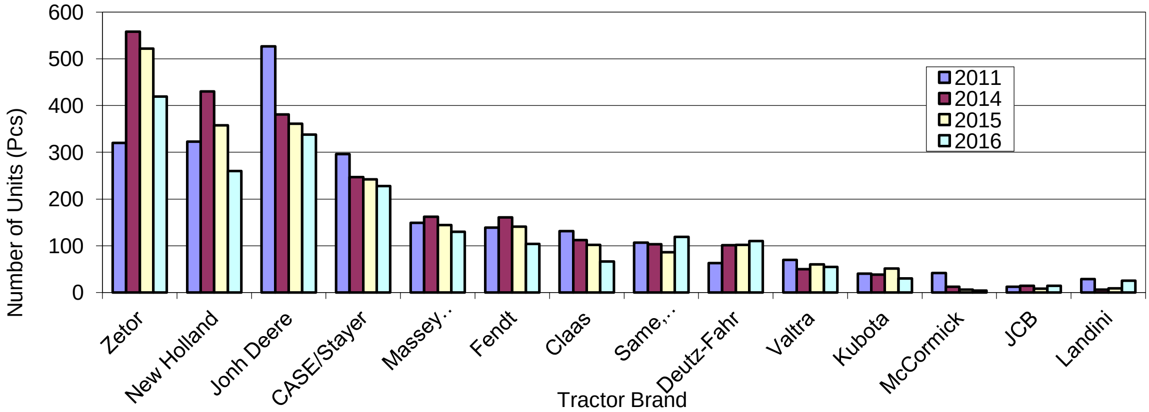
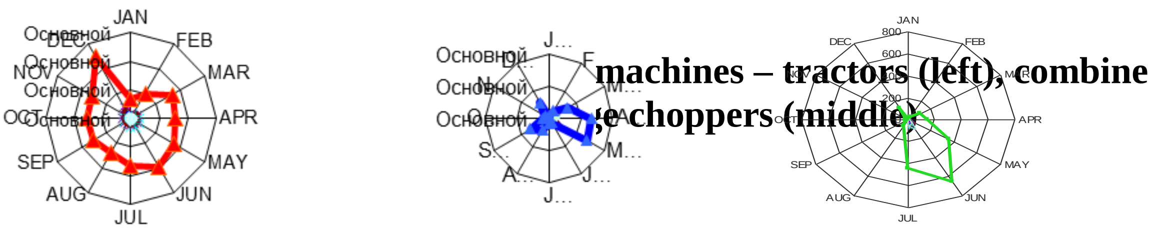


Fig. 1 - **Development of tractors selling units according to brand in 2011 - 2016**



machines – tractors (left), combine
...e choppers (middle)

A few players on market place characterize selfpropelled forage choppers sector.

There are only 4 main producers of this machines. Dominant position on market is

holding by Claas machines, with stable number of selling machines. Second big player is Krone with high power model BigX. Higher number of this machines sold in recent years is especially connected with biogas production. There was big investment to these machines in 90´s, where old combine harvesters have been replace by new technology. After that, the renewing of machines is in approx. 6 years cycles. However, total sold number decreasing in last 10 years. Total number is affected by higher capacity and power of new combine models. Compare to past, now just one high capacity combines harvester work as 4 or 5 machines used in 80´s Leading brand on Czech market is Claas combines. Machines of New Holland brand are strong competitors to Claas and John Deere. Interesting is evaluation of selling unit in different month of the year (Fig. 2). Peak season for combine harvesters starts on half of April and finish on end of June. Forage choppers have two peaks – in spring and September in autumn. Tractors are selling during all year with peak in December and low season in January. There are two groups of brands occurred in statistical evaluation – No. 1 John Deere, New Holland, Zetor and Case and No. 2 the others brand. There is statistically significant difference on chosen level of relevance (α=0.05) between this two groups. There is occurred connection with monetary cycle, EU and national agricultural sector´s subsidies schedule and innovation of new machines. If we compare the market share with similar countries in Europe, there is occurred John Deere and New Holland as market leaders. According to the numbers of sold tractors is Czech market quiet small. One of the biggest market in Europe is Poland (over 12 000 tractors sold in 2017), Germany (more than 32000 tractors in 2017).

Conclusions

1. Zetor tractors are dominant machines on Czech market in low and middle powers class tractors. Total number of units sold on Czech market is decreasing due to higher power and capacity of new machines.
2. Renewal of combine harvesters depend on 6 years cycle due to depreciation period in accounting. Number of selling machines is affected by commodity process and by level of subsidies.
3. Selling process of machines has a seasonal character, depending of machines.

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