

## OWNER'S EDUCATION AND MEANS OF TRANSPORT AVAILABLE ON THE FARM

### Summary

The presented results of research and their analysis allow to define a relationship between some indices of the availability of means of transport and the farmer's level of education. There is a small increase in the availability of means of transport ranging from 2.00 to 2.43 pieces with the average of 2.23 pieces. While in calculation per 100 ha of cultivated land, there is a nearly two-fold decrease (from 11.98 to 6.16) between the group with primary and higher education. The number of farms with loading and unloading devices increases together with a growing level of education - 29.41% for primary education and 42.85% for secondary education. Both in the quantitative structure and in the total load capacity, load box trailers are the most common equipment, on average 70.54% of the number and 82.38% of the load capacity and means of transport. Their share increases together with an increase in the level of education in both cases. On average, the largest number, i.e. 42.65% falls within the range from 3-5 tons of load capacity. Not much less, i.e. 39.49% falls within the lowest range, i.e. up to 3 tons and their share decreases considerably in this group together with an increase in the level of their education.

**Keywords:** transport, equipment, means of transport, education

## WYKSZTAŁCENIE WŁAŚCICIELA A WYPOSAŻENIE GOSPODARSTWA W ŚRODKI TRANSPORTOWE

### Streszczenie

Przedstawione wyniki badań ich analiza pozwalają stwierdzić, iż niektóre wskaźniki wyposażenia w środki transportowe wykazują pewien związek z poziomem wykształcenia rolnika. Wyposażenie w środki transportowe przy średniej 2,23 sztuki wykazuje w miarę wzrostu poziomu wykształcenia niewielki wzrost od 2,00 do 2,43 sztuki. Natomiast w przeliczeniu na 100 ha UR pomiędzy grupą o wykształceniu podstawowym a wyższym występuje prawie dwukrotny spadek (od 11,98 do 6,16). Ilość gospodarstw posiadających urządzenia za- i wyladunkowe rośnie w miarę wzrostu poziomu wykształcenia podstawowe 29,41% i wyższe 42,85%. Zarówno w strukturze ilościowej jak i ładowności całkowitej środkami o najwyższym udziale są przyczepy skrzyniowe średnio 70,54% ilości i 82,38% ładowności środków. W obydwu przypadkach w miarę wzrostu poziomu wykształcenia następuje wzrost ich udziału. Średnio najwięcej środków, bo 42,65% mieści się w przedziale 3-5 ton ładowności. Niewiele mniej, bo 39,49% znajduje się w przedziale najmniejszym, tj. do 3 ton i w tej grupie w miarę wzrostu poziomu wykształcenia ich udział znacznie maleje.

**Słowa kluczowe:** transport, wyposażenie, środki transportowe, wykształcenie

### 1. Introduction

In highly developed countries, logistics costs of enterprise operations are estimated at 20-40% of total costs. The costs of transport and storage constitute approx. 75% of these costs [1, 2]. The availability of technical equipment, including means of transport, has a significant influence on the farming effectiveness (in particular the costs) as their share in the structure of the equipment is considerable, according to Grześ, it is 23% (the highest share as compared to other groups of machines) [3, 4].

Analyses of the equipment in the means of transport depending on the farming conditions show high variability between individual enterprises- farms with low dynamics of changes in time, which means, that, in practice, this is the oldest group of technical equipment [5, 6]. At the same time, the farming effectiveness is influenced by various factors including, amongst other things, the farmer's education and their age [7, 8]

### 2. Aim and scope of the study

In connection with changes occurring in the agriculture, which also (and mostly) pertain to the equipment including

technical means of production, resulting from the availability of such means both on the primary and secondary market, the aim of the study was to analyse the availability of means of transport on farms. The analysis focuses on universal means of transport available on selected farms of the Lesser Poland region. 166 farms situated in the Lesser Poland Region were included in the study. The study included farms within the scope of activities of secondary and vocational agricultural schools - children of farm owners are students of such schools and after the completion of their education they declare taking over their parents' farms. The analysis of the equipment was performed in the context of farm owner education. Hence, the farms under analysis were divided into the following groups, taking into account the education of their owners:

A – primary – 7 persons – 4.22%,  
B – vocational – 87 persons – 52.41%,  
C – secondary – 65 persons – 39.15%,  
D – higher – 7 persons – 4.22%.

### 3. Research methodology

The research was performed on the basis of guided clinical interview and the objects of the research were se-

lected purposefully - declaration of conducting agricultural production at an invariable level or, which was quite frequently encountered, of an increase in the production. One of the basic questions of the interview pertained to the means of transport owned by the farm – their type and characteristics (load capacity, usage, year of manufacture and purchase). The quantity level of the means of transport owned was determined in pieces per farm and per 100 ha of cultivated land with simultaneous presentation of their structure (delivery vans, trucks, trailers, universal - load box etc.). The quality of the equipment, on the other hand, was expressed by the analysis of the load capacity of the means of transport and the total load capacity per 1 ha of cultivated land. Additionally, an analysis of the age of the means of transport was performed - assuming that particular condition of agricultural transport have a significant influence on the technical condition depending on the period of usage.

#### 4. Research results

Farming conditions are the primary factor determining which means of transport are owned as well as the expenditures incurred. Hence, Table 1 presents the characteristics of the farms under analysis, taking into account, in particular, the farming conditions. With the average area of cultivated land of 26.24 ha, the size of the farm grows together

with an increase in the level of the owner's education, from 16.70 for the group with primary education to 39.44 ha for the group with higher education. As the level of education increases, the share of arable land also grows, which, with the decreasing livestock density shows that a higher level of education is connected with a lower share of animal production. The fact of a high share of leased land (the highest in the group with higher education, which may show the willingness to increase the farmers' production capacity.

Generally, it can be concluded that the farms under analysis have a very disadvantageous spatial distribution - the average distance in internal transport is 2.91 km with no evident connection with the size of the farm. Also in external transport, the average distance of 15.25 km is considerable with no evident connection with the size of the farm. It seems that this is the level of the yield of marketable agricultural output in tons (the highest distance in groups with the highest sales levels) and it also results from farmers searching places offering higher prices or willing to buy larger amounts of the product.

The tractors owned in pieces per farm as presented in Table 1 do not show a relationship with the level of the farmers' education. However, as calculated per 100 ha of cultivated land, there is a clear downward trend with the growing level of education, which is undoubtedly connected with the surface area of the farm.

Table 1. Characteristics of farms under analysis

Tab. 1. Charakterystyka badanych gospodarstw

Specification	Unit	Owner's education				
		On average	Group A	Group B	Group C	Group D
Surface area of cultivated land	[ha]	26.24	16.70	18.65	35.99	39.44
% of the GO share	[%]	73.09	52.84	66.92	75.91	94.91
% of the leased cultivated land	[%]	38.82	43.71	32.70	41.84	47.09
Number of plots	[pieces]	20.19	16.43	15.31	26.46	26.43
Average size of the plot	[ha]	1.30	0.96	1.27	1.41	1.16
Livestock density	[SD·100ha of cultivated land <sup>-1</sup> ]	69.18	92.13	68.31	66.96	67.55
Distance - internal transport	[km]	2.91	2.71	2.55	3.41	2.83
Distance - external transport	[km]	15.25	8.03	13.56	18.82	9.67
Sales of production	[t·ha of cultivated land <sup>-1</sup> ]	5.22	2.07	5.22	5.82	2.76
Purchase of tools and equipment	[t·ha of cultivated land <sup>-1</sup> ]	1.04	0.68	1.07	0.97	1.69

Source: own work / Źródło: opracowanie własne

Table 2. Tractors and means of transport owned

Tab. 2. Wyposażenie w ciągniki i środki transportowe

Specification	Unit	Owner's education				
		On average	Group A	Group B	Group C	Group D
Tractors						
Pieces per farm	[pcs]	1.81	1.57	1.75	1.94	1.71
Pieces per 100 ha of cultivated land	[pcs]	6.90	9.40	9.38	5.39	4.34
Number of ha of cultivated land per tractor	[ha]	14.49	10.64	10.66	18.55	23.06
Average power of the engine	[kW]	50.01	59.01	46.19	54.26	45.31
Means of transport*						
Pieces per farm	[pcs]	2.23	2.00	2.09	2.42	2.43
Pieces per 100 ha of cultivated land	[pieces·100 ha of cultivated land <sup>-1</sup> ]	10.78	11.98	11.21	6.71	6.16
The sum of tons of capacity per farm	[t·farm <sup>-1</sup> ]	8.64	5.20	8.09	9.70	8.32
Tons per 1 ha of cultivated land	t·1ha of cultivated land <sup>-1</sup>	0.33	0.31	0.43	0.30	0.21
Average load capacity	t	3.88	3.31	4.62	5.00	4.27

\* delivery vans, trucks, load box trailers and tow tractors

Source: own work / Źródło: opracowanie własne

Hence, the workload of the tractor measured by the number of ha per cultivated land grows together with an increase in the level of education. This may show better organization of work and use of tractors. On the other hand, there is a small increase in the availability of means of transport ranging from 2.00 to 2.43 pieces with the average of 2.23 pieces. While in calculation per 100 ha of cultivated land, there is a nearly two-fold decrease (from 11.98 to 6.16) between the group with primary and higher education. Hence, in combination with the size of the farm, the number of tons of the total capacity of means of transport per 1 ha of cultivated land. As larger farms, despite the usually lower intensity of production, transport in total more loads, this fact may show better organization of work and the use of means of transport, but also with a more common use of transport services by farmers with higher education.

Transport of loads is inseparably connected with loading and unloading works. The analysis of loading and unloading devices allows for concluding that on average 37.95% of farms own the aforementioned devices. On the other hand, the number of farms with loading and unloading devices increases together with a growing level of education - 29.41% for primary education and 42.85% for secondary education.

The type of the means of transport used is the primary factor affecting its effectiveness. Therefore, Table 3 presents the percentage share of the individual means of transport in their number and total load capacity per farm.

Both in the quantitative structure and in the total load capacity, load box trailers are the most common equipment, on average 70.54% of the number and 82.38% of the load capacity and means of transport. Their share increases together with an increase in the level of education in both cases. There is a significant decrease in the share of delivery vehicles together with an increase in the education (but also in the surface area of the farm and hence, the amount

of loads transported at a time). An advantageous phenomenon is a decrease in the share of tow tractors from 21.42 to 5.88% and the load capacity ranging from 20.41 to 4.95%.

The load capacity of the means of transport is a basic parameter affecting work effectiveness. Hence, Table 4 presents the percentage distribution of the load capacity of the means of transport in the groups under analysis.

On average, the largest number, i.e. 42.65% falls within the range from 3-5 tons of load capacity. Not much less, i.e. 39.49% falls within the lowest range, i.e. up to 3 tons and their share decreases considerably in this group together with an increase in the level of their education. Means of transport with the highest load capacity, above 8 tons, have the lowest share and they do not occur in all groups.

There are few new means of transport on farms under analysis - the average age of the tractor is 17 years (Table 5). The situation in the group of tow tractors and load boxes is the worst in this respect. In this scope, no relationship was found within the distinguished groups.

Also, the share of means of transport below 10 years of age is quite small. The situation in the group of trucks is the most advantageous in this respect. Farmers buy means of transport on the primary market - new means of transport and second-hand means of transport used. On average, 82.82% of tractors were purchased as new; the most were bought in the group of vocational training, not many fewer from. Also, the share of means of transport below 10 years of age. The situation in the group of trucks is the most advantageous in this respect. Farmers buy means of transport on the primary market - new means of transport and second-hand means of transport used. On average, 82.82% of tractors were purchased as new, the most in the group with vocational training, not many fewer with higher education. On average, 47.13% of trailers purchased were new, the most new trailers were bought by farmers with higher education.

Table 3. The percentage structure of equipment with means of transport in the aspect of their numbers and the total load capacity  
Tab. 3. Procentowa struktura wyposażenia w środki transportowe w aspekcie ich ilości i ładowności całkowitej

Specification	Unit	Owner's education				
		On average	Group A	Group B	Group C	Group D
The share of means of transport in the number (pieces) per farm						
Trucks	[%]	2.97	0.00	1.65	5.10	0.00
Delivery vehicles	[%]	15.14	14.29	18.68	12.10	5.88
Load box trailers	[%]	70.54	64.29	65.38	75.16	88.24
Tow tractors	[%]	11.35	21.42	14.29	7.64	5.88
The share of means of transport in the total load capacity per farm						
Trucks	[%]	4.64	0.00	2.62	8.53	0.00
Delivery vehicles	[%]	6.26	8.16	8.76	7.10	1.98
Load box trailers	[%]	82.38	71.43	79.56	78.09	93.07
Tow tractors	[%]	6.72	20.41	9.07	6.28	4.95

Source: own work / Źródło: opracowanie własne

Table 4. The percentage load capacity distribution of means of transport in groups (pieces per farm)  
Tab. 4. Procentowy rozkład ładowności środków w grupach (sztuk na gospodarstwo)

Specification	Unit	Owner's education				
		On average	Group A	Group B	Group C	Group D
Load capacity up to 3 tons	[%]	39.49	64.28	39.22	30.57	31.25
Load capacity 3 – 5 tons	[%]	42.43	21.43	48.37	44.59	43.75
Load capacity 5 – 8 tons	[%]	14.59	13.34	8.53	19.02	23.33
Load capacity above 8 tons	[%]	3.49	0.00	3.22	4.40	0.00

Source: own work / Źródło: opracowanie własne

Table 5. The age of means of transport on the farms under analysis  
 Tab. 5. Wiek środków transportowych w badanych gospodarstwach

Specification	Unit	Owner's education				
		On average	Group A	Group B	Group C	Group D
Age of means of transport						
Tractors	[years]	17	20	18	15	20
Trucks	[years]	12	-	13	12	-
Delivery vehicles	[years]	14	23	13	13	20
Load box trailers	[years]	21	24	20	20	22
Tow tractors	[years]	23	37	24	18	12
% share of means of transport below 10 years of age						
Tractors	[%]	25.58	22.03	16.75	31.74	20.20
Trucks	[%]	30.00	-	33.33	37.50	-
Delivery vehicles	[%]	20.00	0.00	20.59	21.05	0.00
Load box trailers	[%]	18.00	0.00	20.17	20.34	0.00
Tow tractors	[%]	4.88	0.00	0.00	16.67	0.00
% of new means of transport at the time of purchase (purchase on the primary market)						
Tractors	[%]	52.82	50.60	60.43	37.55	57.99
Trucks	[%]	18.18	0.00	0.00	25.00	0.00
Delivery vehicles	[%]	12.50	50.00	2.94	21.05	100.00
Load box trailers	[%]	47.13	53.10	47.38	41.31	70.08
Tow tractors	[%]	79.19	100.00	86.66	66.67	100.00

Source: own work / Źródło: opracowanie własne

## 5. Summary and conclusions

The research conducted and its analysis allows for defining a relationship between some indices of the availability of means of transport and the farmer's level of education. There is a small increase in the availability of means of transport ranging from 2.00 to 2.43 pieces with the average of 2.23 pieces. While in calculation per 100 ha of cultivated land, there is a nearly two-fold decrease (from 11.98 to 6.16) between the group with primary and higher education. The number of farms with loading and unloading devices increases together with a growing level of education - 29.41% for primary education and 42.85% for secondary education. Both in the quantitative structure and in the total load capacity, load box trailers are the most common equipment, on average 70.54% of the number and 82.38% of the load capacity and means of transport. Their share increases together with an increase in the level of education in both cases. On average, the largest number, i.e. 42.65% falls within the range from 3-5 tons of load capacity. Not much less, i.e. 39.49% falls within the lowest range, i.e. up to 3 tons and their share decreases considerably in this group together with an increase in the level of their education.

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