

## **THE USE OF THE PRODUCTION CAPACITY OF MEANS OF TRANSPORT DEPENDING ON THE FARM OWNER'S AGE**

### *Summary*

*The presented results of research on the availability of means of transport both in terms of pieces per farm and the total payload (the sum of tons per farm) shows a decreasing trend with the growing age of the farmer. The number of farms which have loading and unloading devices with the growing age of the farmer show a clear increasing trend. In the group of tractors, with an annual average use of the production capacity of 5.27% with the growing age of the farmer, there is clear decrease in use. The use of the production capacity of trailers (the basic means of transport) shows a decrease with the growing age of the farmer. The aforementioned facts may suggest that the youngest farmers attach must more importance to the improvement in the use - the organization of the operation of technical means of production. An analysis of the use of the production capacity of tractors in the context of their power (usable groups) shows an increase in the use with an increase in the tractor power. Also, the indices of the use of the production capacity for trailers show advantageous values together with an increase in the payload capacity of trailers.*

**Key words:** *transport, means of transport, tractors, trailers, vehicles, use, production capacity, farmer's age*

## **WYKORZYSTANIE ZDOLNOŚCI PRODUKCYJNYCH ŚRODKÓW TRANSPORTOWYCH W ZALEŻNOŚCI OD WIEKU WŁAŚCICIELA GOSPODARSTWA**

### *Streszczenie*

*Przedstawiono wyniki badań wyposażenia w środki transportowe, zarówno w sztukach na gospodarstwo jak i ładowności całkowitej (suma ton na gospodarstwo) wykazuje tendencję zniżkową w miarę wzrostu wieku rolnika. Ilość gospodarstw posiadających urządzenia za- i wyladunkowe w miarę wzrostu wieku rolnika wykazuje wyraźną tendencję zwyżkową. W grupie ciągników, przy średnim rocznym wykorzystaniu zdolności produkcyjnych o 5,27% w miarę wzrostu wieku rolnika następuje wyraźny spadek wykorzystania. Wykorzystanie zdolności produkcyjnych przyczep (podstawowego środka transportu) w miarę wzrostu wieku rolnika wykazuje zmniejszenie. Powyższe fakty mogą sugerować, iż rolnicy najmlodszy przywiązują znacznie wyższą wagę do poprawy wykorzystania – organizacji pracy technicznych środków produkcji. Analiza wykorzystania zdolności produkcyjnych ciągników w kontekście ich mocy (grup użytkowych), wykazuje wzrost wykorzystania w miarę wzrostu mocy ciągnika. Również wskaźniki wykorzystania zdolności produkcyjnych dla przyczep wykazują korzystne wartości w miarę wzrostu ładowności przyczep.*

**Słowa kluczowe:** *transport, środki transportowe, ciągniki, przyczepy, samochody, wykorzystanie, zdolności produkcyjne, wiek rolnika*

### **1. Introduction**

Transport as an inseparable element of agricultural production has a significant share in both expenditures and technical values of the means of production. [1, 2, 3]. Hence, the rate of implementing innovations in this area of activities influences the farming effectiveness. The rate of implementation of innovations - technical progress is influenced by a large number of factors, including the size of the farm, the direction of the activities as well as other factors, such as age and education of farm owners. Younger and better educated farmers invest more often in the purchase of new technical means (tractors, means of transport and modern machines) [4]. Fragmented and economically weak farms do not have appropriate means for the purchase of new machines. Hence, despite wear and tear, a lot of means of transport are still used as physical wear and tear has not occurred yet and their operation is often unprofitable [5, 6].

### **2. Aim and scope of the study**

The effectiveness of management and expenditures incurred for production is determined not only by the equipment in technical means - including means of transport, but

also their use in the production process. Hence, the aim of the study involved the assessment of the use of the production potential of means of transport available at farms in the context of the farm owner's age. The analysis focuses on universal-dropside means of transport available on selected farms. 166 farms situated in the Lesser Poland Region were included in the study. The research included farms within the reach of secondary and vocational agricultural schools. During a guided interview, current farm owners and their successors (students of agricultural schools), declared their willingness of continuing to run the farm and, in the majority of cases, their willingness to enlarge the farm. Hence, it can be assumed that these farms are likely to develop. Owners of the farms under analysis were divided into three age groups:

- A – up to 40 years of age 26 farms -15.66%,
- B – 41 – 55 years of age 118 farms – 71.08%,
- C – over 55 years of age 22 farms – 13.26%.

### **3. Research methodology**

The research was performed on the basis of guided interview and the objects of the research were selected purposefully - declaration of conducting agricultural produc-

tion 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). For the assessment of the use of the potential production capacity of means of transport, the index of use of the production capacity was accepted after Tabor [7] in the following form:

$$K_{wp} = \frac{W_{rz}}{n} \cdot 100 [\%],$$

where:

$K_{wp}$  – level of use of production capacity [%],

$W_{rz}$  – actual use during the year [h],

$n$  – service life - normative use of means of transport during their service [h].

Service life – normative use of means of transport during service was accepted according to Swiss data after Lorenkowicz [8].

#### 4. Research results

The availability of technical means of production and their use is a function of the size of the production workshop and the conditions of management. Hence, Table 1 presents basic factors which influence the equipment and use of means of transport. The basic parameter - the size of the usable area, with the average of 26.24 ha shows a strong connection with the farmer's age - it decreases with the growing age of the farmer. The share of arable land in the surface area decreases with the growing age of the farmer, which is connected with lower livestock density, which means that younger farmers focus more on plant produc-

tion. The installed power in tractors and vehicles, with the average of 9.45 kW·1ha<sup>-1</sup> of cultivated land clearly grows together with the farmer's age. Distances, both in internal transport (resulting from the size of the farm and the field location) as well in external transport (distances of market where products are bought and sold) decrease together with the growing age of the farmer. This fact shows (with a lower surface area of the farm - fewer tons to transport) and a lower distance, farms run by older farmers are less encumbered by transport.

The conclusion above is confirmed by an analysis of the availability of means of transport both in terms of pieces per farm and the total payload (the sum of tons per farm) shows a decreasing trend with the growing age of the farmer. Also, the share of the most effective means of transport - vehicles - decreases with the growing age of the farmer. In each of the separated age groups, dropside trailers have the greatest share in the equipment. On the other hand, the number of farms which have loading and unloading devices with the growing age of the farmer show a clear increasing trend. Various loading and unloading devices are available on 37.95% farms, in the group of the youngest farmers 26.92% and of the oldest ones 59.09%.

The effect of the availability of the analysed means of transport and the size of work as well as work organization is the use of the production potential shown in Table 2.

In the group of tractors, with an annual average use of the production potential of 5.27% with the growing age of the farmer, there is clear decrease in use.

As a result, an increase in the number of years to full depreciation of the means of transport occurs with the growing age of the farmer, as well as an increase in the age of tractors used and an increase in the share of tractors after their service life.

Table 1. Characteristics of farms under analysis

Tab. 1. Charakterystyka badanych gospodarstw

Specification	Unit	Owner's age			
		on average	Group A	Group B	Group C
Average age of the farmer in the group	{years}	46.40	31.92	47.28	58.77
Surface area of cultivated land	[ha]	26.24	35.63	25.27	20.34
GO share	[%]	73.09	80.39	74.59	50.00
Share of the leased cultivated land	[%]	38.82	37.71	41.24	24.99
Livestock density	SD·100 ha <sup>-1</sup> of cultivated land	41.47	40.06	39.49	53.75
Installed power (tractors+vehicles)	kW·1 ha <sup>-1</sup> of cultivated land	9.45	7.27	9.83	10.01
Distance - internal transport	[km]	2.91	3.48	2.84	2.58
Distance - external transport	[km]	15.25	19.78	15.40	8.92
Tractors					
Pieces per 100 ha of cultivated land	[pcs]	6.90	6.36	7.05	6.72
Average power of the engine	[kW]	50.01	56.42	48.84	48.29
Means of transport*					
Pieces per 100 ha of cultivated land	[pcs]	10.78	14.65	10.16	9.56
The sum of tons of capacity per farm	[t]	8.64	8.65	9.01	7.14
Tons per 1 ha of cultivated land	t·ha of cultivated land <sup>-1</sup>	0.33	0.24	0.36	0.35
Average load capacity	t	3.88	3.88	3.95	3.66
The share of individual means of transport in the total load capacity per farm					
Trucks	[%]	4.64	1.93	6.41	0.00
Delivery vehicles	[%]	6.26	4.90	8.95	2.37
Load box trailers	[%]	82.38	85.45	77.24	85.59
Tow tractors	[%]	6.72	7.72	7.40	12.04

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

Source: own work / Źródło: opracowanie własne

Table 2. Use of production capacity  
 Tab. 2. Wykorzystanie zdolności produkcyjnych

Specification	Unit	Owner's age			
		on average	Group A	Group B	Group C
Tractors					
Hours of operation per year (field+transport)	[h]	527	686	508	439
Service life	[h]	10000	10000	10000	10000
Use of production capacity	[%]	5.27	6.86	5.08	4.39
Number of depreciation years	[years]	19	15	20	23
Current age	[years]	17	14	17	19
Share	[%]	67.11	57.65	70.75	61.30
Load box trailers					
Hours of operation per year transport	[h]	294	355	291	231
Service life	[h]	5500	5500	5500	5500
Use of production capacity	[%]	5.35	6.45	5.29	4.20
Number of depreciation years	[years]	19	15	19	24
Current age	[years]	21	20	20	21
Share of means of transport after service life	[%]	42.15	45.84	41.55	40.45
Trucks					
Hours of operation per year transport	[h]	725	700	728	--
Service life	[h]	16000	16000	16000	16000
Use of production capacity	[%]	4.53	4.38	4.55	--
Number of depreciation years	[years]	22	23	22	--
Current age	[years]	12	14	11	--
Share of means of transport after service life	[%]	0.00	0.00	0.00	--
Delivery vehicles					
Hours of operation per year transport	[h]	545	578	537	607
Service life	[h]	9400	9400	9400	9400
Use of production capacity	[%]	5.80	6.15	5.71	6.45
Number of depreciation years	[years]	17	16	17	15
Current age	[years]	14	13	14	17
Share of means of transport after service life	[%]	23.21	33.33	18.14	66.67

Source: own work / Źródło: opracowanie własne.

Table 3. Use of the production capacity of trailers in the context of their power  
 Tab. 3. Wykorzystanie zdolności produkcyjnych ciągników w kontekście ich mocy

Specification	Unit	Trailer usage group			
		light	medium	heavy	very heavy
Hours of operation per year field+transport	h	400	446	583	1306
Service life	h	10000	10000	10000	10000
Use of production capacity	%	4.00	4.46	5.83	13.06
Number of depreciation years	years	25	22	17	8
Current age	years	24	18	12	5
Share of means of transport after service life	%	55.17	63.87	36.05	15.38

Source: own work / Źródło: opracowanie własne

Table 4. Use of the production capacity of trailers in the context of their payload  
 Tab. 4. Wykorzystanie zdolności produkcyjnych przyczep w kontekście ich ładowności

Specification	Unit	Trailer payload [t]			
		up to 3.0	3-5	5-8	area 8
Hours of operation per year	h	163	232	274	306
Service life	h	5000	5000	6000	6000
Use of production capacity	%	3.26	4.64	4.57	5.10
Number of depreciation years	years	31	22	22	20
Current age	years	19	23	18	7
Share of means of transport after service life	%	19.30	64.79	45.83	14.29

Source: own work / Źródło: opracowanie własne

As far as the use of the production capacity of trailers is concerned - the basic means of transport also together with the growing age of the farmer, a decrease in the annual use of the production capacity occurs. The aforementioned facts may suggest that the youngest farmers attach most importance to the improvement in the use - the organization of the operation of technical means of production. This means that they know the influence of the aforementioned factors on the effectiveness of the operation of means of transport. The effectiveness of work - by expenditures incurred in the case of tractors is connected with their power, hence Table 3 presents an analysis of the use of the production ability of tractors in the context of their power (usage groups), within the analysed group, the indices of the use of the production capacity and the age of trailers show advantageous tendencies.

Also, the indices of the annual use, the use of the production capacity and the age of the means of transport for trailers shown in Table 4, as means with the highest share in the equipment, show advantageous values together with an increase in the payload capacity of trailers. Trailers with the highest payload are the youngest means of transport with the highest level of the use of their production capacity.

## 5. Summary and conclusions

The analysis of the availability of means of transport both in terms of pieces per farm and the total payload (the sum of tons per farm) shows a decreasing trend with the growing age of the farmer. In each of the separated age groups, dropside trailers have the greatest share in the equipment under analysis. On the other hand, the number of farms which have loading and unloading devices with the growing age of the farmer show a clear increasing trend. Various loading and unloading devices are available on 37.95% farms, in the group of the youngest farmers 26.92% and of the oldest ones 59.09%. In the group of tractors, with an annual average use of the production capacity of 5.27%

with the growing age of the farmer, there is clear decrease in use.

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