

## THE LEVEL AND STRUCTURE OF MEANS OF TRANSPORT AND LOADER RESOURCES ON ORGANIC FARMS\*

Maciej Kuboń, Dariusz Kwaśniewski, Urszula Malaga-Toboła  
*Institute of Agricultural Engineering and Informatics, University of Agriculture in Krakow*

**Abstract.** The paper presents the means of transport and loader resources on organic farms both in qualitative and quantitative approach. The scope of the work comprises 100 organic farms situated in southern Poland in 26 districts (*gminas*) of the gorlicki, krakowski, miechowski, nowosądecki, olkuski, proszowicki and wielicki counties (*poviats*). Among others it was observed that the farm resources considering both the quantity and quality of the means of transport is low and greatly differs from the traditional farms. On organic farms, there is on average 0.86 means of transport with average load capacity 2.06 t per one tractor. Agricultural trailers and tractor wagons prevailed in the structure of studied means. Also loader and loading devices quantities are very low.

**Key words:** organic farm, resources, means of transport, load capacity

### Introduction, aim and scope of work

According to Agricultural and Food Quality Inspection (IJHARS) report, organic agriculture sector in Poland has been developing constantly, as may be evidenced by a growing number of organic farms. As of 31 December 2010 there were over 20 thousand of organic farms covered by the supervision of certification bodies. It denotes over 20% growth in comparison with 2009. A serious hindrance for the development of Polish organic agriculture sector is a general economic situation in the country and resulting number of consumer ready to pay more for better food [Żelzik 2009]. It should be remembered that costs of manufacturing organic products are much higher, whereas harvests are on average 20-40% lower than produced on traditional farms [Krasowicz-Kukuła 1998, Klima 2003]. Studies on organic farming and its product market do not have a long history. These issues have been the focus of interest since the eighties of the previous century. Despite the fact that knowledge in this area is extending all the time, there are still many simplifications and unsolved problems in this research area which require wide and complex studies [Łuczka-Bakuła 2007]. We still lack information about the links and relationships between organic farms and external supply markets, but we also need to know more on the volume and structure of raw material and material flows between individual links of production

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process. From the perspective of optimization of material flows, the basic element joining individual links of the logistic chain is transport. It is an imperative element of agricultural production which integrates individual elements of technological production cycle. Transport operations on organic farms are made difficult by a considerable dispersion of production and therefore a great diversity of loads distributed over wide spaces and transported many times, and in some cases also at considerable distances from the supply and sales market. The above mentioned conditionings, but also the needs and outlays involved in the necessity of transport, should be reflected in the variety of means of transport and organization of their work [Kuboń 2001; Marczuk 2006; Kuboń 2007; Marczuk 2011]. In order to optimize production processes it is necessary to learn current resources of means of transport and transport devices on farms, but also the organization of their work, both in the internal and external transport. Therefore, the paper strives to determine the resources of means of transport and loaders on organic farms, both in quantitative and qualitative aspect.

The studies covered 100 organic farms situated in 26 districts (*gminas*) of the gorlicki, krakowski, miechowski, nowosądecki, olkuski, proszowicki and wielicki counties (*powiats*). The material for analyses was provided by the initial studies conducted on selected farms in the framework of development project No. 12-0165-10 entitled "Innovative effect of technique and technology and IT support of management on production effectiveness on organic farms".

Four area groups were identified among the studied farms for further analysis. The first group was composed of farms with area below 5 ha of agricultural lands (AL), the second were farms from 5.01 to 10 ha, the third farms from 10.01 to 20 ha and the fourth those of above 20.1 ha. Analyzed were the means of transport resources possessed by a farm, i.e. delivery vans, agricultural trailers, tractor wagons, single axle trailers and utility trailers, and among loaders: forklift carriages, loaders and backhoe loaders.

## Results

Average area of the studied holdings was 11.9 ha AL, at standard deviation 12.8 and the ploughlands constituted 50.5% of AL. The remaining percentage were permanent grasslands (37%), whereas orchards and perennial plantations made up 12.5%. Among the available agri-environmental packages the farmers most frequently chose the variant of agricultural crops (98.8% with certificate; 1.2% during transition period), permanent grasslands (87.2% with certificate; 12.8% during transition period) and horticultural crops + berries (93.3% with certificate; 6.7% during transition period).

The plans of studied farms for the nearest future were shown in Figure 1 .

None of the analysed farms will be liquidated in future and only 6% plan to diminish their acreage. Almost 60% is for increasing and extending organic production and 37% plan to preserve the current state. Objects in group II (10.01 – 20 ha ) were most inclined toward future investments, and 80% of respondents planned a considerable extension of their production and commercial activities. Farms classified in groups I and II were the least interested in increasing organic production or investments, respectively 53.1% and 57%.

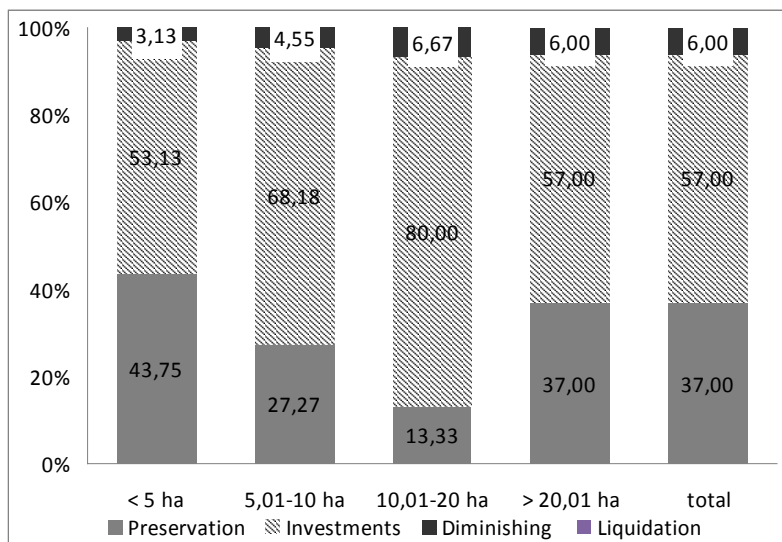


Fig. 1. Farms' plans for the nearest future

Farm resources of means of transport, in their quantitative and qualitative aspect, depended on possessed traction force. The paper by Kwaśniewski et al. [2011] shows in detail the resources and structure of possessed tractors per individual area groups. There were 1.5 agricultural tractor with average power of 53.8 kW per farm. Agricultural trailers (9.24 pcs·100 ha<sup>-1</sup>AL), tractor wagons (5.28 pcs·100 ha<sup>-1</sup>AL) and single axle trailers and utility trailers (1.79 pcs·100 ha<sup>-1</sup>AL) cooperate with tractors. On average, every tenth farm owned a loader, which in conversion to 100 ha AL gave a value of 1.15 pcs (Table 1). Figure 2 presents the structure of possessed means of transport.

Table 1. Quantitative resources of means of transport and loaders on farms

Area group	Delivery vans		Agricultural trailers		Tractor wagons		Single axle trailers and utility trailers		Loaders	
	a	b	a	b	a	b	a	b	a	b
< 5 ha	0.03	1.29	0.35	11.71	0.42	11.19	0.13	3.90	0.03	0.73
5.01-10 ha	0.13	1.55	0.63	9.08	0.34	5.37	0.06	1.07	0.19	2.83
10.01-20 ha	0.14	0.95	1.27	8.76	0.00	0.00	0.09	0.85	0.00	0.00
> 20.01 ha	0.13	0.27	1.67	5.19	0.13	0.59	0.07	0.33	0.07	0.12
Total	0.10	1.15	0.84	9.24	0.26	5.28	0.09	1.79	0.08	1.15

where: a – pcs·farm<sup>-1</sup>, b – pcs·100 ha<sup>-1</sup> AL.

The data above show that agricultural trailers (65.12%) and tractor wagons (20.16%) dominated in the structure of resources, whereas delivery vans (7.75%) and single axle trailers (6.98%) had a very small share. It should be stated that with growing farm area the share of agricultural trailers is increasing, whereas the proportion of tractor wagons and single axle trailers is decreasing. The investigations indicated a deficiency of loaders and devices for loading on the analyzed farms. The situation is similar on traditional farms. The fact was confirmed by the research conducted by Kuboń and Tabor [1995] and Sawa and Parafiniuk [2000]. The authors point also to a declining tendency of loading works mechanization index over the last years.

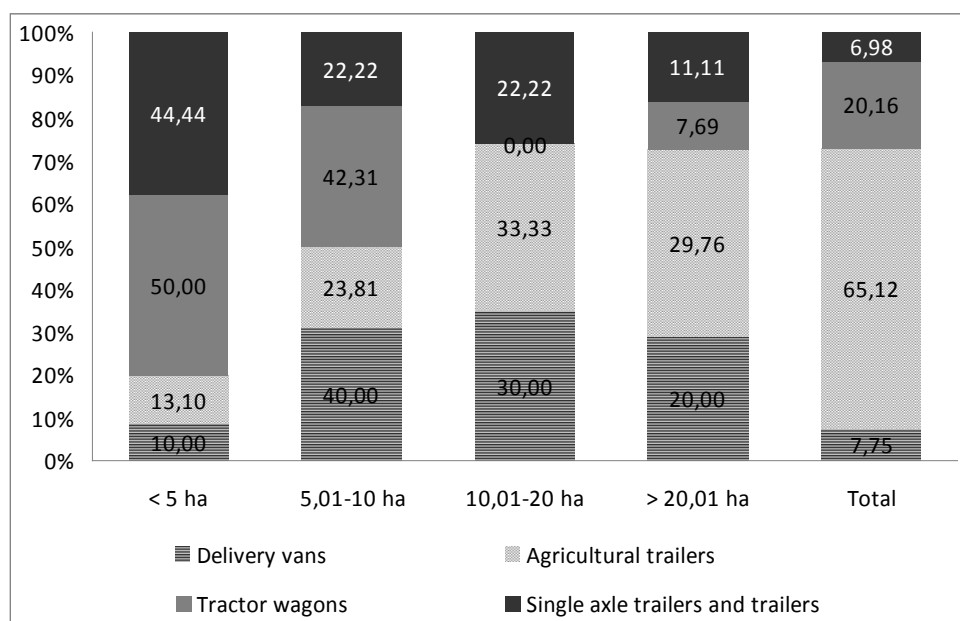


Fig. 2. Structure of means of transport on studied farms

Organic farm resources of means of transport considering their quality were presented in Table 2, whereas their structure in Figure 3. Average load capacity of delivery vans was on the level of 3.11 t, however the highest was registered in farm group of between 10.0 to 20 ha and the lowest in the holdings of below 5 ha.

Similar relationships occurred for agricultural trailers, where the highest load capacity (4.34 t) was noted on largest farms and the lowest (2.85) in the smallest holdings. For the other means both average and unit load capacity were on a similar level in all area groups and for wagons they ranged from 0.94 to 1.04 t at an average of 0.99 t and for utility trailers between 0.52 to 0.6 t at an average of 0.52 t. Qualitative analysis of these means revealed that an average load capacity of trailers and wagons was growing with increasing farm area but their unit load capacity was decreasing.

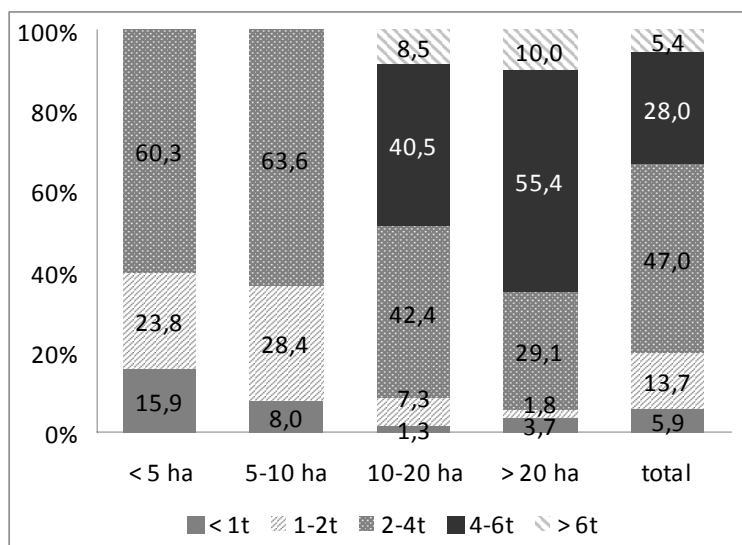
The level and structure...

Devices of load capacity between 2-4 t (47%) and 4-6 t (28%) prevailed in the means of transport structure. The devices of load capacity over 6 t constituted the lowest percentage- 5.4%. Means of transport with load capacity of 2-4 tons dominated on farms possessing less than 10 ha (over 60%), whereas on farms of over 10 ha devices of 4-6 tonnes. While analyzing the structure of load capacity one may notice that increase in the farm area caused a decrease in the share of means with load capacity between 2 and 4 tonnes (60.3-29.1%) and 1-2 tonnes (23.8-1.8%) but the proportion of means with 4-6 tonne of load capacity increases.

Table 2. Qualitative resources of means of transport on studied farms

Area group	Delivery vans		Agricultural trailers		Tractor wagons		Single axle trailers and utility trailers	
	a	b	a	b	a	b	a	b
<5 ha	1.50	0.02	2.85	0.34	1.04	0.11	0.50	0.02
5.01-10 ha	2.33	0.03	3.37	0.31	0.94	0.05	0.50	0.01
10.01-20 ha	4.17	0.04	3.80	0.34	-	-	0.53	0.00
> 20.01 ha	3.50	0.01	4.34	0.21	1.00	0.01	0.60	0.00
Total	3.11	0.03	3.65	0.31	0.99	0.05	0.52	0.01

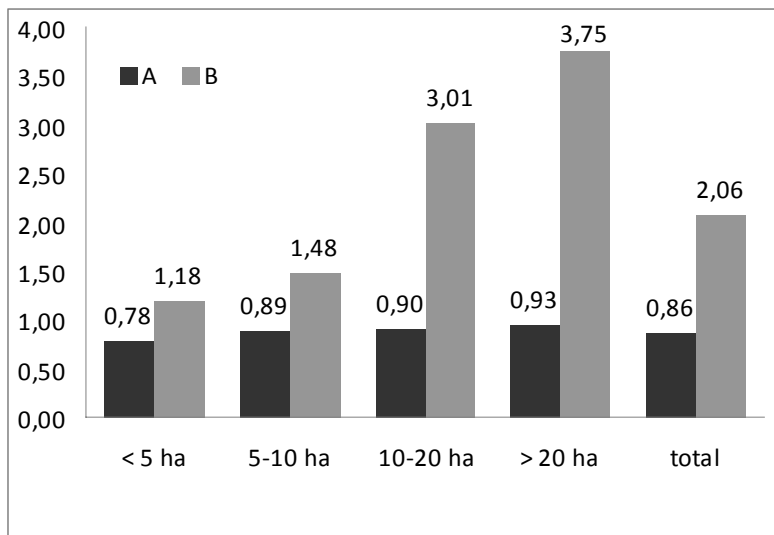
where: a – t.means<sup>-1</sup>, b – t.ha<sup>-1</sup> AL.



Source: author's own studies

Fig. 3. Load capacity structure of means of transport

The next Figure (Fig. 4) shows the quantitative (number of means of transport per one agricultural tractor) and qualitative (total load capacity per 1 means of transport) evaluation indicator of farm means of transport resources.



A – number of means of transport per one tractor  
 B – average load capacity of a means of transport

Source: author's own studies

Fig. 4. Evaluation indicators for means of transport resources on farms

On the basis of conducted investigations it was stated that on average there was 0.86 means of transport with a load capacity of 2.06 t per one tractor on organic farms. A tendency was observed that with growing organic farm area both quantitative and qualitative resources of their means of transport were growing, too. On the largest farms (over 20 ha), the number of means of transport increased by 19.2% in relation to the smallest farms and their load capacity grew even three-fold.

## Conclusions

The analysis of results of the investigation conducted on 100 organic farms situated in southern Poland allows to state that farm resources, concerning both quality and quantity of means of transport are low and considerably differ from traditional farms. In comparison with studies conducted on traditional farms by Kuboń [2001] and Parafiniuk 2006], the number of means of transport on organic farms is by half lower, whereas average load capacity almost 30% lower. In both systems of production agricultural trailers and tractor wagons prevail in the means of transport structure constituting respectively 85.28% and 83.4%. Very poor resources of loaders on organic farms should be also noticed (0.08 pcs·farm<sup>-1</sup>), which is connected with greatly dispersed agrarian and production structure. On the other hand, means of transport load capacity is on a similar level in both production systems.

In order to diminish the costs of raw material-commodity flows further detailed studies are necessary to determine the current transport potential, its utilisation but also its share in the realization of individual technological process. Once we know their share, the range of influence and organization of labour, it will be possible to fully optimize transport processes.

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## **POZIOM I STRUKTURA WYPOSAŻENIA GOSPODARSTW EKOLOGICZNYCH W ŚRODKI TRANSPORTOWE I ŁADUNKOWE**

**Streszczenie.** W pracy przedstawiono wyposażenie gospodarstw ekologicznych w środki transportowe i ładunkowe zarówno w ujęciu jakościowym jak i ilościowym. Zakresem pracy objęto 100 gospodarstw ekologicznych położonych w rejonie Polski południowej z 26 gmin powiatu gorlickiego, krakowskiego, miechowskiego, nowosądeckiego, olkuskiego, proszowickiego i wielickiego. Stwierdzono m. in., że wyposażenie gospodarstw zarówno pod względem ilości jak i jakości środków transportowych jest niskie i znacznie odbiega od wyposażenia gospodarstw konwencjonalnych. Średnio na jeden ciągnik w badanych gospodarstwach ekologicznych przypada średnio 0,86 środka transportowego o średniej ładowności 2,06 t. W strukturze środków przeważają przyczepy rolnicze i wozy ciągnikowe. Niski jest również wyposażenie w środki i urządzenia ładunkowe.

**Słowa kluczowe:** gospodarstwo ekologiczne, wyposażenie, środki transportowe, ładowność

**Correspondence address:**

Maciej Kuboń; e-mail: [Maciej.Kubon@ur.krakow.pl](mailto:Maciej.Kubon@ur.krakow.pl)  
Instytut Inżynierii Rolniczej i Informatyki  
Uniwersytet Rolniczy w Krakowie  
ul. Balicka 116B  
30-149 Krakow, Poland