Abstract.*Pryvedeny results эksperymentalnыh of research process yzmelchenyya grain sternward valtsedekovoy zernodrobylkoy, based kotorыh obosnovany ee ratsyonalnыe Options.*
Keywords: Grinders grain valtsedekovaya crusher, grinding module, Factor varyatsyy

Annotation.*The results of experimental studies of the process of grinding grain in roll-and-deck crusher are presented; on which crusher's rational parameters were justified.*
Key words: grain grinders, roll-and-deck crusher, module of grinding, coefficient of variation

UDC 629,631,554

COMPARISON OF OPERATION OF VEHICLES FOR CARRIAGE sugar beet

SG Fryshev, Dr.

Abstract.*The methodology of comparative evaluation of vehicles for transportation of sugar beet harvesters.*
Keywords:*sugar beet, harvesting,Transport-tionVehicles, overloading, efficiency*

Formulation of the problem. The use of different methods of transportation of roots of beet harvesters (BC) provides a different composition Harvesters transport systems (ZTK). Evolution of BC took place recently in the area of equipment originally bunkers, compensators capacity of 1.5-3.5 tons, and then with increasing engine power up to 250-300 kW capacity hopper gradually increased - up to 10-12, 15-18, 20-25 tons. According greatly increased carrying capacity for the transport fleet, which is enriched with specialized equipment. Great choice of machines on the market for technical and operating parameters causes considerable diversity makes BC and transport systems used in farms recently. Cost economic evaluation of harvesting and transport technologies (ZTT) is complicated by the lack of stable prices for equipment due to frequent changes in exchange rates. It is therefore advisable to develop methods of comparative assessment that is based on an assessment of specific labor manufacturing operations ZTT.

Analysis of recent research. According to specialists of the Institute of bioenergy crops and sugar beet NAAS of Ukraine the most effective organization exportation of sugar beets in the field collection point is the use of trains using heavy vehicles (AM), with AM carrying two trailers (traditional flowsheet) [1]. In order to use AM for each of them fixed four-axle trailer. When streaming harvest AM loaded first, and then two trailers that were downloaded before. At the wrong time, when the road train carrying beets at the collection point, with the help of two empty tractor trailers transported to BC where downloaded

and then go on the road. When returning empty-AM driver vidchiplyaye their trailers loaded from BC, prychiplyaye previously retrieved two trailers and transported to the collection point.

The process, which is accepted by us for such a comparison is made complex machines: beet harvesters, car towing (BP) Car trailers (NP) dump trucks and tractors. The transport unit containing NP tractor equipped truck coupling device moves across the field, drove up to the next BC, which is filled with root vegetables and loading hopper. Capacity is selected basket of emergency or even fold capacity hopper BK way that one or two - all three charged NP roots of the bunker. After loading the tractor emergency transports to the edge of the field, and his vidchiplyaye prychiplyaye empty NP, which is there, and returns to the field for combines. Loaded products to NP prychiplyayetsya BP truck with a device that carries beet reception center, a trailer unloaded, and returns to the state of emergency by the field.

For quantitative evaluation of these methods and determine the feasibility of a more rational need to develop methods comparative assessment of different ways of working vehicles.

The purpose of researchisincrease efficiency technology transportation of sugar beet harvesters through its rational choice based on appropriate justification methodology of comparative evaluation of vehicles.

Results. Analysis of the first scheme in question shows the following. AM itself is streaming scheme for the "long arm" movement "harvester - reception center" with stops at the edge of fields for vidchiplennya-coupling trailers. This scheme has disadvantages inherent in her simple BC AM and pending downloads [2]. Current trailers in conjunction with a tractor working in a mode of expansion joints for movement napivchovnykovoyu scheme to "short arm" - "harvester - by the field" with stops at the edge of fields for vidchiplennya-coupling trailers. The need to perform additional operations vidchiplennya-trailer coupling reduces the effectiveness of this method.

Another way (second flowsheet) of transport is the use of simultaneous napivchovnykovoho way traffic as "short" and the "long" arm. As the vehicle used reversible NP working in the field with a tractor that is equipped truck coupling device while on the road - with blood pressure [3]. This method has positive components as both "short" and the "long" shoulder joints work as TOR, which eliminates downtime as BC and TC, and the use of truck hitch on the tractor reduces labor costs.

For comparative evaluation of two technological options apply specific duration of harvesting and transport operations (PTO) in a time which is assigned to 1 ton of transported products, h / t. For process variant using train with two trailers PTO determined by the equation:

$$t_{П1} = \frac{T_{О1}}{q_A \gamma_A (q_A \gamma_A + q_П \gamma_П)} = \frac{t_{ПЕР1} + t_{ОЧ1} + t_{ЗАВ1} + t_{П-В}}{q_A \gamma_A} + \frac{t_{ОЧП} + t_{РУХ} + t_{РА}}{q_A \gamma_A + q_П \gamma_П},\ год/т, \quad (1)$$

$$t_{П2} = \frac{T_{П2}}{q_П \gamma_П} = \frac{t_{ПЕР2} + t_{ОЧ2} + t_{ЗАВ2} + t_{П-В}}{q_П \gamma_П},\ год/т, \quad (2)$$

where: $t_{П1}$, $t_{П2}$ - Specific duration of harvesting and transport operations under the car and trailer to the tractor; $T_{О1}$, $t_{ПЕР1}$, $t_{ОЧ1}$, $t_{ЗАВ1}$, $t_{П-В}$, $t_{ОЧП}$, $t_{РУХ}$, $t_{РА}$ - The duration (in hours) of harvesting and transport operations vehicle, according overall, moving across the field, waiting for upload, download, vidchiplennya-coupling trailers, trailers standby supply, the movement collection point and back unloading of roots at the receiving point; q_A, $q_П$ - Car and trailer load, t; γ_A, $\gamma_П$ – coefficients of static capacity utilization vehicle and trailer; $T_{П2}$, $t_{ПЕР2}$, $t_{ОЧ2}$, $t_{ЗАВ2}$, $t_{П-В}$ - The duration (in hours) of harvesting and transport operations trailer with a tractor, under overall, moving across the field, waiting for upload, download, vidchiplennya-trailer coupling relative to the tractor.

According to experimental data [4-6] the length of the vehicle moving on the field, waiting for the download, the download is:

$$t_{ПЕР1} + t_{ОЧ1} + t_{ЗАВ1} = 0,09 + \frac{q_A \gamma_A}{W_H},\ Н \quad (3)$$

where: W_H - Performance vygruznogo conveyor hopper combine tonnes / year.

Accordingly, the length of the tractor trailer moving on the field, waiting for the download, the download is:

$$t_{ПЕР2} + t_{ОЧ2} + t_{ЗАВ2} = 0,09 + \frac{q_П \gamma_П}{W_H},\ Н \quad (4)$$

The total duration of the specific harvesting and transport operations for technological applications, train with two trailers with (3) and (4) defined as:

$$T_П = t_{П1} + t_{П2} = \frac{t_{ПЕР1} + t_{ОЧ1} + t_{ЗАВ1} + t_{П-В}}{q_A \gamma_A} + \frac{t_{ОЧП} + t_{РУХ} + t_{РА}}{q_A \gamma_A + q_П \gamma_П} + \frac{t_{ПЕР2} + t_{ОЧ2} + t_{ЗАВ2} + t_{П-В}}{q_П \gamma_П} =$$

$$= \frac{0,09 + \frac{q_A \gamma_A}{W} + t_{П-В}}{q_A \gamma_A} + \frac{t_{ОЧП} + t_{РУХ} + t_{РА}}{q_A \gamma_A + q_П \gamma_П} + \frac{0,09 + \frac{q_П \gamma_П}{W} + t_{П-В}}{q_П \gamma_П}, \ год / т \qquad (5)$$

For the second variant of the process - use semi components PTO determined equations:

(6)

$$t_{Н1} = \frac{t_{П-ВН} + t_{РУХ} + t_{РА}}{q_Б} = \frac{t_{П-ВН} + \frac{2l_{ij}}{v_T} + t_{РА}}{q_Б}, \ год / т,$$

(7)

$$t_{Н2} = \frac{t_{ПЕР3} + t_{ОЧ3} + t_{ЗАВ3} + t_{П-ВН}}{q_Б} = \frac{0,09 + \frac{q_Б}{W_Н} + t_{П-ВН}}{q_Б}, \ год / т,$$

where: $t_{Н1}$, $t_{Н2}$ - Specific duration of harvesting and transport operations in accordance with avtotyahachem trailer and semi-trailer tractor; $t_{П-ВН}$ $t_{РУХ}$, $t_{РА}$ $t_{ПЕР3}$, $t_{ОЧ3}$, $t_{ЗАВ3}$ - The duration of harvesting and transport operations, respectively: vidchiplennya-coupling semi truck using devices avtotyahacha movement of the vehicle at the collection point and back unloading roots, moving across the field of emergency tractor, waiting download, download NP; lij - distance transportation of grain from the field (and point) to the point of discharge (item j), km; v_T - Average technical speed of the car on the way from the field to the barn km / h; $t_{РА}$ - JSC length of stay in the unloading point, depending on the level of mechanization and organization of work; $q_Б$ - Weight bunker harvester Root: $q_Б = \omega_K d_В$ T (where: ω_K - Capacity hopper BC, m3; $d_В$ - Unit weight of sugar beet, t / m3).

Load Semi defined as:

$$q_Н = \frac{q_Б}{\gamma_Н},$$

where: $\gamma_Н -$ static rate of capacity utilization of emergency.

The total duration of the specific harvesting and transport operations to use semi with (3) and (4) defined as:

$$T_Н = t_{Н1} + t_{Н2} =$$

$$\frac{t_{П-ВН} + \frac{2l_{ij}}{v_T} + t_{РА}}{q_Н \gamma_Н} + \frac{0,09 + \frac{q_Б}{W_Н} + t_{П-ВН}}{q_Н \gamma_Н} = \frac{2t_{П-ВН} + \frac{2l_{ij}}{v_T} + t_{РА} + 0,09 + \frac{q_Б}{W_Н}}{q_Б}, \ год / т \qquad (8)$$

Save time unit cost is determined as the difference between the PTO and technological options is:

$$\Delta T = T_П - T_Н = \frac{0,09 + \frac{q_A \gamma_A}{W_Н} + t_{П-В}}{q_A \gamma_A} + \frac{t_{ОЧП} + t_{РУХ} + t_{РА}}{q_A \gamma_A + q_П \gamma_П} + \frac{0,09 + \frac{q_П \gamma_П}{W_Н} + t_{П-В}}{q_П \gamma_П} -$$

$$- \frac{2t_{П-ВН} + t_{РУХ} + t_{РА} + 0,09 + \frac{q_Б}{W_Н}}{q_Б}, \ год/т. \qquad (9)$$

The resulting equation shows that the increase in the unit cost savings achieved through the increase in bunker BC and reduce the amount of time spent on vidchiplennya-coupling device using the truck coupling. For comparison of dependency will make the following assumptions:

- weight of cargo that is transported on a car trailer, equal to the mass of cargo in semitrailer and equal to the mass of sugar beet in the bunker BC: $q_A \gamma_A + q_П \gamma_П = q_Н \gamma_Н = q_Б$;
- bulk cargo, which is transported by vehicle weight cargo in each of the two trailers:

$$q_A \gamma_A = \frac{1}{3} q_Б, \ q_П \gamma_П = \frac{2}{3} q_Б;$$

- vidchiplennya-length trailer coupling 2 times the length vidchiplennya - coupling semi truck using the device: $t_{П-В} = 2 t_{П-ВН}$;
- Waiting period for filing trailers car at high priority of implementation of operations and minimum accepted $t_{ОЧП} = 0$.

Saving specific amount of time considering the assumptions defined as:

$$\Delta T = \frac{0,09 + \frac{\frac{1}{3} q_Б}{W_Н} + 2t_{П-ВН}}{\frac{1}{3} q_Б} + \frac{t_{РУХ} + t_{РА}}{q_Б}$$

$$+ \frac{0,09 + \frac{\frac{2}{3} q_Б}{W_Н} + 2t_{П-ВН}}{\frac{2}{3} q_Б} - \frac{2t_{П-ВН} + t_{РУХ} + t_{РА} + 0,09 + \frac{q_Б}{W_Н}}{q_Б} = \qquad (10)$$

$$= \frac{0,315 + \frac{q_Б}{W_Н} + 7t_{П-ВН}}{q_Б}, \ год/т$$

The resulting expression to determine the effectiveness of the transport of sugar beet harvesting in unit labor costs during use semi-trucks as joints compared with traditional transportation option.

Example calculation. Sugar beets are harvested harvesters Ropa Euro Tiger (row 9) with a capacity per hour of working (basic) time

$W_{KP} = 170$ t / h, bunker capacity of 40 m3 (25.6 tons) and productivity at unloading conveyor with hopper beet W_H = = 720 t / h. The utilization of time changes to BC for technological applications, working semitrailers $\tau = 0,81$; working hours $t = 12$ *год*. For removal of roots of used combine working as emergency compensators. APryynyata $t_{В-ПН}$ = 0.05 h, Stay in the car reception center - 0.1 hours.

Identify the effectiveness of the transport of sugar beet harvesting in unit labor costs during use semi-trucks as joints compared with traditional transportation option, and the total time savings on transportation from one BC per day.

Decision. Saving unit labor costs when using semi-trucks as joints compared with traditional transport option is:

$$\Delta T = \frac{0,315 + \frac{q_Б}{W_H} + 7t_{П-ВН}}{q_Б} = \frac{0,315 + \frac{25,6}{720} + 7 \cdot 0,05}{25,6} = 0,027 \ м / год.$$

The amount of roots collected and transported for the day is:

$$Q = W_{KP} t \cdot \tau = 170 \cdot 12 \cdot 0,81 = 1652 \ м.$$

Save time on transportation per working day defined as:

$$T = \Delta T \cdot Q = 0,027 \cdot 1652 = 44,6 \ год.$$

Conclusion. Theoretical analysis of harvesting-transport complex for sugar beet with the use of current road trucks and semi-trailers by traditional technology using trains with trailers allowed to justify the methodology Comparative evaluation of vehicles for transportation of sugar beet harvesters.

List of references

1 *Kuril VL* Sugar beet - high quality / VL chickens, *VM Sinchenko, VI Pyrkin and others.* // Sugar beet. - 2012. - №4. - P. 14-18.

2 *Izmailovo AY* Technologies and solutions for tehnycheskye transportnыh Increase of the effectiveness of APC / AY Izmailovo. - M .: FHNU "Ros-ynformahroteh", 2007. - 200 p.

3 *Fryshev Mr S.*. Analysis bandwidth transport processcomplex with no bukernymy combines / SG // Fryshev Scientific Bulletin of National University of Life and Environmental Sciences of Ukraine. Series: APC equipment and energy. - K., 2014. - Vol. 196, ch. 2. - P. 203-211.

4 *Zyazev VA* Transit cargoes selskohozyaystvennыh avtomobylnым transport / VA*Zyazev, MS Kaplanovych, VI Petrov*. - M .: Transport, 1979. - 253 p.

5 *Kaplanovych M. C*. Handbook on selskohozyaystvennым transportnым Business / MS*Kaplanovych*. - M .: Rosselhozyzdat, 1982. - 315 p.

6 *Buryanov AI* Technology, Organization and Planning for transit cargoes selskohozyaystvennыh enterprise: monograph / AI Buryanov. - Zernograd: FHOU IDPs ACHHAA, 2010. - 268 p.

Abstract.*Obosnovana method sravnytelnoy otsenki work transportnыh funds for Transit saharnoy from beet combine.*

Keywords:*Saharan beet, Other cleaning, transport, rovka, transportnые sredstva, Transshipment, Efficiency*

Annotation.*The technique of a comparative assessment of works of transport facilities on conveyance of a sugar beet from combines is proved.*

Key words: *sugar beets, harvesting, transportation vehicles, overloading, efficiency*

UDC 631: 372

TO STUDY QUESTIONS feasibility of using small-sized MEW With axle 2K2

RG Shkarivskyy, MA
GV Shkarivskyy, Ph.D.

Abstract.*The results of the analysis of the feasibility of using in agricultural production of power means 2K2 wheel formula taking into account the characteristics of households, their material and technical equipment and contribution to the gross output of agriculture.*

Keywords: mobile power unit, compact, axle 2K2, use, usefulness, agricultural production

Formulation of the problem. Food security state is determined by its ability to provide the population with food

food. Getting proper food and raw materials for their production provides the agricultural sector, using the necessary means of production. One of the basic means of production in the crop is machine-tractor unit (AIT), established on the basis of mobile power product (MEW). Given the fact that the agricultural sector unites enterprises of different ownership forms and sizes and individual farms should be noted that the requirements for MEW MTA to create a very rigid and can not be put into any one type of machine. In this case, the relevant question is examining the feasibility of using power means in agriculture for various purposes and sizes, including small wheel formula 2K2 with the relevant provisions of the State Target Program of technical policy in agriculture.

Analysis of recent research. Research and development work with small-sized oil plant, characterized wheel formula 2K2 can be grouped into several distinct groups, namely: 1 - dedicated to improving the design of walking tractors [1-4]; 2 - on the problems of control and