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Research Article

REGULATION OF LOADING OF MELONS IN REFRIGERATED WAGONS AND CONTAINERS

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ABSTRACT

This article discusses the study of technology and conditions of transportation of melons. The research methods are recommended by studying the norms of loading melon products from perishable goods into wagons.

KEYWORDS

Railway transport, continuous cooling chain, transportation technology, transportation conditions.

INTRODUCTION

When fresh melons are transported by rail, they are placed in boxes №3 13359-73 №3 of STATE STANDARD. In order to regulate the loading of wagons, it is necessary to determine the average weight of one place. This work was carried out directly at the melon loading points (Chukursoy station) by measuring the weight of 50 placed boxes. Based on the commission measurement of gross weight, interval tables of weight indicators in one place of box STATE STANDARD 13359-73 №3 were compiled. These figures were calculated by subtracting the tare from the gross weight. On the basis of measuring the weight of the container and gross commission STATE STANDARD

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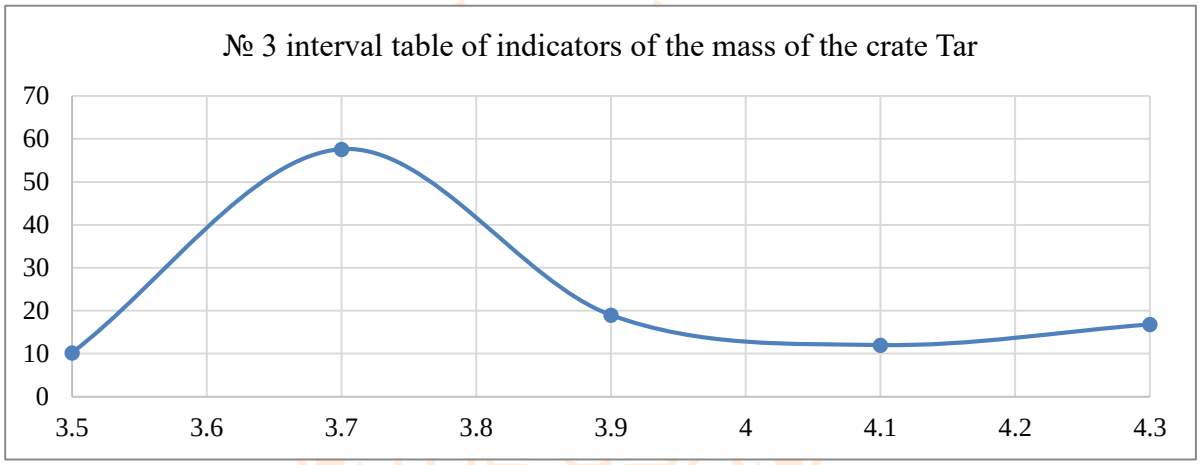
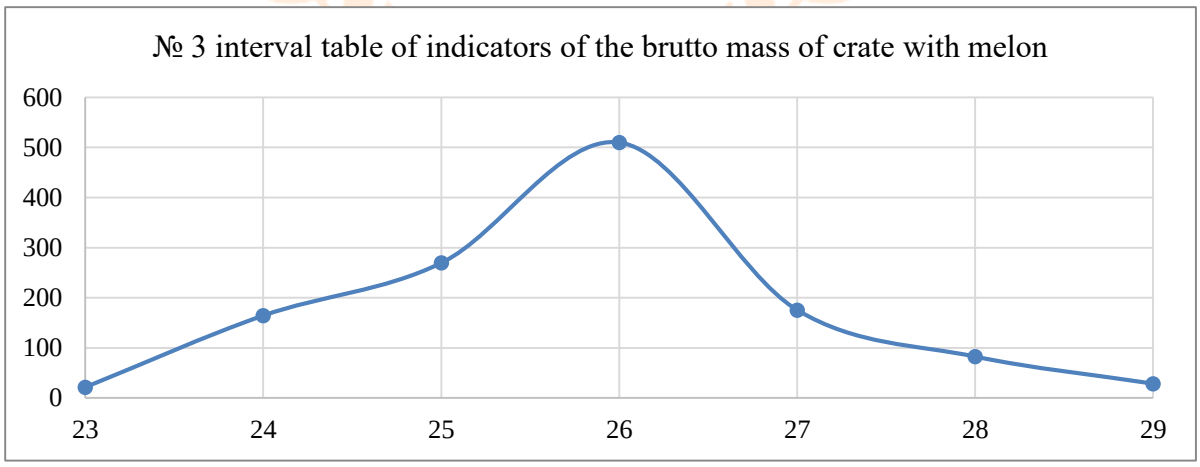
13359-73 interval tables of the weight of the container in one place of the box №3 were made (Table. 1; 2; 3).

The analysis of the indicators of the interval tables confirms that, since the description of the rows in question is within the allowable range, the obtained average values of gross and tara sizes are true, as well as they can be used as a calculation:

$$(G = 0,2 \div 1,56;\ V = 5,1 \div 7,45\%)$$

Thus, when transporting melons in №3 boxes, the average weight of one box should be 3.7 kg, and the gross weight - 25 kg.





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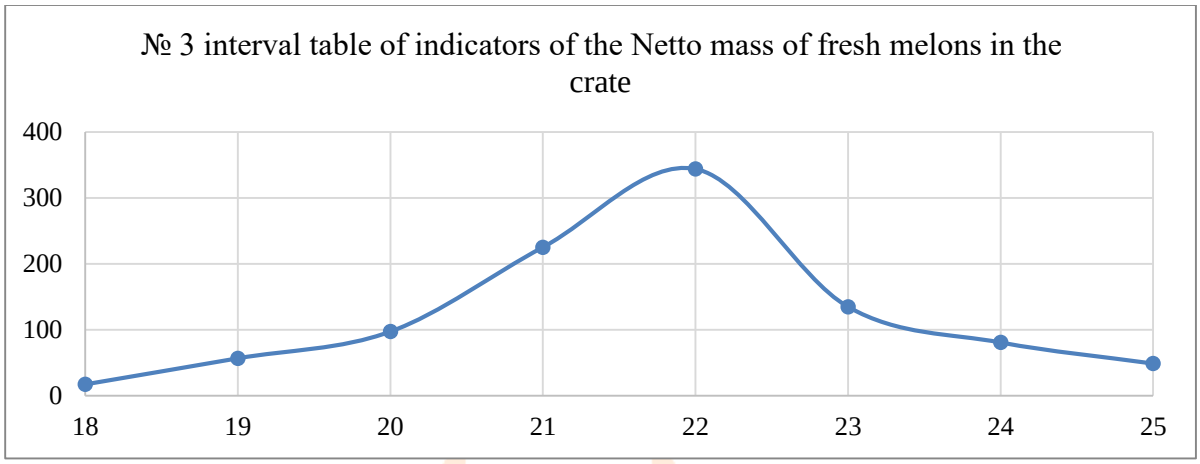

Figure 1. №3 Histogram of mass distribution of box

Figure 1 shows a histogram of the distribution of the mass of freshly cut melons in one place across the dish, gross and net. In this case, it can be seen that there is a tendency for the mass on the vessel to decrease from the mean value, as 19 measurements were made on a mass smaller than the mean value and 12 measurements were made on a mass larger than the mean value. In terms of gross mass, the following can be observed - having a mass smaller than average in 19 measurements and a mass larger than average in 31 measurements. Thus, there is reason to increase the average mass of gross.

Table 1

№3 Interval table of mass indicators of a box container

q_i	$\overline{q_i}$	n_i	$\overline{q_i} \cdot n_i$	$\overline{q_i} - q$	$(\overline{q_i} - q)^2$	$(\overline{q_i} - \overline{q})^2 \cdot n_i$
3.3-3.5	3.4	3	10.2	0.3	0.09	0.27
3.5-3.7	3.6	16	57.6	0.1	0.01	0.16
3.7-3.9	3.8	5	19	0.1	0.01	0.05
3.9-4.1	4.0	3	12	0.3	0.09	0.27
4.1-4.3	4.2	4	16.8	0.5	0.25	1.00
Jami		31	115.6			1.75

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$$\overline{q} = \frac{\sum(\overline{q_i} \cdot n_i)}{\sum n_i} = \frac{115{,}6}{31} = 3{,}7;\ G = \sqrt{\frac{\sum(\overline{q_i} - \overline{q})^2 \cdot n_i}{\sum n_i}} = \sqrt{\frac{1{,}75}{31}} = 0{,}2;\ V = \frac{G}{\overline{q}} \cdot 100 = 5{,}4\%$$

Table 2

№3 interval table of gross mass indicators of melon with 3 boxes

q_i	$\overline{q_i}$	n_i	$\overline{q_i} \cdot n_i$	$\overline{q_i} - q$	$(\overline{q_i} - q)^2$	$(\overline{q_i} - \overline{q})^2 \cdot n_i$
22-23	21.5	1	21.5	3.5	12.5	12.5
24-24	23.5	7	164.5	-1.5	2.25	15.75
24-25	24.5	11	269.5	-0.5	0.25	2.75
25-26	25.5	20	510	-0.5	0.25	5
26-27	26.5	7	175.5	1.5	2.25	15.75
27-28	27.5	3	82.5	2.5	6.25	18.75
28-29	28.5	1	28.5	3.5	12.25	12.25
Jami		50	12.52			82.50

$$\overline{q} = \frac{\sum(\overline{q_i} \cdot n_i)}{\sum n_i} = 25{,}0;\ G = \sqrt{\frac{\sum(\overline{q_i} - \overline{q})^2 \cdot n_i}{\sum n_i}} = 1{,}28;\ V = \frac{G}{\overline{q}} \cdot 100 = 5{,}12\%$$

Table 3

№ Interval table of net mass indicators of fresh melons in 3 boxes

q_i	$\overline{q_i}$	n_i	$\overline{q_i} \cdot n_i$	$\overline{q_i} - q$	$(\overline{q_i} - q)^2$	$(\overline{q_i} - \overline{q})^2 \cdot n_i$
17-18	17.5	1	17.5	3.7	13.69	13.69

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18-19	18.5	4	74	2.7	7.29	29,16
19-20	19.5	5	97.5	1.7	2.89	14.45
20-21	20.5	11	225.5	0.7	0.49	5.39
21-22	21.5	16	344	0.3	0.09	1.44
22-23(	22.5	6	135	1.3	1.69	10.14
23-24	23.5	5	117.5	2.3	5.29	26.45
24-25	24.4	2	49	3.3	10.89	21.78
Jami		50	10.60			122.5

$$\overline{q} = \frac{\sum(\overline{q_i} \cdot n_i)}{\sum n_i} = 21{,}3;\ G = \sqrt{\frac{\sum(\overline{q_i} - \overline{q})^2 \cdot n_i}{\sum n_i}} = 1{,}56;\ V = \frac{G}{\overline{q}} \cdot 100 = 7{,}4\%$$

Today, there are no standards for the technical loading of wagons for the transportation of fresh melons by rail. In order to justify the norm of technical loading of wagons for transportation of fresh melons in a standard container or without a container (bulk),TashREI's (Tashkent railway transport engineering institute) SRL scientific research laboratory) carried out experimental increase work at a number of stations, the results of which were formalized in the act. On the basis of these acts, a record of experimental work is made, on the basis of which the analysis of the problem under study is performed. Statistics show that the loading of wagons of the same type varies over a very large limit, with a difference in loading of up to 6 tons. When the experimental transport was organized, different loads were allowed on the wagons due to the fact that the capacity of the wagon did not match the frequency of the load placed on the trays (25 boxes). Under normal conditions (non-experimental), large differences in loads on wagons of the same type are explained by the application of different loading schemes and non-compliance with the multiplication of the load relative to the wagon capacity.

The calculated mass of the box with the melon was assumed to be 25 kg.

For refrigerated rolling stock, it is recommended to set the technical norm of wagon loading at the level of static loading of wagons (Table 4). The draft technical standard of loading on wagons for transportation of fresh melons is presented (Table 5, Figure 2).

Table 4

The following is an account of an experimental increase in fresh melons

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Wagon number	Growth height, cm	Number of seats left	Gross mass of cargo, kg	Quality%		
				Standard	No-standard	Waste
1	2	3	4	5	6	7
Increase in boxes to GDR sections						
872-3042	200	1075	24895	89.4	3.3	7.3
872-3050	200	1075	25540	81.4	5.5	13.1
Average			25218	85.4	4.4	10.2

Calculation of the average mass (gross) of a box according to statistics

Periodic frequency	$X_{ave.}$	n	$X_{ave.} \cdot n$
24.0 - 25.0	24.5	4	98.0
25.0 - 26.0	25.5	3	76.5
26.0 -27.0	26.5	2	53.0
		9	227.5

$X_{ave.}$ = 227, 5/9 = 25.3 kg

Calculation of the average mass (net) of a box according to statistics

Periodic frequency	$X_{ave.}$	n	$X_{ave.} \cdot n$
19.0- 19.5	19.25	7	134.75

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19.5-20.0	19.75	4	79.0
20.0-20.5	20.25	6	121.5
20.5-21.0	20.75	8	166.0
		25	501.25

$X_{ave.}$ = 501.25 / 25 = 20.1 kg

Table 5

Draft technical standard of wagon loading for transportation of fresh melons

Group number and cargo name	GDR 5 wagon sections	
	Carrying capacity 42 t	The total load is in tons
4 groups in a standard container (in box №3 of STATE STANDARD 13359-73) Fresh melons	26.0	104.0

The calculation of the average value of the mass of one box of melons was determined on the basis of statistical data. The results of the calculation of the gross and net mass of a single place performed on the basis of the loading norm of wagons are given below. These data are also confirmed by statistical materials.

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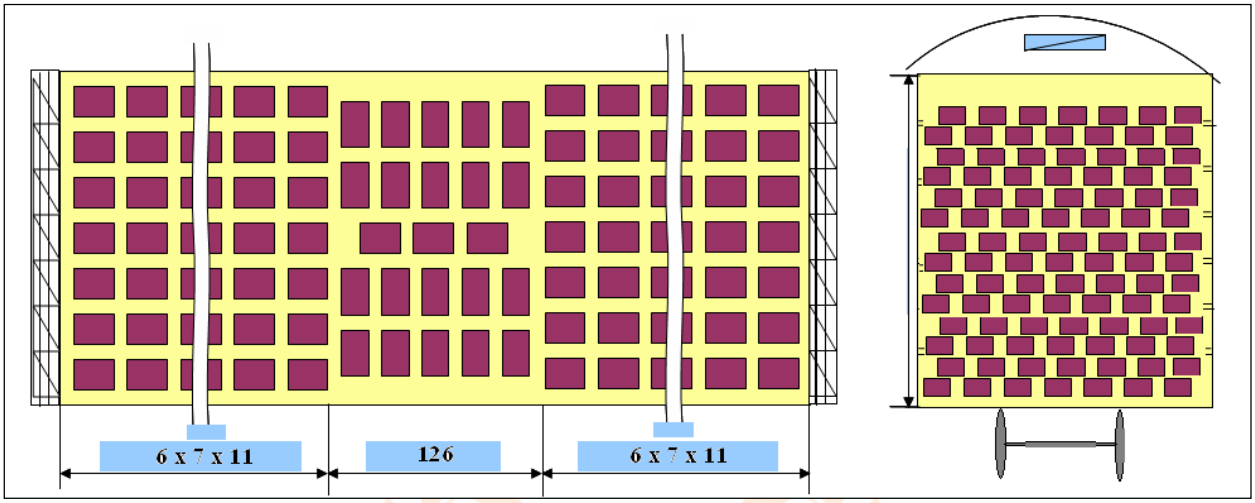

Figure 2. Scheme of loading №3 boxes of STATE STANDARD 13359-73 on GDR section wagons

In short, shippers provide freshly cut melons in boxes №3 when the outer dimensions of the container are different. Therefore, there was a need to study the external dimensions of the vessel. According to the results of the study, the following dimensions of the box №3 of STATE STANDARD 13359-73 were adopted: length - 636 cm; width - 410 cm, height - 285 cm.

In order to regulate the loading of wagons, the average mass of the box №3 of STATE STANDARD 13359-73 was determined in one place. Based on the gross and container mass measurements, interval tables of single-location indicators of the box container were constructed. As a result, when transporting melons in box №3, the average mass of one box should be 3.7 kg, and the gross weight - 25 kg.

REFERENCES

1. Соглашение о международных перевозок скоропортящихся пищевых продуктов и о специальных транспортных средствах, предназначенных для этих перевозок. (СПС). Труды Международного института холода (МИХ)
2. Сухова И.А. Пакетирование как фактор повышения качества транспортировки скоропортящихся грузов / И.А. Сухова, Д.А. Красникова // Научная мысль. 2015. № 2. – С. 39-41
3. Турсунходжаева Р.Ю. Эффективность кварцевания бахчевых культур до их транспортировки в железнодорожных вагонах на дальние расстояния/ Р.Ю. Турсунходжаева // Материалы республиканской научно-технической конференции «Ресурсосберегающие технологии на железнодорожном транспорте» - Ташкент: ТашИИТ, 2007. - С. 74-78.
4. Турсунходжаева Р.Ю. Исследование повышения качества перевозимых плодов и овощей в Республике Узбекистан / Р.Ю. Турсунходжаева //Сборник научных статей международной научно-практической конференции «ИННОВАЦИЯ -2007» Ташкент, 25-26 октября 2007г. – С. 116-117.

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5. Илесалиев Д.И. Перевозка экспортно-импортных грузов в Республике Узбекистан / Д.И. Илесалиев, Е.К. Коровяковский, О.Б. Маликов // Известия Петербургского университета путей сообщения. – 2014. – № 3 (39). – С. 11-17.
6. Tursunkhodjayeva R. Y. «Innovative Technologies on Ensuring Safety of Fruit and Vegetable Productions in Transit by Railway» International Journal of Advanced Research in Science, Engineering and Technology 2019 й (11453-11456 стр)
7. Турсунходжаева, Р. Ю. (2020). Факторы, влияющие на сохранность качества плодоовощей при перевозке. Universum: технические науки, (3-1 (72)), 62-67.
8. Yusupjanovna, T. R. Fruits and Vegetables: Problems of Their Delivery to the Consumer and Solutions. International Journal on Integrated Education, 3(12), 336-338.