# What granary load can a bitrain carry and how much could be saved in fuels?

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However, it must be taken into consideration that according to the Argentine legislation in this regard (Law 24,449), semi-trailer or trailer trucks cannot exceed a total weight of 45 tons (with some variation depending on the axle configuration), while for the Bitrain trucks, that same limitation (derived from the new legislation, Decrees N ° 27/2018 and 32/2018) reaches 75 tons.

What granary load could a bitrain carry in Argentina?

To answer this question, we proceeded to draw up table N°1. In this theoretical exercise, we estimate the load of grains that a bitrain could take in comparison with a traditional truck, according to the limitations established by Argentine legislation. A 9-axle bitrain has an estimated load volume of 80 cubic meters, while a traditional truck can approximately load 54 cubic meters. The products we analyzed were: soybeans, corn, wheat, sunflower seed, rye, brewing and forage barley, rice and sorghum.

**Table No. 1: Loading capacity allowed in Argentina by law N ° 24,449. Comparison between a Bitrain and a Truck.**

| | Specific Weight (kg/m3) | 9 axes Bitrain Volume =80 m3 | | | Truck with trailer / semitrailer Volume =54 (m3) | | | Bitrain vs Truck (Theoretical maximum) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tare | Useful Load | Total Load | Tare | Useful Load | Total Load | Rise on useful load | |
| Soybeans | 700 | 22.000 | 53.000 | 75.000 | 13.000 | 32.000 | 45.000 | 21.000 | 66% |
| Corn | 750 | 22.000 | 53.000 | 75.000 | 13.000 | 32.000 | 45.000 | 21.000 | 66% |
| Wheat | 800 | 22.000 | 53.000 | 75.000 | 13.000 | 32.000 | 45.000 | 21.000 | 66% |
| Sunflower seed | 400 | 22.000 | 32.000 | 54.000 | 13.000 | 21.600 | 34.600 | 10.400 | 48% |
| Rye | 700 | 22.000 | 53.000 | 75.000 | 13.000 | 32.000 | 45.000 | 21.000 | 66% |
| Brewing Barley | 650 | 22.000 | 52.000 | 74.000 | 13.000 | 32.000 | 45.000 | 20.000 | 63% |
| Forage Barley | 600 | 22.000 | 48.000 | 70.000 | 13.000 | 32.000 | 45.000 | 16.000 | 50% |
| Rice | 600 | 22.000 | 48.000 | 70.000 | 13.000 | 32.000 | 45.000 | 16.000 | 50% |
| Sorghum | 750 | 22.000 | 53.000 | 75.000 | 13.000 | 32.000 | 45.000 | 21.000 | 66% |

*Source: @BCRmercados based on bitrains' manufacturing companies*

In the case of soybeans, a traditional truck today transports about 32 tons, while with the nine-axle bitrain could carry about 53 tons. The increase in the load is 66%. Similar figures would be presented in corn, wheat and rye and grain sorghum. In brewing barley the figure could be slightly lower: 52 tons in the bitrain.

But in the case of sunflower, due to its specific weight in Kgs per cubic meter, the bitrain could transfer-theoretically-about 32 tons of load, while the traditional truck would be located at 21.6 tons. There, the load increase by using the bitrain would be 48%.

In rice, a traditional truck could carry about 32 tons, while the nine-axle bitrain could load-theoretically-about 48 tons. The increase is 50%.



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These rises in the transported load directly impact on a reduction in the Bitrain's operating costs per ton transported compared to a traditional truck.

How much is the fuel saving that could be verified by using the bitrain instead of a traditional truck?

At this point we will focus on the reduction of fuel consumption per tonne-kilometer transported for the case of soybeans, which translates into a greater bitrain energy efficiency and an improvement in environmental quality.

The fuel consumption of a traditional truck could oscillate between 25 and 30 liters per hour circulating with an average speed of 80 km / h. In the case of the bitrain, the consumption could be between 28 and 35 liters per hour at that average speed. 1 With this data, we made table No. 2.

**Table No. 2: Comparison between a bitrain and a regular truck in fuel consumption for soybeans' transport.**

| Product: Soybeans | | Traditional Truck | Bitrain | Rise/ Savings |
|---|---|---|---|---|
| Avg. Consumption | [lts/hs] | 27,5 | 32 | |
| Avg. Speed | [Km/hs] | 80 | 80 | |
| Avg. Consumption | [lts/Km] | 0,344 | 0,400 | 16% |
| Transported Tonnes | [Tn] | 32 | 53 | 66% |
| Avg. Consumption | [Liters per ton / km) | 0,011 | 0,008 | -30% |

*Source: @BCRmercados*

As can be seen, the increase in tons transported by soybean using the bitrain (66%) is higher than the increase in fuel consumption generated by its use (16%). Therefore, bitrain improves the energy efficiency measured through average consumption, or the amount of liters per ton-kilometer, since the average consumption in the example cited drops by 30%. The traditional truck would consume 0.011 liters per ton / km, while the bitrain would use 0.008 liters per ton / km. Thus, bitrain generates an average fuel saving of 30% compared to the traditional truck.

This increase in the efficiency of fuel use per tonne-kilometer can also be quantified in money for a given trip. For example, for a bitrain that transports 53 tons of soybeans along 850 kilometers, there is a transport production of 45,050 tons-kilometers (53 tons x 850 km). Those 45,050 tons-kilometers imply a total saving of almost 135 liters of gas oil (0.003 x 45 050). This saving per ton of soybean is equivalent to almost US $ 3 / tn. If soybeans are currently valued at 300 US $ / t, fuel savings equal 1% of the product's value (measured in US $ / tn). An interesting figure, in addition to the beneficial environmental impact.

This savings in fuel costs should be added to the rest of the savings that would occur in other items that integrate the operating costs of heavy vehicles (tires, lubricants, oil, washing, repairs, spare parts, etc.)

Bitrains Advantages

The benefits in the use of bitrains for the cereal transport arises from the increase in the loading capacity in relation to conventional trucks. There are several advantages:

• In the reduction of transport costs per ton transported.


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• Less investment in pavement maintenance of roads and highways (less wear due to fatigue).

• In a decrease in the number of vehicles needed to transport a certain amount of cargo (fewer units circulating on routes and roads).

• Less loading time.

• Shorter download time.

• Lower cost by not requiring a dump platform.

• Less personal risk and stress of the elements.

• Greater efficiency by not requiring internal sweep or contaminant remnants.

• Greater safety due to the lack of exposed nozzles, avoiding the loss of products.

• Greater benefit due to lower volatile shrinkage, pollution and energy consumption.

1 Santini, Cristian. 2016. Ground transportation of cargo. Comparative analysis of performance and competitiveness. UTN



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