Measuring postharvest losses in wheat logistics chain: a Brazilian case study[1]

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Introduction

According to Lipinski et al. (2013), about 25% of every calorie grown is not consumed by humans because of food losses across all stages of the food value chain. About 24% of total food loss occurs at production or harvest, 24% at handling and storage, 4% at processing and packaging, 12% at distribution and marketing, and 35% at consumption.

Specifically at transportation stage, food loss occurs due many factors, but the majority is related to failure in infrastructure, as, for example, poor road conditions and old heavy-duty vehicles. Better road conditions, availability of alternative modes of transportation or even an appropriate warehouse infrastructure are important to allow lower food loss in transportation.

In Brazil, there is a high dependence on road transport, which accounts for more than 60% of all cargo moved within the country. Brazil has 1.6 million kilometers of roadway, but only 221,000 km are paved. According to CNT (2013), 46% of the Brazilian Federal road system's paved are in poor states of Conservation. Besides that, the heavy-duty fleet is about 17 years, and there is a lack of storage capacity.

In this context, food loss in transport and storage in Brazil is a relevant issue to be studied, once the country is an important player in global food production.

Objectives

This study aims to measure quantitative losses across wheat grain logistics chain in Rio Grande do Sul (RS), a Brazilian state responsible for about 50% of national production of wheat. Besides this, it is important to highlight the representative participation of smallholders in wheat production in RS state and the strong presence of cooperatives in the logistics chain of wheat. Based on the main results of the study, this paper suggests some strategies to reduce losses in different stages in supply chain.

Methods

The study was divided in two phases. In the first phase, it was done a literature review aiming to characterize wheat logistics chain in Brazil and, specially, in RS State. The second one was related to field trip and primary data collection.

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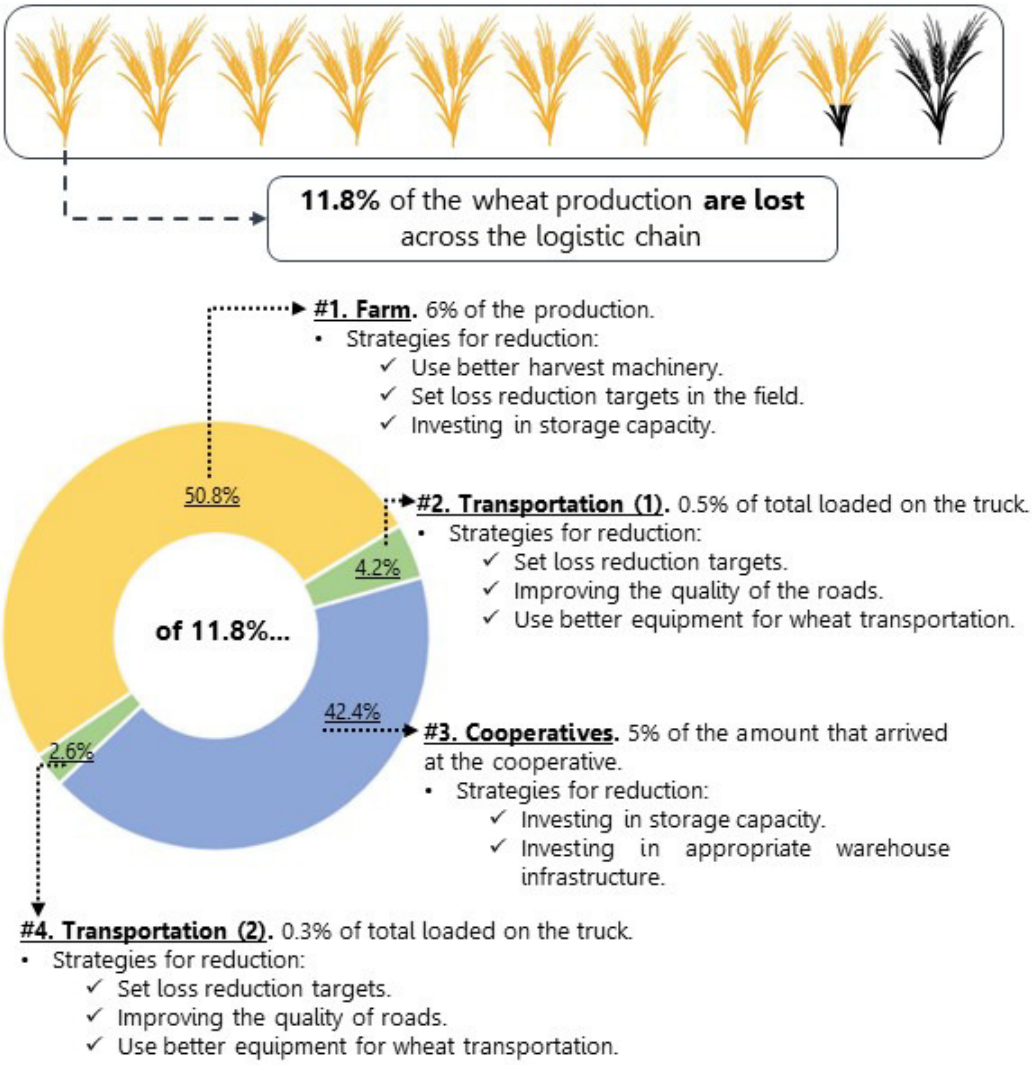
Two different questionnaires were built and applied to agents involved in wheat logistics chain in RS State: (a) cooperatives and wheat mills; and (b) trucking companies.

It was visited 6 cities in RS State, and the total distance traveled was almost 590 miles. A total of 13 agents in wheat logistics chain in the RS State were interviewed: 5 trucking companies, 3 wheat mills, 2 cooperatives, 2 port terminals/traders, and 1 union.

Results

Wheat grain losses were quantified during following stages in logistics chain: harvesting (on farms), storage (in cooperatives), processing (in wheat mills) and transportation (from farms to cooperatives; and from cooperatives to wheat mills). The main results are presented in Figure 1.



[Figure1]

During harvesting, losses occur due crops left behind in fields due to (i) poor mechanical harvesting, (ii) inapropriate machinery regulation, or (iii) inapropriate speed of harvesters.

During transport from farms to cooperatives ("Transportation1") losses involve a considerable uncertainty rate, because there is no weighing of vehicles on farms. Some aspects of this transport stage are: (i) the short distances involved between smallholders and cooperatives; (ii) the use of overweight vehicles; and (iii) the unpaved roads.

During storage in cooperatives, the main factors causing quantitative losses in this stage is the poor conditions of storage infraestructure.

During transport from cooperatives to mills ("Transportation2"), the uncertainty is lower than "Transportation1" stage due the presence of weighing structure at cooperatives and mills. "Transportation2" is characterized by: (i) paved roads; and (ii) more efficient loading operation.

During wheat industrialization process, mills said there is no significant loss.

Total wheat grain loss across logistics chain is about 11.8%. The main stages responsible for those losses are harvesting and storage in cooperatives. Transport accounts for 0.8% of total loss.

In this context, the strategies suggested for reducing losses in logistics chain include (but are not limited to):

1. Set loss reduction targets: From a management system, even if simple, each agent can establish baselines, identify the most critical stages or activities, and set loss reduction targets along the logistics chain.
2. Choose a better transportation service level: truck companies that respect the maximum limit weight on trucks, more productive heavy-duty fleet, and loading and unloading more efficient systems.
3. Private and public investments on:
    a. appropriate warehouse infrastructure: improving static capacity of storages in Brazil and introducing hermetic technologies for crops;
    b. roads: improving quality of roads;
    c. alternative modes of transportation with lower loss rates, such as waterways and railways.

Conclusions

This study aimed to characterize wheat grain logistics chain in RS State and to measure the quantitative losses across each stage from farmers to mills. From the surveys, it can be highlighted:

- Quantitative total wheat grain losses:
    a. Wheat grain losses in RS State are about 11.8%, wich is 200,000 ton per year.
    b. This amount means that the wheat lost in RS State it would be enough to feed almost 3,000 people per year.
    c. It represents that about 6,700 trucks loaded with wheat do not arrive in final destination.

- Different losses occur across different stages in wheat grain logistics chain:

a. Harvesting and storage in cooperatives are the main stages, accounting for about 93.2% of total loss.
b. Transport accounts for 6.8% of total loss.
c. Losses in “Transportation1” are higher than losses in “Transportation2”, because of differences in uncertainty degree and transport conditions.

- Different agents across wheat logistics chain have different point of view about losses:
  a. In general, farmers are not aware of the losses. They do not know and do not measure losses, because there is no weigh system on farms. They prefer overload the vehicle than choose a better transportation service level.
  b. Cooperatives and mills are more aware of this issue, because quantitative losses means monetary losses during commercial transaction among them.

References

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