Soyabeans: Moisture Content, Self Heating and Cargo Damage

Introduction

In recent years, a number of claims have arisen at the discharge port, often following long ocean voyages where pre-existing cargo conditions have become apparent at discharge. This Risk Alert provides an overview of the principal risks associated with the carriage of soyabeans in bulk and is intended to support members, Masters and operational teams by highlighting the key factors that contribute to cargo deterioration and claims exposure on long ocean voyages, particularly from the Americas to the Far East.

Trade and Seasonal Export Patterns

The global trade in soyabeans operates year round, driven by sustained demand from China, the world's largest importer. Brazil and the United States remain the main exporters, together supplying most of the global market. In 2026, Brazil is expected to produce over 182 million tonnes of soyabeans, with around 112 million tonnes forecast for export.

Trade data shows a continuing increase in Chinese import demand, resulting in regular shipments from South America to East Asia. These voyages typically last 40 – 45 days and sail through multiple climate zones.

Soyabean shipments from Brazil to China follow a highly seasonal pattern, with peak activity during the South American harvest period between February and April. During this time, cargoes are often shipped soon after harvesting, with limited opportunity for drying and controlled storage ashore, increasing the risk of higher moisture content and biological activity at loading. These shipments are also exposed to challenging conditions, beginning with high summer temperatures in South America (often around 30°C), followed by temperature variations during the voyage and cold winter conditions at discharge in northern China. Peak export periods place pressure on inland logistics, port infrastructure and vessel availability, increasing the likelihood of:

- cargoes being presented for shipment shortly after harvest;
- limited drying or conditioning time ashore;
- congestion at load ports; and
- delays at anchorage or during discharge.

Harvesting and Pre-Shipment Conditions

Harvesting conditions are an important risk factor. Where soyabeans are harvested during rainfall or periods of high ambient humidity, the cargo is more likely to present with elevated moisture content at the load port. Deteriorating weather towards the final stages of harvesting may restrict access to crops, allowing harvested soyabeans to absorb additional moisture and potentially affecting cargo quality.

Extended inland transport from harvesting regions to export terminals, particularly where exposure to precipitation occurs, may further affect cargo condition. Soyabeans harvested under wet conditions may therefore be more susceptible to self-heating, mould development and deterioration during the voyage.

In Brazil, soyabeans are cultivated across different agroclimatic zones, including equatorial (north), tropical (central) and subtropical (south). As noted by EMBRAPA, variations in growing conditions can result in differences in soyabean structure and composition, which may influence their resilience to handling, storage and carriage, and their susceptibility to deterioration.

Where harvesting or inland transport occurs under wet conditions, members may wish to request moisture certification and carry out visual inspection at the load port prior to loading. Where cargo condition is in doubt, members may consider seeking expert advice and, where appropriate, decline cargo presented during rain and suitably clause bills of lading.

Moisture Content and Risk with Newly Harvested and Stored Soyabeans

Moisture content remains the primary cause of damage in the carriage of soyabeans. While contractual limits may permit up to 14% moisture at loading, moisture content and cargo temperature are closely linked and together determine how long soyabeans can be carried safely without deterioration. Changes in either can adversely affect cargo condition. In this context, quality standards applied at the load port may also differ from those applied at the discharge port. Differences in moisture limits and grading criteria, for example between Brazil and China, can contribute to variations in cargo assessment at discharge.

Vertical silos at port facilities

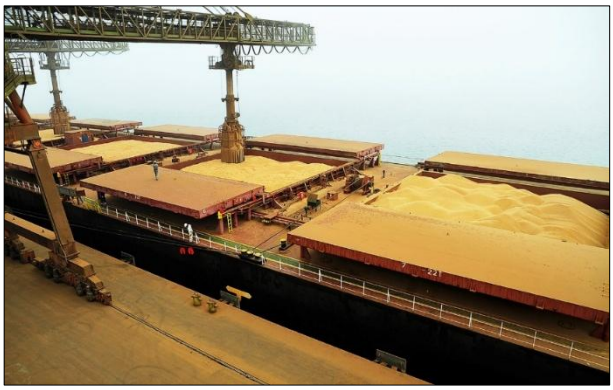
Soyabeans are a living agricultural product and continue to respire after loading, generating heat that can encourage mould growth where moisture levels are elevated. Newly harvested cargoes are generally more biologically active and therefore more susceptible to self-heating, particularly where moisture content approaches contractual limits. This risk may be further increased where drying and storage ashore are inadequate, where cargo is loaded during rainfall or where long voyages, delays or congestion are encountered.

Soyabeans stored ashore for extended periods may appear dry at loading but can contain localised areas of higher moisture or early mould due to moisture migration within silos. These conditions may not be evident at the load port and may only become apparent during the voyage or at discharge.

In addition to the inherent characteristics of the soyabeans, localised heating may occur where cargo is stowed in contact with hot shipboard structures, such as engine room bulkheads or heated double-bottom fuel tanks. Although any damage is often limited, claims may still arise due to segregation, handling and disposal of affected cargo.

Vessel Suitability, Hatch Integrity and Water Ingress

Soyabeans are highly sensitive to contamination, residual moisture and odours. Cargo holds should meet a demonstrable standard of cleanliness, be dry and odour free prior to loading. Where these standards are not met, a vessel may fail pre-loading inspections, potentially leading to delays and associated claims.



Soyabeans loading via shore-based spout

Hatch cover integrity is of paramount importance, as any water ingress can rapidly lead to increased moisture content, caking, mould growth or self-heating of the cargo. Ultrasonic testing of hatch covers and associated sealing arrangements prior to loading is therefore strongly recommended to confirm weathertightness and reduce the risk of cargo wetting during the voyage and any subsequent claims.

Ventilation, Sweat and Condensation Risk

Soyabeans loaded in warm, humid climates are particularly vulnerable when vessels proceed into cooler regions. As ambient temperatures fall, warm, moist air released from the cargo may condense on cooler steel structures, resulting in ship's sweat that can drip onto the cargo surface.

Ventilation cannot influence the factors affecting self heating- of soyabeans. However, effective ventilation management can control sweat formation and thereby reduce the risk of cargo damage. Ventilation should only be carried out when conditions are suitable and should be suspended during periods of adverse weather.

Accurate records of weather conditions, weather reports, cargo temperatures, ventilation operations, photographic evidence and daily deck logbook entries should be maintained throughout the voyage. This documentation will strengthen members' positions in the event of cargo claims.

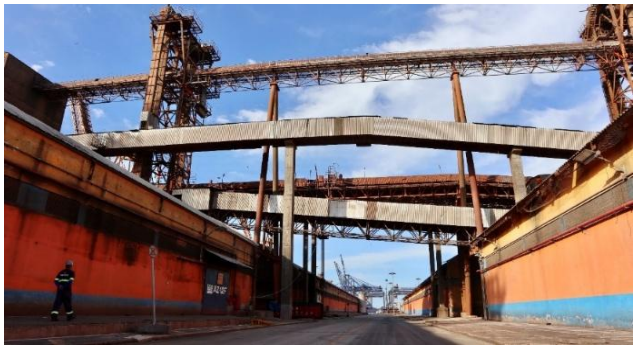
Poor ventilation management and inadequate record keeping frequently weaken shipowners' defences in cargo claims.

Certification, Surveyor Involvement and Evidence

Appropriate documentation and independent verification play an important role in managing cargo risk. Owners should ensure that valid quality and moisture certificates are available prior to loading. Independent cargo surveyors should be engaged at the load port to assist with cargo inspection, monitoring of moisture and temperature and to support the Master in cargo operations where required. Bills of lading should be claused where there is doubt as to the condition of the cargo.

Masters should record weather conditions at loading and avoid loading during precipitation where practicable. Where cargo is loaded continuously during precipitation, a letter or notice of protest should be issued immediately and all relevant documentary evidence retained. Cargo temperature and moisture should be monitored during loading and throughout the voyage, ventilation managed to reduce sweat formation, and accurate records maintained.

Additional measures include closing hatch covers ahead of rain, checking conveyors for water ingress, sealing cargo holds after loading in the presence of relevant stakeholders and retaining representative cargo samples onboard where practicable.



Warehouses and conveyor belts linking silos to loading spouts

Fumigation and Cargo Sealing

Fumigation should be carried out by suitably qualified personnel in accordance with the Recommendations on the use of Pesticides in Ships applicable to the Fumigation of Cargo Holds. - MSC.1/Circ.1264/Rev.1 and guidance provided to the Master. Good practice includes sealing cargo holds in the presence of all stakeholders on completion of loading, with seals broken only at the discharge port or where expressly agreed.

The fumigation exposure period is set by the fumigation company, commonly around ten days, although longer periods may be applied. Extended exposure can increase the risk of condensation developing within the cargo holds. Throughout the fumigation period, the ship's crew should follow the instructions and guidance provided by the appointed fumigation experts.

Delay, Congestion and Exposure

Operational delays, particularly at congested discharge ports, can increase the risk of cargo deterioration prior to discharge. Extended waiting times at anchorage reduce the remaining safe storage period and may increase the likelihood of mould growth, caking and self-heating.

Trade patterns indicate that peak export periods are often associated with increased congestion at discharge ports, which can extend overall transit times and increase the risk of cargo deterioration, even where cargo complied with contractual specifications at the time of loading.

Where congestion or extended waiting times are anticipated, it is advisable to maintain close monitoring of cargo condition, keep accurate records, and maintain regular communication with all relevant parties, together with the preservation of evidence demonstrating that reasonable care was exercised throughout the period of delay.

Conclusion

Soyabeans continue to require careful management, particularly on long ocean voyages from Americas to East Asia. Current trade trends show sustained demand from China, increased reliance on Brazilian exports, and recurring seasonal peaks in shipment volumes. Together, these factors place additional operational pressure on the trade during peak periods and increase exposure to both physical and commercial risk.

Thorough pre-loading inspections, independent surveyor involvement, careful cargo monitoring, appropriate ventilation practices and comprehensive record-keeping are important in supporting safe carriage.

Supportive Information

For further information on this or other Loss Prevention topics please contact the Loss Prevention Department, Steamship Insurance Management Services Ltd.
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