BRITANNIA LOSS PREVENTION

B !NSIGHT

ISSUE 14 // FEBRUARY 2026

CARRIAGE OF BULK SOYA BEAN CARGO: AN OVERVIEW FOR THE MARITIME SECTOR

THE CARRIAGE OF SOYA BEAN CARGOES REPRESENTS A SIGNIFICANT PORTION OF AGRICULTURAL BULK TRADE.

Soya beans are an oilseed crop cultivated primarily for their high protein and oil content. They form the raw material for a range of products including vegetable oil, animal feed, and industrial applications such as for biodiesel. In recent decades, the demand for both soya bean oil and soya bean meal has grown rapidly, driven by an increase in livestock cultivation in Asia.

CWA SINGAPORE 新加坡

OUR PARTNER FOR THIS ISSUE

The CWA Food & Agricultural Commodities department provides expert advice on a range of food, feed and other dry agricultural commodities, across the entire supply chain from field to consumer and especially relating to the shipment of these commodities as bulk, break-bulk, bagged, bottled, drummed, refrigerated, frozen and containerised cargoes.

The department applies scientific and commercial expertise to quality management in the international trade of food, feed and other agricultural commodities, with particular regard to damage causation, quantum, food safety and loss prevention. The department also assists in loss mitigation by applying its scientific, operational and commercial experience to advice on cargo utilisation, salvage and disposal.

THE LARGEST PRODUCERS AND EXPORTERS OF SOYA BEANS ARE BRAZIL, THE UNITED STATES, AND ARGENTINA.

China remains the largest importer of soya beans, hitting a record high of 12.9 million tonnes in September 2025 and standing at 86.18 million tonnes for the first nine months of 2025. The Brazilian ANEC figures show that China is Brazil's largest soya bean export destination, accounting for over 79 % of the country's soya beans exports[1]. Soya bean crop is harvested once a year, between September and November in the Northern hemisphere and between December and June in the Southern hemisphere[2]. Soya beans are carried as bulk cargo on board bulk carrier vessels for international trade. The beans are transported to processing plants following discharge from vessels where the beans are crushed to extract oil and to produce soya bean meal.

In recent years, the global trade pattern for soya beans has shifted significantly. China has reduced imports from the United States due to tariff measures and broader geopolitical tensions amongst the two countries. This has led to an increased reliance on South America, particularly Brazil as the key exporter of soya beans for the Chinese market. This shift has important implications for the maritime industry. Even so, there have also been recent reports of China suspending or rejecting some Brazilian shipments of soya beans related to concerns over pesticide levels due to contamination with other grains.

The route between Brazil and China is associated with a high volume of cargo claims, this reflects both the scale of the trade and the challenges presented by the voyage. The journey from Brazil to China is notably longer, often exceeding 30-40 days. The cargo is also exposed to a wide variation in temperature as vessels transit through equatorial and tropical climates. While vessels from the United States also pass through such regions, the longer voyage duration from Brazil increases the time the cargo spends in transit. It is during this time which any instability may result in cargo deterioration. While the high number of claims is in part due to the large quantity of beans carried on this route and the extended voyage time, the inherent biological characteristics of soya beans have also contributed to a rise in claims.

The differences between the national quality standards further contribute to this rise. Brazilian soya beans are assessed and certified at loading according to Brazilian soya bean standards, these differ in several key parameters from the Chinese standards. There are variations in the permitted moisture limit (14 % in Brazil and 13 % in China) and the classification of heat damaged beans.

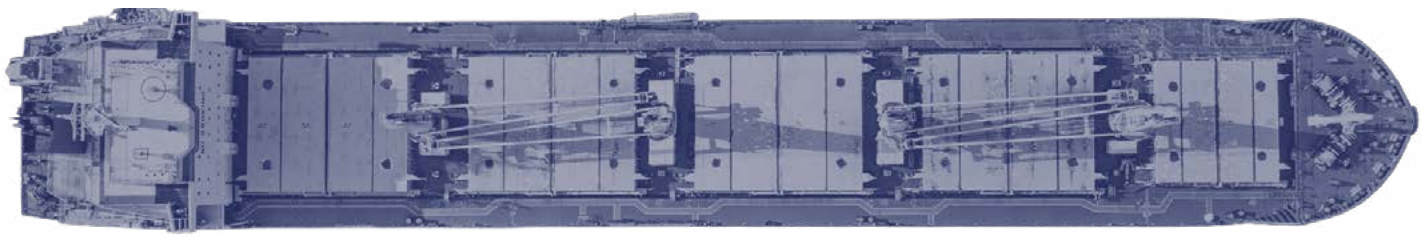
Claims in China are also often based on tests of the processed products for parameters that are not originally tested in the whole soya beans at loading such as free fatty acid content (FFA) or protein solubility. These biochemical qualities can be used to determine if the beans have suffered heat damage, however, these parameters are often not tested for at loading, so it is not possible to determine if these factors have changed significantly during the voyage.

Alongside claims in China, an emerging trend of claims in the Italian market, has been observed. These claims often arise from cases involving cargoes arriving with elevated temperatures also due to self-heating. These 'hot soya bean' cases appear at a smaller scale in comparison to the China claims, however, such incidents highlight that the challenges of soya bean carriage are not confined to any single route. A feature of these Italian cases is that the cargo can be discharged into storage facilities rather than processed immediately. As a result, disputes often involve aspects of on-board cargo care and also the handling of cargo post-discharge.

Given the continued growth of soya bean trade, the sensitivity of this agricultural cargo and the number of associated claims, it is important that members understand and apply practical measures to protect their interests. This article examines the common claim types associated with soya bean cargoes, the conditions that make them vulnerable during carriage, and the recommended loss prevention practices at each stage of their carriage.

[1] UkrAgroConsult - China: Soybean imports set record in September, demonstrating potential of trade diversification https://ukragroconsult.com/en/news/china-soybean-imports-set-record-in-september-demonstrating-potential-of-trade-diversification/

[2] U.S. Department of Agriculture - Crop Calendars for Brazil https://ipad.fas.usda.gov/rssiws/al/crop_calendar/br.aspx



CLAIM TYPES

SOYA BEAN CARGOES ARE HETEROGENOUS. TO ASSEMBLE A SINGLE SHIPMENT, BEANS ARE DRAWN FROM MULTIPLE FARMS, SILOS, OR PRE-SHIPMENT FACILITIES.

As a result, even if the cargo appears compliant with the specification, there is a natural variability in quality and chemical composition of beans within the stow. Individual parcels may carry higher moisture contents or temperatures compared to the composite sample and quality certificate or may have experienced longer periods of pre-shipment storage. These variations matter because agricultural commodities carry mould spores and other microorganisms. Parcels with higher moisture or temperature create conditions more favourable for microbial proliferation.

During shipment, the moisture content and temperature of the beans are two key parameters governing cargo stability. Microbial activity increases under warm and moist conditions. The respiration of these microbes is an exothermic process, releasing heat into the surrounding area. As the local temperature rises, the oxidation of lipids in the beans accelerates. This oxidation is also an exothermic process, and it leads to the creation of a positive feedback loop of self-heating. The increase in cargo temperature in long term storage on board a vessel is shown in Figure 1.

Once this cycle becomes established, it can continue spreading within the stow, leading to self-heating, mould growth, caking, and ultimately heat-damaged beans. In severe or prolonged cases, the temperatures generated may approach levels at which charring or even a fire risk could develop. However, such cases are extreme and would require an extended period of instability to develop.

FIGURE 2 Caked areas are often hot and can contain visible mould (white growth at centre)

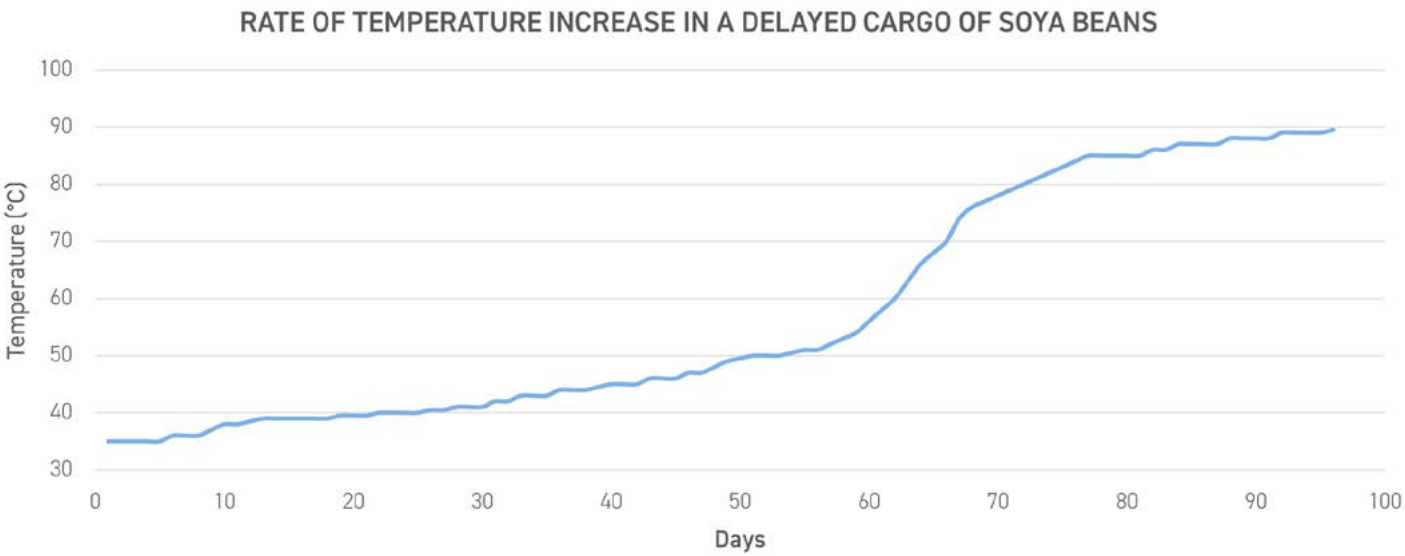


FIGURE 1 Example rate of temperature increase in a delayed cargo of soya beans. Surveyors and crew measured cargo temperatures regularly over the period of delay.

CONTINUED ON NEXT PAGE

In many claims, the physical manifestation of deterioration, darkened beans, odour, caking and mould are reported. These conditions are often attributed to poor ventilation during the voyage, however, when self-heating manifests within the cargo mass, it is frequently a result of a pre-existing instability at loading as opposed to ventilation errors. It is important to carefully review the available evidence and pattern of damage to determine the cause of the damages.

FIGURE 3 Localised foreign matter and dust often leads to development of hotspots. Above shows a caked area hotspot with high foreign matter content and darker discolouration.

The extent and nature of the deterioration can often be assessed by laboratory analysis. Testing for biochemical parameters can measure changes to the beans' internal composition. Protein solubility and FFA content are two commonly used indicators. Where beans are exposed to elevated temperatures, proteins denature or lose their native structures, this will reduce their solubility as the hydrophobic parts of the structure are exposed – thereby, protein solubility can act as a proxy for extent of heat-damage. A decrease in protein solubility will also impact the nutritional value of the soya bean meal produced from such beans, since denatured proteins are less digestible. In sound stable beans, protein solubility typically lies above 90 %. The Chinese standard for soya bean meal specifies a minimum protein solubility of 73%.

The oxidation of lipids due to heating also increases the proportion of FFAs in the extracted oil, this reduces its quality and the refining yield. In sound beans an FFA value below 2% is expected. The Chinese standard for crude oil states a maximum acid value of 4% is acceptable, this is equivalent to about 2% FFA.

These parameters, although not part of the commercial specifications for the raw beans, are often used by Receivers to assess their products and determine whether the cargo has undergone heating and to estimate potential losses in the end-product yield. For Owners and Charterers, it is important to recognise that such analysis will form part of the claim.

Disputes often arise due to differences in quality grading and specification standards between exporting and importing countries. Brazil permits up to 14% moisture content and differentiates between heat-damaged and fermented beans. Fermented beans are defined as beans which have experienced a mild internal discolouration but not to the extent that they would be considered heat damaged. Under the Chinese grading no such differentiation is made and fermented beans would be considered heat damaged. The Chinese standards are also slightly stricter, capping moisture at 13%. Chinese standards apply a more stringent visual threshold, classifying even mildly discoloured beans as heat damaged. These differences can significantly alter the reported results. For example, beans deemed fermented under Brazilian standards may be categorised as heat damaged under Chinese standards. This often results in a higher apparent damage when the beans are tested at discharge and compared to load port results. Grading, by nature, involves an element of subjectivity as assessments are made visually by lab technicians. To complement grading, biochemical testing (such as that described above) can provide objective support for determining whether heat damage has occurred.

In addition to deterioration, contamination is another possible cause of dispute. Soya beans may be contaminated by residues of previous cargoes, paint or rust flakes, or by contact with other grains at terminals where multiple commodities share handling systems. A contamination may result in rejection and costs associated with sieving, cleaning.

A recent increase in soya bean claims has been observed at Italian discharge ports involving cargoes arriving at elevated temperatures or showing early stages of self-heating. The elevated temperatures are said to present a fire safety issue. Higher cargo temperature compared to ambient, even without damage, can still lead to claims in Italy due to the additional labour necessary to dissipate the temperature by cargo shifting. A rise in temperature may also indicate that the cargo is unstable. The best way forward is to use the cargo as soon as possible. The longer cargo remains in storage the higher the risk of deterioration and cargo temperatures increasing to the point that additional cargo shifting is required. In addition, representative sampling would allow evidence to be collected to show that the cargo was in relatively good condition at the time of or just after discharge.

PREVENTATIVE MEASURES

EFFECTIVE LOSS PREVENTION FOR SOYA BEAN CARGOES RELIES ON A COMBINATION OF PREPARATION, MONITORING, AND CONSISTENT DOCUMENTATION THROUGHOUT THE STAGES OF THE VOYAGE.

The following measures reflect industry best practices and draw on the lessons from recent claims, particularly on the Brazil to China trade route.

PRE-LOADING PREPARATION

Prior to loading, cargo holds should be presented in a clean, dry, and odour-free condition, with all residues, flakes, and debris removed. Photographic evidence of hold cleanliness and dryness, together with inspection certificates should be retained as evidence.

Cargo hatch covers must be maintained weathertight. It is recommended to regularly confirm that the hatch cover sealing system remains effective (best demonstrated by ultrasonic testing), including the functionality of the hatch cover coaming drain lines.

Before cargo enters the holds, vessels should request or receive a cargo declaration and details of preloading analysis results.

DURING LOADING

Loading operations should be suspended during rain as the introduction of additional moisture onto the cargo will increase the risk of deterioration. During loading stoppages, the specific reason for each interruption should be clearly documented.

If possible, any evidence, photographs or records of the shipper's representative sampling carried out, the loading sequence and any variations between parcels should be collected. Photographs of the cargo during loading should be retained. If possible, an independent surveyor should be appointed to monitor loading and cargo conditions.

Where possible, the crew should take their own cargo temperature measurements using a calibrated temperature probe. The probe should be inserted into the cargo and allowed to equilibrate for several minutes, or until the reading stabilises to ensure that the temperature recorded is accurate. Periodic measurements taken during and at completion of loading are ideal with multiple points of measurement taken across the cargo surface in each hold. These measurements provide a baseline for assessing whether any heating has occurred and can support the vessel's ventilation log. Where cargo temperatures are high or significantly exceed ambient conditions during loading (+10°C above ambient or cargo temperature above 35/40°C), a letter of protest may be issued.

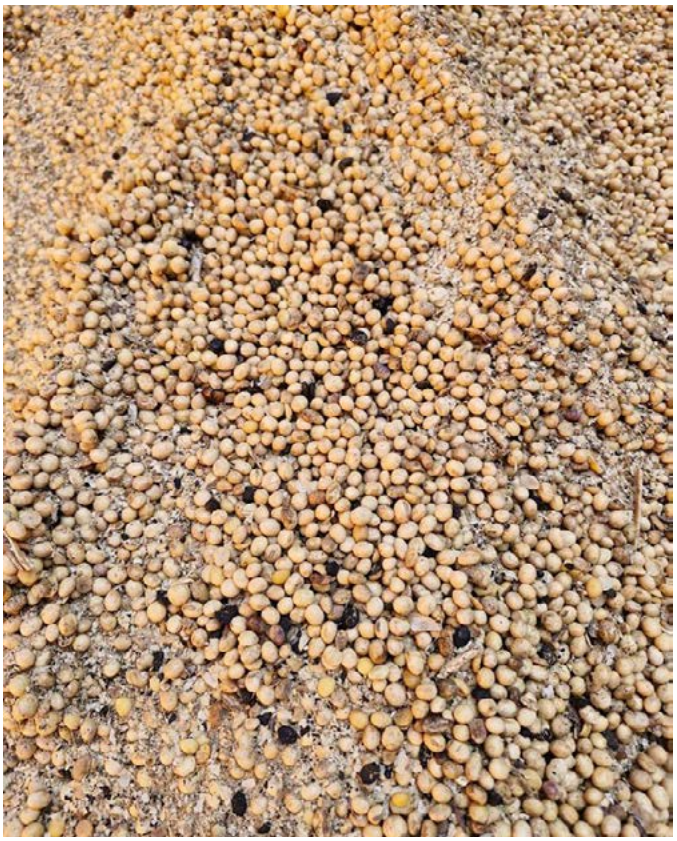


FIGURE 4 Drier or bin burned soya beans mixed with sound soya beans. Cargo temperature was low and burned beans dispersed indicating they originated preloading.

A continuous visual inspection during loading is essential. The crew should note any signs of abnormalities in the incoming stream of cargo. If such issues are detected, loading should be paused, and the matter should be raised with Charterers and the P&I club.

LADEN PASSAGE

Record keeping during the voyage is a key requirement and will assist in the event of a claim. Crew should document ventilation operations, ambient temperatures, weather conditions, and vessel operations. The vessel should consider potential heat transfer from fuel oil tanks adjacent to cargo holds. If fuel heating is operationally required, the crew should clearly document the duration and temperature of any heating and heating temperatures should be kept to a minimum. Ideally, fuel oil should not be heated in tanks adjacent to laden holds.

Fumigation must be conducted by an accredited professional, and the vessel should retain all fumigation documents. The crew should follow the fumigators' guidance precisely throughout the voyage. It is recommended that the appointed fumigator is a member of professional register such as the GAFTA approved register. More details regarding the fumigation of grains and oilseed cargoes can be found here.

On occasion, charterers may request that fumigant sleeves are removed at a point before arrival at the port of discharge, for example if stopping for bunkers. Communications relating to this activity must be retained and the physical handling of fumigant and associated equipment must only be carried out by external experts. If excessive ventilation is required prior to sleeve removal, and the ambient conditions do not match the ventilation rule being followed, it may also be necessary to issue a letter of protest to the charterers.

Ventilation during the voyage should be carried out in accordance with the established dew point or three-degree rule. The dew point rule calls for ventilation when the dew point of the outside air is lower than that inside the holds. The three-degree rule calls for ventilation when the ambient air temperature is at least three degrees Celsius lower than the cargo temperature. Either rule is acceptable as long as it is applied consistently throughout the voyage although it is recommended that the three-degree rule is followed since it is easier to apply. The crew should record their calculations and decision whether or not to ventilate in the ventilation log and give justifications for times when ventilation is not carried out. This can be supported by weather reports and supplemented by photographs of weather/sea conditions. Ambient temperatures should be measured at every watch change and ventilation should be adjusted according to the external conditions to ensure ventilation is correct.

Often ships are instructed to remain at anchor for prolonged periods prior to berthing at the port of discharge. The longer the cargo remains on board the ship, the more the cargo quality will deteriorate. Whilst the ship cannot control the berthing schedule, the master may consider sending a letter of protest to the receivers.

DISCHARGE PORT

FIGURE 5 Heat-damaged layer present in a cargo of soya beans. The dark central layer contained high concentration of other mixed types of grains and foreign matter indicating the loading of a contaminated parcel.

Upon arrival at the discharge port, the crew should document the initial hatch cover opening. Photographs and observations should capture the conditions of the cargo surface. If any evidence of damage is observed, discharge should be paused. We recommend that the Club is notified promptly, and that an experienced surveyor is appointed to represent the Member's interests.

FIGURE 6 Deep seated caking present in soya bean cargo discharged by unloader

All decisions taken by the Receivers, stevedores and other parties should be carefully documented. Clear photographs should be taken of the pattern of damage present in the hold, the conditions of the beans up close and of any localised damaged areas. The photographs should be dated, and the hold and location of the damages should be noted.

FIGURE 7 Mouldy cargo residue left on side steelwork related to a surface mould crust

Where feasible, a segregation of sound and affected cargo should be carried out to mitigate losses. Representative sampling may assist in determining the cause and extent of deterioration.

CONCLUSIONS

The carriage of soya beans continues to present challenges for Members, particularly in the context of an increasing trade and shifting routes. Soya beans remain an integral part of the agricultural commodity trade and account for a significant number of claims. Their vulnerability to moisture, temperature variations and to prolonged storage contributes to the number of claims.

Clear vessel documentation and appropriate cargo care are essential to loss prevention and defending cargo claims. An understanding of typical standards and the possible causes of deterioration can allow Members to respond to claims with greater confidence. In summary, continued awareness, technical understanding and consistent application of good practices are the key to ensuring that Members' interests remain protected.

CASE STUDIES

ITALIAN HOT SOYA BEANS

A vessel loaded a cargo of bulk soya beans in Argentina and completed a 35-day voyage to Italy. At load port, the cargo was certified as meeting contractual specifications, with a maximum moisture content of 14%. Cargo temperatures measured during loading were approximately 30°C, this is consistent with the warm climatic conditions at the time. The vessel ventilated following the three-degree rule, suspending ventilation during rain and sea spray.

Upon arrival in Italy, Receivers alleged that the cargo exhibited elevated temperatures and issued a letter of protest. Temperatures measured during discharge ranged from 30 to 38°C, only mildly elevated compared to load port temperatures. The cargo was discharged into warehouses and silos, although delays in the port led to intermittent stoppages during the discharge process. Receivers subsequently requested security, citing the costs associated with shifting the "heated" cargo. Losses were calculated based on the per tonne cost of shifting cargo in warehouses which was then applied to the total cargo, despite the majority of cargo being stored in silos (with cheaper shifting options) and a large parcel of the cargo already having been processed without requiring shifting.

Survey findings confirmed the presence of friable compaction caking distributed throughout the stow. Elevated temperatures were recorded during a shipboard inspection, however, no pattern of heat-damage was observed. The observations were more consistent with a physical compaction of the cargo that commonly develops in long voyages carrying parcels of cargo with a high fraction of fines and dust. The lack of heat damage implied that little meaningful heating had occurred to impact the cargo condition.

The nature of this case differed from soya bean claims typically encountered in China where claims that heat damage has materially affected the beans which leads to a reduction of production yield or quality leading to financial losses. Italian claims, in contrast, tend to focus on the immediate operational consequences such as the cargo shifting and storage.

For cases of this type, it is essential that detailed cargo temperature measurements are taken at multiple depths and locations across and within the stow. Elevated temperatures compared to local ambient temperatures alone do not demonstrate cargo deterioration. Members are encouraged to request clear justification and supporting evidence from Receivers on the losses claimed.

It is also important to note that after discharge, temperatures within a silo or warehouse may continue to rise and form hot spots within the cargo.

Receivers are responsible for the adequate mitigation of their losses. Any claims for shifting costs should be carefully evaluated to ensure they are not inflated or based on conditions that arose after discharge of the cargo. Cargo temperatures can be collected during storage from bulk stows in warehouses by temperature probes, though these may not penetrate the full bulk of the stow. For cargo stored in silos, some silos contain temperature probes throughout the silo depth to measure temperatures – such records should be requested to corroborate that cargo is not deteriorating under Receivers' custody.

CHINA CASE STUDY

A cargo of soya beans was loaded in Brazil for carriage to China. The cargo was shipped in compliance with the Brazilian export specifications. A maximum moisture content of 14% was declared and routine quality testing was performed. No issues were reported at load port and the cargo was accepted as fit for shipment. The vessel sailed to China with the voyage exceeding 35 days. The crew ventilated in accordance with the three-degree rule and maintained a record of ambient conditions, ventilation operations and of cargo temperatures. No heating was reported during the voyage.

Upon arrival in China, the Receivers alleged that the cargo was damaged with an elevated proportion of heat-damaged beans. The Receivers claimed that this would cause a reduction in the quality of the processed products. One of the issues with soya bean claims in China is that the assessment of cargo quality in China is based on the Chinese standard for soya beans rather than the Brazilian standard. This is despite the fact that the beans at loading are assessed according to the Brazilian standards. A major difference between the two standards is the definition and assessment of heat damaged beans.

Claims are also often based on the quality of the final processed products such as the soya bean oil or the soya bean meal. Soya beans arriving damaged may be subject to claims regarding low protein solubility or high FFA in the products. These parameters are important to the processing of the soya beans in China, though they do not technically form part of the contractual specifications of the soya bean cargo. The claim is often based not only on the physical condition of the beans, but on the performance of the finished product after processing.

This study illustrates the challenges faced in Chinese claims. As the carriers have no control over the quality of the soya beans supplied for shipment, the importance of the cargo care is clear.

The preventative measures described above for each stage of carriage should be focused upon, ensuring that documentation and records are accurate and up to date.

Seeking Club advice is recommended should there be any apparent cargo damage, or upon receipt of a cargo claim. The Club can advise in the appointment of an appropriate expert, who will be able to assist in the required evidence gathering and mitigation actions to help defend and minimise any claim that may occur.

DISCLAIMER

This Loss Prevention Insight report is published by THE BRITANNIA STEAM SHIP INSURANCE ASSOCIATION EUROPE (the Association). Whilst the information is believed to be correct at the date of publication, the Association cannot, and does not, assume any responsibility for the completeness or accuracy of that information. The content of this publication does not constitute legal advice and Members should always contact the Association for specific advice on a particular matter.