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Impact of Procurement Logistics on Animal Feed Quality

Optimising Logistics of Soya Extraction Pellets for Feed Production

High feed production standards demand for advanced quality assurance throughout the global supply chain as well. A mixed feed producer stated occasional deviations from demanded quality of supplied soya extraction pellets. The identification of potentials for the optimisation of quality assurance, and of value added has been subject of a thesis. Results have shown that risks may be reduced, and cost effectiveness may be improved by optimisation of storage and transport processes, as well as by an advanced logistics partnership.

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A feed mill processes about 950 t soya extraction pellets monthly. The mixed feed production is subject to rigid internal inspections. Contamination by Salmonella has been detected occasionally with entrance inspections. The identification of potential contamination risks by Salmonella, as well as of genetically modified (GMO) soya throughout the chain has been subject of a thesis [1]. Another aim of this work was to identify potentials for cost savings of the feed mill by analysing the added value through the chain.

First of all, a detailed insight of the existing supply chain was obtained by using questionnaires, and by visiting the involved companies. The present-state processing, transport, storage, and inspection routines had been described as follows.

From field to feed mill

The soya is cultivated in the Mato Grosso region in the South West of Brazil. After harvesting, the soybeans are picked up at the farms and then transported to centralised oil mills of large soya processors, by use of special vessels or trucks. Before processing, rigid entrance quality checks are realized the results of which have an impact on the purchase price of the soya. After cleaning, shelling, and crushing of the soya to flakes, Hexane is used for extracting the oil. After the extraction the soy flakes are toasted at a temperature of 130 °C to remove remaining Hexane, and to destroy undesired organic constituents. Finally, the soya extraction pellets are made by pressing the flakes.

The entire soya processing chain from farming to export is organised and supervised by an international feed supplier. The supplier demands for certification of all involved Brazilian enterprises according to the GMP+ standard. In course with the certification procedure many improvements have been made to avoid salmonella contamination e.g. by supervised HACCP concepts, or by improved constructional design of trucks and storage facilities to ward off birds, animals, and their excrements. At the Brazilian export port, inspections are conducted to document quality parameters such as fat and protein contents, as well as hygienic status of fungi, toxins, salmonella, and GMO's. Before shipping, the loading space is checked by the Loading Compartment Inspection (LCI) for hygiene and dryness. It takes between 17 and 18 days to ship the soya (approx. 10,000 t per sea vessel) to the European ports Amsterdam or Rotterdam. There, the soya freight is usually directly unloaded off-shore into local vessels employing swimming docks with special loading equipment (*Fig. 1*). Only by way of exception the soya is intermediately stored in a silo at the port. The port management is GMP+ certified as well; it takes additional samples for monitoring contaminants.

In the concerned supply chain the further transport of soya is done by local vessels to an inland harbour. The inner-European trading of soya is organised by another company in the chain, and by its regional affiliate.

At the inland port an intermediate storage of the soya takes place normally. The soya gets unloaded by using an excavator, and is transported into a storehouse by use of uncovered conveyors. The storage space is subdivided into storage sections with a capacity of about 800 t each. The sections are made of concrete panels. They are neither closed at the front nor at the upper side. The soya falls from the conveying belt that is located under the roof into the desired section.

The inland port is managed by another company in the supply chain. It is certified according to the DIN ISO 9001:2000 standard.

The final transport of the soya to the feed mill is taken over by a forwarding agency. Only in exceptional cases, the feed mill runs its own trucks. The trucks (25 t capacity) are loaded with the soya by use of a wheel loader. The feed mill requests from the forwarding agency a safety declaration containing information about of previously transported goods, cleaning, disinfection etc.

At the feed mill, the supplied soya is

Fig. 1: Loading of a local vessel with soya

stored in silos. Prior to its release for processing, rigid inspections according to feedstuff legislation, and to determine intrinsic quality parameters are conducted.

Risk assessment of supply chain

The assessment of the investigated supply chain regarding to a potential contamination with genetically modified soya resulted in a small risk. First of all, solely non-GMO soya seeds are cultivated in the Mato Grosso region. The cultivation in this region is controlled by four of the world's largest soya suppliers (Archer Daniels Midland, Bunge International, Cargill, Duke Enterprise Export) which accomplish high quality standards. Moreover, the region is located in the north of the 24th southern latitude. GMO seeds are cultivated in more southern regions. Finally, genetic information gets denaturised with the thermal treatment during extraction. The Brazilian supplier warrants for non-GMO quality of the extraction pellets with a certificate. Thus, a detection of GMO in a delivery would indicate either premeditation or gross negligence, e.g. if storage facilities have not been cleaned according to the instructions. As expected all so far supplied soya has complied with the legal limit of 0.9 % GMO share [2, 3].

On the other side uncovered conveyors, open storage facilities as well as open hatchways may enable undesired access by e.g. birds, or small animals. By this, a certain risk of salmonella contamination is given at several points of the investigated supply chain. A number of suggestions are made in the thesis how to reduce such risk by improvements in a covering design and construction of conveying and storage facilities.

Potentials for optimisation

The analysis of the value added in the supply chain indicated several potentials for cost savings in the logistics between the inland port and the feed mill. In the thesis, the following changes are suggested:

- Implementation of WEB-based electronic data interchange (WEB-EDI)
- Advanced logistics partnership (ALP) with supply chain management
- Shifting of soya storage from the feed mill to the inland port
- Implementation of scheduled supply tours for the soya delivery

A more effective stock management system can be realised by using WEB-EDI. With the implementation of an automated ordering system, the decosts would decrease for approx. 0,75 € per order transaction. About two man-hours daily could be saved in the concerned feed mill. With installation costs of up to 2,000 €, potential annual savings would amount for approx. 10,000 €. An improved co-operation in the supply chain would be another non-monetarily assessed advantage of implementing a WEB-EDI. But, the progression of traditional supplier-customer-relationship towards an advanced logistics partnership (ALP) in sense of a supply chain management demands for the exchange of Know-how as well to jointly refine on quality standards, products, and processes [4]. WEB-EDI is an efficient tool for such required information management as well.

The suggested shifting of the soya storage would demand for the construction of further, state-of-the-art storage facilities at the inland port, resulting in an increase of annual storage costs by approx. 137,000 €. By this, interim storage capacities at the feed mill could be reduced by 125 t, equivalent to 300,000 € cost savings annually. Altogether, the potential annual cost savings by storage shifting would amount for up to 163,000 €. Further, the technically improved storage facilities would reduce the risk for contamination by e.g. Salmonella. However, an advanced logistics partnership would be a prerequisite of such joint investment.

The quite even need for soya of the feed mill offers certain potential for further optimisation. The supply tours can be organised according to a fixed cycled schedule. The tours could be organised and taken over by one of the supply chain's partners. The number of partners involved into the supply chain could be reduced by this way. The resulting annual cost savings would amount for up to 5,100 €, or by 10 % of present expenditures.

Effects

The main outcomes of the suggested optimisation approaches would be:

- Increased process stability, and maintained product quality by standardised process schemes
- Strengthening of the core competences
- Further progressing risk management
- Keeping future legislative demands [5] throughout the chain
- Up to 170,000 € of potential annual cost savings
- More efficient information management, and stock management system

Literature

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