

# Analysis of Strategies to Improve Commodity Storage and Conservation Measures in Agricultural Trading Enterprises

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## ABSTRACT

Commodity storage is an essential part of the contemporary commodity circulation process, and agricultural commodities often have the characteristics of easy volatility, deterioration, oxidation, etc. Therefore, agricultural trade enterprises to do a good job of its agricultural commodities in the logistics and transportation process of storage and conservation work, and according to the actual demand for agricultural products on the storage of agricultural commodities conservation measures to improve, in order to achieve agricultural trade commodity storage in the entire agricultural trade commercial circulation process of the least deterioration, decay, the transformation and development of agricultural trade enterprises is of great importance. In this paper, from the agricultural trade enterprises of commodity storage maintenance, specific analysis of agricultural trade commodities in the storage process usually encountered several problems, and then explore the optimal solution of agricultural trade commodity storage maintenance measures to improve the strategy.

**Keywords:** Agricultural logistics; commodity storage; commodity conservation; improvement strategies.

## INTRODUCTION

On January 21, 2022, the person in charge of the Ministry of Agriculture and Rural Affairs said at a press conference that in 2021, China's grain production hit a record high and this year will ensure a stable grain sowing area to ensure that the annual grain production remains above 1.3 trillion catties. Zeng Yande, chief agronomist and director of the Department of Development Planning at the Ministry of Agriculture and Rural Affairs, also said at the conference that in 2021, China's grain and agricultural production was again bumper, with grain production reaching a record high. China's grain sown area reached 1.764 billion mu, an increase of 12.95 million mu compared to 2020; total grain production yielded 136.57 billion jin, an increase of 26.7 billion jin on a high base. In response to this year's grain production, Zeng Yande said that every effort will be made to stabilize grain production and ensure a stable grain sown area, so that the annual grain production will remain above 1.3 trillion jin. And with the continuous progress of China's agriculture, coupled with the rapid development of agricultural technology, many agro-trade enterprises have achieved great success in the field of agricultural products. However, due to

the uneven distribution of agriculture and population size in China and the uneven ratio of agricultural production to demand in the east and west, higher logistics costs need to be consumed to compensate for this situation. Due to the volatile, perishable and oxidisable characteristics of agricultural commodities, agricultural logistics has been in a state of inefficiency for a long time, and often grain, vegetables and various fresh agricultural products cannot achieve "smooth flow of goods" and "value for money", which also leads to This has led to problems in the storage and maintenance of agricultural products in many agricultural enterprises.

## OVERVIEW OF AGRICULTURAL STORAGE AND CONSERVATION

The current forms of storage of agricultural products in China can be broadly divided into three categories, namely rural subsistence storage, agricultural commodity storage and national strategic storage. Among them, rural subsistence storage includes production storage of seeds, feedstuffs, raw materials for rural industries and sideline industries, as well as farmers' consumption storage; although the storage volume of rural subsistence storage is

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large, it is relatively easy to store and maintain because the storage area is relatively dispersed, so there is no need to specifically study how to improve its storage and conservation measures. Agricultural commodity storage, however, is a very important part of the logistics chain for agricultural products and is the main focus of this paper on ways to improve storage and conservation measures for agricultural products. Agricultural commodity storage is linked to industry and agriculture, urban and rural areas, as well as to the daily production and consumption of rural and urban residents, and is currently mainly operated by the state commercial sector, most agricultural trading enterprises and a few private traders. The main types of strategic national stocks are rice, flour, etc. The amount of strategic national stocks is confidential and cannot be disclosed. Strategic national stocks are grain reserves that the state has entrusted to the grain sector for the purpose of preparing for war and famine. The State Council decides on the determination and change of the reserve tasks and the use of the stocks, and the required reserve funds are specially allocated by the State Treasury, which also subsidises the storage costs. Under normal circumstances, the grain in strategic storage does not participate in the reproduction of agricultural products and cannot be used at will, except to exchange new for old.

The conservation of agricultural products mainly occurs during the transportation and storage of agricultural products. If we want to optimise the storage and conservation of commodities, we must first understand the physical and chemical properties of various types of agricultural commodities and the laws of change in the quality of commodities, which is the prerequisite and objective basis for good maintenance of commodities. Agricultural commodities are mainly chemical and mechanical products, and there are three main factors that affect their quality changes during storage. First, the light, heat, wind, rain, humidity, dryness and other natural conditions caused by physical and chemical changes, such as fertilizers, pesticides in high humidity, high temperature and strong light decomposition, volatilization, precipitation, spontaneous combustion and other phenomena, as well as the oxidation of agricultural machinery tools in the air rust phenomenon. Secondly, biological changes caused by fungal micro-organisms, such as mould and mildew of bamboo and wood farm tools and seeds, which are likely to lead to

the decay of farm tools and the death of seeds, greatly affecting future cultivation and harvest. Thirdly, damage and deterioration caused by various insect pests, such as insect infestation of bamboo tools and locusts eating food, etc. The losses caused by such pests are often incalculable at the time of planting, harvesting and even sale, but if conservation measures are not applied to agricultural products in short-term storage, it is very likely that such things will happen, thus affecting the interests of both buyers and sellers. Therefore, the conservation of produce is essential in its storage.

Agricultural products are diverse and unique in nature. Therefore, on the one hand, their transport, storage, packaging and processing requirements are relatively high, to fully consider their form, decay, string taste, shock and pressure resistance, ventilation and air permeability and moisture absorption and other characteristics, in order to ensure that in the logistics process does not deteriorate, not polluted; on the other hand, due to the low price of agricultural products, to make them have a certain market competitiveness, must be in the packaging, transport, storage and processing and other aspects of serious. On the other hand, due to the low price of agricultural products, in order to make them competitive in the market, it is necessary to carefully study and take into account such aspects as packaging, transportation, storage and processing, so as to minimise logistics costs. Storage and conservation of agricultural products means that after the harvesting of various agricultural products, the logistics process of agricultural commodities circulation in the market is arranged in accordance with the needs of the market, and the conservation measures taken in the storage, packaging, loading, unloading, handling and transportation of the relevant agricultural products, in order to ensure that the least damage and deterioration of various agricultural products before reaching the terminal point of sale.

### COMMON AGRICULTURAL STORAGE AND CONSERVATION MEASURES

#### Refrigeration and Preservation

Low temperatures reduce the respiratory intensity of produce, reduce water loss and inhibit the growth of microorganisms. It can also slow down the activity of microorganisms and inhibit the activity of enzymes, in order to weaken the physiological and chemical changes

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in the storage of agricultural products and maintain the proper quality. The general refrigeration temperature is approximately  $-1^{\circ}\text{C}$  to  $8^{\circ}\text{C}$ . Cold storage using this temperature is often referred to as high temperature cold storage. By reducing the rate of biochemical reactions and the rate of changes caused by microorganisms, refrigeration can extend the shelf life of fresh foods and processed products. For most foods, refrigeration does not prevent spoilage in the same way as canning, dehydration or freezing, but only slows down the rate of deterioration and is therefore actually a relatively ineffective preservation technique. However, not all food under refrigeration conditions can extend the shelf life, such as some tropical and subtropical fruits and some vegetables if they are stored in their freezing point above  $3$  to  $10^{\circ}\text{C}$ , cold damage will occur, and bread in low temperature aging speed up food refrigeration is not only conducive to maintaining the appearance of food, flavor and nutritional value, but also to reduce the loss caused by pests, parasites and rodents. It also improves its safety. Now with the continuous development of food processing technology, cooling and refrigeration technology is also used in the processing process, thus improving the quality of food processing. Certain chemical and enzymatic reaction rates in food production, as well as the metabolism and growth rates of food microorganisms needed, such as cheese maturation, beef tenderisation, meat curing, beverage wine aging, etc. are also often controlled using refrigeration technology. Refrigeration technology can also be used in canning processes, such as improving the peeling and coring of peaches. Deterioration of the flavour of citrus juices and percolations can also be improved using refrigeration. Cooling and refrigeration techniques can facilitate meat cutting and bread slicing and improve efficiency. The precipitation of waxes in edible oils can be accomplished by cooling and refrigeration. Cooled beverages are cooled before being aerated with water to increase the solubility of carbon dioxide. Cooling and refrigeration technology is already in full use in many food production techniques. This type of storage is characterised by good results, but is more expensive.

### Drying / Dehydration

Drying is the process of removing moisture from food in hot air after it has been evaporated

by heat. Food drying is one of the main techniques used in food storage and processing. Through drying technology, most of the water in food is removed to reduce the water activity, inhibit the growth and reproduction of microorganisms and extend the storage period of food. There are two aspects in the drying process: one is the migration of water molecules in the food from the inside to the surface in contact with the dry hot air, when the water molecules reach the surface, according to the vapour pressure difference between the surface and the air, the water molecules are immediately transferred and diffused into the air - moisture transfer; the other is the heat in the hot air is transferred from the air to the surface of the food, from the surface and then to the interior of the food - heat transfer. Therefore, the food drying process has both the transfer of mass (i.e. moisture) and heat, i.e. moist heat transfer. There are two types of drying: natural and artificial. The purpose of drying is to reduce the humidity of the storage environment and the produce itself in order to eliminate the conditions for microbial growth and reproduction and to prevent the produce from becoming mouldy and spoiled. The physiological activity of dry produce has been reduced to a very low level, which effectively inhibits microbial activity and makes it suitable for long term storage. A number of factors influence the drying rate and these are related to two aspects: the processing conditions during the drying process, determined by the type of dryer and the operating conditions (temperature, air flow rate, relative air humidity, atmospheric pressure and vacuum, etc.); and the nature of the food product placed in the dryer (surface area, component orientation, cell structure, type and concentration of solutes). Accelerating the rate of moisture and heat transfer and increasing the drying rate are the main objectives of drying.

### Air-Conditioning for Freshness

Gas preservation technology is to artificially control the proportion of nitrogen, oxygen, carbon dioxide, ethylene and other components in the gas, humidity, temperature (above the freezing threshold) and air pressure, through the inhibition of the amount of respiration of storage cells to delay its metabolic process, so that it is in a near dormant state, rather than the state of cell death, so as to be able to maintain the texture, colour, taste, nutrition and so on for a longer period of time. The result is that the texture, colour, taste and nutrients of the stored

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material remain essentially unchanged for a longer period of time, thus achieving a long-term preservation effect. Even after the storage material is removed from the air conditioned environment, its cellular activity will still maintain the normal metabolic rate in the natural environment and will not mature and rot quickly.

In short, in the storage of agricultural products, there are often more general warehouses and special warehouses are not enough, special warehouses such as low-temperature storage, cold storage, three-dimensional warehouses, etc. is "a library is difficult to find", resulting in simple warehouse storage and mixed storage, farmers scattered storage, and even open-air stacking problem is quite prominent. In terms of loading and unloading, the level of mechanisation is low, and most of them rely on manual operation. Due to the low level of storage and handling facilities and equipment for agricultural products, the storage loss of agricultural products is high and the cost is high, which reduces the market competitiveness of agricultural products. Therefore, in terms of storage of agricultural products, the construction of new warehouses should be accelerated to expand the storage capacity and realize the mechanization of storage operations. Strengthen the organization and management of warehousing, establish and improve the storage and custody system for agricultural products, and improve the scientific storage of agricultural products and rationalize the storage structure.

### **STORAGE AND CONSERVATION OF AGRICULTURAL PRODUCTS AND AGRICULTURAL LOGISTICS**

#### **Agricultural Logistics and Modern Agricultural Logistics**

It is important to emphasize that agricultural logistics is not the same as the flow of agricultural products. It is the link between production and consumption and involves two main types of issues: firstly, the transfer of ownership of agricultural products - the flow of commerce; secondly, the value added in the flow of agricultural products - the logistics. - logistics. To have a smooth flow of agricultural products there must first be a developed modern agricultural logistics. However, traditional agricultural logistics generally involves only the sales logistics in the circulation field, but modern agricultural logistics includes a wider scope, including both pre-production supply

logistics, production logistics, and post-production sales logistics and waste recycling logistics. It is a unified body of logistics, commercial flow, information flow and capital flow. By effectively overcoming the time and space obstacles in circulation, it creates the greatest value for agricultural products by providing the right products and services at the right time and place and at the right price. Another one-sided understanding is that agricultural logistics is simply regarded as the transportation, storage and loading and unloading of agricultural products, which is not conducive to the benign development of agricultural logistics. Combining modern logistics theory and agricultural economic theory, this paper believes that modern agricultural logistics refers to the creation of time value, space value and potential property value of agricultural products by completing the physical or virtual flow of a series of supply chain links from pre-production to post-production in order to meet the needs of users. Specifically, it includes a series of links such as production, acquisition, transportation, storage, loading and unloading, handling, packaging, distribution, circulation and processing, information activities, etc. It is a systematic, integrated and modern concept of economic activities in several fields related to agricultural products.

#### **Agricultural Logistics Industry and Modern Agricultural Logistics Industry**

An industry is a collection of economic activities of enterprises with certain similar attributes, including both activities in the field of production and activities in the field of distribution; it includes both production, distribution and service activities in the material goods sector and production, distribution and service activities in the non-material goods sector (services, information, knowledge, etc.). The agricultural logistics industry refers to the collection of economic activities of enterprises related to the characteristics of agricultural logistics. In terms of business activities, agricultural logistics includes agricultural product supply logistics, agricultural product production logistics, agricultural product sales logistics, waste logistics and re-biological logistics. Agricultural product supply logistics refers to the logistics activities of organizing the supply of agricultural production materials in order to ensure the production of agricultural products; agricultural product production

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logistics refers to the logistics activities in the production process of agricultural products; agricultural product sales logistics refers to the logistics activities of transferring agricultural products to users along with sales activities; agricultural product waste flow and recycling logistics refers to the logistics activities of reusing intermediate waste of agricultural products and the logistics activities of reusing renewable resources. The logistics activities in the process of reuse of renewable resources. Modern agricultural logistics industry is the sum of economic activities of associated enterprises and economic people operating with modern logistics theory, logistics concept and logistics methods.

### STRATEGIES TO IMPROVE STORAGE AND CONSERVATION MEASURES FOR AGRICULTURAL PRODUCTS

According to the regularity of changes in the quality of agricultural commodities, in the process of achieving optimal storage and conservation, four main technical tasks should be grasped, such as commodity inspection, commodity maintenance, processing and reform of storage and conservation facilities.

1. First, from the commodity inspection, which is an extremely important gate, it fundamentally determines the value of the commodity and the use of value can be achieved if the purchased goods are not qualified, it will make the optimal storage and conservation of commodities lose the material basis, so as to increase the loss of commodities in the storage process loss. Such as Changde area in the past production of calcium phosphate phosphate fertilizer, the quality of quality standards cannot be met, but the commercial sector at the time there was no quality inspection agencies and technical equipment, what the factory production, the acquisition of what, the results of the acquisition in the sale, the backlog of more than 20,000 tons, cutting losses of 1.24 million yuan, Changde area of agricultural trade enterprises to seriously learn this lesson, after 1978, the establishment of a conventional laboratory, the use of commodity testing knowledge and Modern technical equipment, all the purchased chemical commodities for quality analysis and inspection, all unqualified resolutely not to buy, so as to keep the quality of commodities, urged the factory to improve the quality of local agricultural commodities. At present, all phosphate fertilisers produced in this region meet quality standards, and the pass rate of

bicarbonate of nitrogen has increased accordingly.

2. In the maintenance of commodities, we should take into account the factors affecting the change of commodity quality, adapt to local conditions and adopt advanced conservation techniques such as bicarbonate of nitrogen fertilizer is very sensitive to air and temperature and humidity, open packaging storage days, its nitrogen content can be volatile, moisture increased in order to solve the problem of good nitrogen volatility, in recent years, Changde area agricultural departments use cyclohexanone adhesive to patch the break in the bicarbonate of nitrogen bags, and achieved very good results, so that the loss of bicarbonate of nitrogen in storage is greatly reduced. The rate of loss of bicarbonate of nitrogen in storage is greatly reduced. Another example is the problem of bamboo stupid insects eating bamboo farming tools, they start from the study of the physiological characteristics of this pest, generally take the bitter chloride, aluminum phosphide pharmaceutical fumigation method, the prevention and control effect up to intestine above with this method of treatment, the average cost of each piece of bamboo farming tools only one minute two percent, but can reduce the loss of triangle four minutes four percent Changde County Agricultural Company annual fumigation treatment of bamboo farming tools pieces, reduce the loss of loss.

3. In the processing and reformulation of commodities, should start from the study of agricultural commodity composition, physical and chemical properties, body structure, a part of the long-term backlog, but there is still a certain value of commodities, according to the needs of the market for processing and reformulation, comprehensive recovery or improve the usefulness of commodities, so that commodities can be sold as soon as possible spot to such as some emulsion pesticides due to the deterioration of the emulsifier and drug precipitation, if it will be sold to farmers to use, it will But if the quality of pesticide theory as a guide, the use of certain technologies and equipment, such pesticides in the active ingredients extracted, re-add emulsifiers for emulsification, can be fully restored to its usefulness, to recover losses. In addition, some of the outdated agricultural machinery to modify the conversion, but also to achieve the effect of "dead" for "living". For example, the Cili County Agricultural Company has organized

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repeated trials of scientific and technical personnel, and this year part of the inventory has been eliminated single tube sprayer, converted into industrial and agricultural type wooden barrel body sprayer into the market, welcomed by farmers, and soon sold out, not only increased revenue, but also to reduce the account of funds more than 20,000 yuan, the average monthly less interest paid.

4. In the innovation of storage and protection facilities, we should target the characteristics of agricultural commodities, such as large volume of stupidity, fragility and changeability, and gradually adopt modern technical facilities to equip agricultural warehouses, such as commodity loading and unloading machinery, zero packaging machinery, start temperature and humidity regulating devices, automatic alarm and fire-fighting facilities, electronic computer applications, etc., so as to substantially improve the efficiency of agricultural commodity storage and maintenance. Commodity storage and maintenance optimization, which is currently the weak link of agricultural science and technology work, urgently need to strengthen. Practice has proved that a good grasp of this work can significantly improve the economic efficiency of enterprises. Hunan Province Changde area agricultural system since the year to carry out a comprehensive commodity storage maintenance optimization as the main content of the work of science and technology, five years, the pure sales of goods to expand the investment, capital turnover to speed up the day, the rate of consumption of goods down the intestine, the average annual savings of nearly 10,000 yuan of losses.

### DEVELOPMENT IDEAS OF AGRICULTURAL LOGISTICS IN CHINA

#### Attach Great Importance to the Agricultural Logistics Industry

Modern logistics is recognised as the third source of profit, and the scope for profit is enormous. Both the government and enterprises must adopt modern logistics and supply chain management methods in a timely manner. The government must have a medium and long-term plan and formulate policies to accelerate the development of modern agricultural logistics industry; give tax and financial support to agricultural logistics enterprises; plan the agricultural logistics industry on a national scale to adjust the industrial layout and industrial focus and drive the development of related

industries. In response to the "tip of the iceberg" of logistics costs, agricultural logistics enterprises should take cost management as the core for modern enterprise management.

1. Focus on supporting the infrastructure of the agricultural logistics industry The basic logistics system is a platform that supports the efficient and stable operation of all logistics activities and even further supports the operation of the economy. Combined with the local reality to effectively strengthen: ① transportation and communication infrastructure construction: in terms of road construction, railway construction, inland river navigation, information network platform, etc. ② Construction of transport equipment: improve agricultural transport equipment, develop a social transport system, and develop special transport technology and means of transport. ③ Storage facilities infrastructure construction: accelerate the transformation of traditional warehouses, the construction of a number of modern agricultural storage facilities.

2. The scientific and reasonable planning of agricultural products logistics parks is an inevitable product of the modern logistics industry and regional economic development to a certain stage, and is a realistic choice to solve the spatial differences in resource endowment and the spatial and temporal differences in production and consumption. Agricultural products logistics parks are places formed by a number of different types of agricultural products logistics enterprises specialising in agricultural products logistics services and possessing a variety of logistics facilities, which are relatively concentrated and are logistics nodes with a certain scale and comprehensive service functions. Agricultural products are distributed through various channels to the terminal sales place and reach the consumers. In the whole process of the flow of physical entities of agricultural products, logistics information is collated throughout, thus realising the time value, place value and processing value of agricultural products.

3. Vigorous development of third-party agricultural logistics At this stage, China's agricultural logistics system is not strongly asset-specific, whether transactions occur occasionally or repeatedly, resources can be allocated by means of market governance, which is an efficient mode of governance. Logistics market governance improves the technical efficiency of logistics enterprises, as

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the market provides standardised professional services for logistics services, reducing logistics costs for client enterprises in terms of technical efficiency. This market governance structure for the agricultural logistics industry manifests itself in reality as third party logistics services. A professional agricultural logistics enterprise is set up and entrusted by the seller or buyer to engage in agricultural logistics business. In this way, not only can we save the cost of agricultural logistics and improve the efficiency of agricultural logistics under the condition of professional services, but also enable the seller or buyer of agricultural products to concentrate on the business of the enterprise with human and material resources.

4. With the development of modern information technology and the emergence of new logistics organisations, the main body of competition in logistics has begun to shift to logistics enterprises, especially between third party logistics enterprises. In terms of the scope of competition, it has started to shift from the competition in a single logistics link such as storage link, transportation link and packaging link to the competition in the management level and management efficiency of the whole logistics process, i.e. the supply chain process. In terms of the means of competition, it has shifted from improving logistics facilities such as automated warehouses and multimodal transport to improving the overall operational efficiency by integrating resources through information technology. The ability to process information and manage information in agricultural logistics determines the responsiveness of the entire supply chain to the market and the ability to provide high efficiency and high level services to customers. In recent years, the core competitiveness of logistics enterprises in western developed countries has not only been the use of advanced transport equipment and automated warehouses, but more importantly, the responsiveness to customers. Therefore, diversified customer-focused agricultural logistics brokers, agents and intermediary organisations are being fostered,

making full use of the postal logistics network, the supply and marketing agency market system and the logistics facilities of state-owned grain enterprises.

Efforts to cultivate modern agricultural products logistics industry talents form the industry, academia, research and official aspects together on agricultural products logistics industry and related areas of research. To mobilize and guide the relevant universities to grasp the development direction of the modern agricultural products logistics industry, intensify the transformation of relevant majors, open additional relevant courses or majors, hold various forms of training courses, and focus on training the much-needed managers of agricultural products logistics enterprises, logistics department managers, logistics planning and logistics information system development talents.

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