

Manejo de operaciones entre regiones de cosechadoras combinadas basadas en la nutrición de proteínas de soja como ejemplo

Cross-Region Operation Management of Combine Harvesters based on Soybean Protein Nutrition as An Example

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Resumen

La proteína de soja siempre ha sido una proteína dietética importante para las personas en China y otros países asiáticos. En los últimos años, la calidad nutricional de la proteína de soja se ha reevaluado, y los estudios clínicos han demostrado que la proteína de soja tiene algunas funciones fisiológicas de atención médica. En los últimos años, con la introducción sucesiva de la política nacional de apoyo a la agricultura y el beneficio de los agricultores, especialmente la introducción de subsidios para la compra de maquinaria, el entusiasmo de los agricultores por la compra de maquinaria agrícola ha seguido aumentando y han surgido varias máquinas agrícolas, especialmente La cosechadora. Sobre la base de hacer un buen trabajo plantando sus propias tierras de cultivo, muchos agricultores con cosechadoras han llevado a cabo operaciones interregionales de maquinaria agrícola para agregar cosechas adicionales. Sin embargo, debido al rápido crecimiento de las cosechadoras y motores, y al mismo tiempo, las cosechadoras son maquinaria agrícola con estructuras complejas, una gran inversión única, un alto nivel de tecnología de operación segura y un entorno operativo pobre han causado un gran aumento de riesgos de seguridad y accidentes frecuentes de maquinaria agrícola. Ha traído nuevos problemas a la gestión de seguridad. Para prevenir y reducir accidentes y garantizar la seguridad de la vida y la propiedad, es necesario fortalecer la supervisión de seguridad y el manejo de los cosechadores.

Palabras clave: alimento de soja; Nutrición proteica; Cosechadora; Operación de zonas cruzadas

Abstract

Soy protein has always been an important dietary protein for people in China and other Asian countries. In recent years, the nutritional quality of soy protein has been re-evaluated, and clinical studies have shown that soy protein has some physiological health care functions. In recent years, with the successive introduction of the national policy of supporting agriculture and benefiting farmers, especially the introduction of subsidies for purchasing machinery, the enthusiasm of farmers for purchasing agricultural machinery has continued to rise, and various agricultural machinery has sprung up, especially the harvester. On the basis of doing a good job of planting their own farmland, many farmers with combine harvesters have carried out cross-regional operations of agricultural machinery to add extra harvest for themselves. However, due to the rapid growth of combine harvesters and drivers, and at the same time harvesters are agricultural machinery with complex structures, large one-time investment, high level of safe operation technology, and poor operating environment have caused a large increase in hidden safety hazards and frequent agricultural machinery accidents. Has brought new problems to security management. In order to prevent and reduce accidents and ensure the safety of life and property, it is necessary to strengthen the safety supervision and management of harvesters.

Key words: Soybean food; Protein nutrition; Combine harvester; Cross-zone operation

1. Introduction

Soybeans are produced in East Asia, and China has a long history of producing traditional soybean products. In the West, since the late 1950s, industrial production of soy protein products required by humans has begun, while China's modern soybean protein industry only developed in the 1980s. Since the 1960s, soy protein food abroad has been recommended to customers because of its rich nutrition[1]. Due to the low protein content and unbalanced amino acid content of cereals, it is difficult to meet the protein content required by the human body, which further affects the growth and development of infants and young children and the health of adults. Therefore, soy protein is more valuable than other food proteins. In the world economy, many people are studying low-priced plant protein, and its advantages are reflected in the product's emulsification, adhesion and

interwoven fiber properties. Soy protein is affected by these structural characteristics, high nutrition, and low price. More and more welcome.

2. Definitions and production methods

Plant soybeans belong to the family Leguminosae. By using nitrogen in the air to ferment soybean roots, the seeds contain 40% protein. After the soybean skin and oil have been removed, the remaining defatted flakes (also known as white bean flakes), most commercial protein products, contain approximately 50% protein. Soybean enters the screening workshop, screens out residual beans and foreign matter, and then processes it. The oil is removed in the solvent of the countercurrent extraction equipment system[2]. After the defatted flakes are taken out from the extraction equipment, the residual solvent is recovered by low-temperature evaporation.

There are 3 main groups of soy protein products, these group protein content ranges from 40% to 90%. All three basic soy protein groups (except full fat and partially defatted soy flour) are distinguished by defatted flakes, including: soy flour, soy protein concentrate, and soy protein isolate. By definition, whole fat powder is made by peeling soybeans[3]. Partially squeezed defatted powder is made by removing tofu and part of the oil. Soy protein concentrate is made from white bean flakes with water and / or alcohol to remove soluble sugar. Soy protein isolate is made from soy defatted white bean flakes to remove sugar, other water-soluble substances and cotyledon fibers.

2.1 Soy flour

Soy flour is ground and sieved before and after degreasing, and the protein content is between 40% and 54%. Soy flour changes with changes in fat content, number of particles, and heat treatment temperature. Changes in heat treatment temperature will cause changes in water dispersibility and quality of active enzymes, which play an important role in many food preparations.

2.1.1 Partially squeezed defatted soybean flour

No steam dryer or regulator is used during processing. Spiral extrusion is used to improve oil yield and no organic solvents are used. This method can provide animals, especially poultry, with the required low-fat, high-protein, and high-energy soybean meal. Squeezed soybean meal is said to have higher digestive energy and higher amino acid content than the dissolving and extracting soybean meal method.

2.1.2 Structural Soy Flour

Structured soybean meal is also called crude soy protein or crude vegetable protein, which is extruded into a structured structure, such as fiber or block in food, by single or double helix. When it is a water compound, crude soybean flour is often made into a structure like beef, pork, seafood, or poultry meat. It is mostly used in the manufacture of fiber food, animal products, poultry and seafood substitutes and other forms.

2.2 Soy protein concentrate

Soy protein concentrate is produced by peeling and defatting white soybean flakes to remove most of the water-soluble and non-protein components. Its dry basis protein content is above 65% ($N \times 6.25$). The production goes through 3 main steps: extraction of acid (pH 4.5), extraction of alcohol (60% ~ 90%), and the protein is deteriorated by humidification and heating before extracting water.

The water-soluble content of concentrated protein filtered by acid is higher than the water-soluble content of alcohol or technology of changing protein properties by high temperature. Low water-soluble protein concentrates are considered as traditional protein concentrates[4]. Traditional protein concentrates are generally produced by alcohol sugar removal. When heated by steam injection or cooking, it will increase its solubility and function. Under this mechanical processing method, solubility and function have been generally improved. This concentrated protein is called a functional concentrated protein.

2.3 Structured Soy Protein Concentrate

The processing of crude soybean protein concentrate is both traditional concentration and acid filtration concentration, and it is extruded with single or double spiral. The extrusion process is designed into a structure, such as a fiber or a block-things that are used as food ingredients. When they are water compounds, they are often made structurally like beef, pork, poultry, or seafood.

2.4 Soy protein isolate

Soy protein isolate is a highly refined protein product on the market and is the representative of soy protein. It is processed on the basis of removing non-protein components from peeled and defatted white soybean flakes (Table 1), and its dry protein content is > 90% ($N \times 6.25$).

Table 1. Making and using soy protein isolate

Types	Production process	Use range
Protein isolate	Use water or an appropriate amount of alkali, the pH value is between 8-9, press the low-temperature defatted bean flakes with a centrifugal separator to extract the insoluble residue; at this pH value, many The protein precipitate looks like curd; use a centrifugal separator to separate the soluble oligosaccharides from the curd, and then repeat washing and drying to produce "isoelectric" separation.	Application of baby foods and nutritional foods; meat and daily foods; emulsification and latex stabilization of related foods; absorption of water and fat; stickiness and fibrous properties; similar to foods, can be used as substitutes

2.5 Structurally isolated proteins

The protein isolate is extruded with a single or double helix, steam-jetted, or the solution of the protein isolate is squeezed into a container containing the acid salt, and the protein is coagulated into fibers. These fibers are combined with a binder and used as a substitute for poultry and seafood.

2.6 Soy products and ingredients

Partially hydrolyzed protein products are obtained from the protein splitting of animal, plant, and microbial enzymes. Completely hydrolyzed protein is used as a seasoning and is made from acid-decomposed soybean meal. At the same time, many biochemically hydrolyzed proteins can also be used as condiments. For example, soy sauce, tofu and many other products are generally welcomed by many countries (Table 2).

Table 2. Making and using soy specialty foods

Types	Production process	Use
Soy milk	Squeeze out the water from the soybeans	Same as milk
Tofu	Soy milk condensate. Contains 88% water, 6% protein, 35% oil, it can be frozen or dried (56% protein)	Fresh tofu can be stored for 6 ~ 12 months
Soy sauce	Made from a combined fermentation of soybeans and cereals, usually wheat.	Flavour
Hydrolyzed vegetable protein	Enzymatic breakdown of acid and / or soybean meal	Flavour

3. Protein quality and human nutrition

Studies have shown that soy products are an excellent source of protein. But soy products are not the only protein resource in food applications. Many studies

It shows that combining soy products with other proteins is beneficial to improving the nutritional value of food, especially in combination with cereals. There are usually three factors that determine protein quality: the digestibility and absorption of the constituent amino acids, the amino acid composition of the protein, and the type of food that binds the protein.

3.1 Amino acid composition

Soy protein is the most complete amino acid composition of all plant proteins. It is rich in 8 amino acids necessary for humans, and the amino acid fraction is close to animal protein. Because the human diet imposes unnecessary restrictions on some foods, an ideal basic amino acid balance is not obtained, for example, cereals, beans, and animal proteins with their own characteristic amino acids[5]. If you mix these proteins in your daily diet, you can form an optimal balance of essential amino acids.

Soy protein can actually provide higher nutritional value than other plants, and some of them have amino acids restricted in other proteins. For example, soy protein products contain more lysine than the body needs. Therefore, soy protein products are the right way to provide lysine, which is different from some protein-containing plants, such as wheat. Numerous studies have demonstrated the nutritional value of soy protein products in combination with other plant proteins with or without amino acid supply.

3.2 Digestibility

Clinical studies on humans and animals have shown that the digestibility of soy protein products is comparable to that of meat, milk, and eggs. Human research on nitrogen digestibility is also applicable to several soy protein products. Children's digestibility of soy flour is 85% and isolate protein is 95%. For adults, the digestibility of soy protein concentrate and soy protein isolate 91% ~ 96%, comparable to the digestibility of milk. In many food ingredients, proteins cannot be hydrolyzed by digestive enzymes due to the presence of

inhibitory enzymes, such as the presence of artificial trypsin in raw soybeans. Proper processing will passivate these substances so that no harmful factors are present in the finished food.

3.3 Digestible Amino Acid Values in Proteins

In 1985, the American Food and Agriculture Association / World Health Organization (FAO / WHO) proposed the PDCAAS standard for essential amino acids required by people of different ages, replacing the outdated PER method. It is a new and more accurate method for estimating protein quality. PDCAAS can maximize the determination of basic amino acid content for special formula foods.

PCDAAS brings a concept of digestible basic amino acid composition in proteins. There are some proteins whose basic amino acid has a PCDAAS of 1.0, which means that 100% of the amino acids are digested. A PCDAAS lower than 1.0 indicates that some amino acids constitute indigestible components. The PCDAAS values of some soybean protein products are shown in Table 3.

Table 3. The value of soy protein products in human nutrition

Protein products	PDCAAS value
Egg protein	1.0
Soy protein concentrate	0.99
Isolated Soy Protein	0.92
Beef	0.92
Pea flour	0.69
Oat	0.57

3.4 Nutritional value of soy protein

The American Research Association has demonstrated the nutritional value of soy protein products to the human diet through research on human nutrition. General information indicates that adding methionine to a newborn infant formula is beneficial. Adult diets have a sufficient amount of nitrogen, and methionine supplementation is not necessary. These studies minimally estimate the content of methionine in soy protein. Studies have shown that methionine in soy protein products improves human body weight per kilogram of body weight per day[6]. With the nutritional level of 0.6g of protein, the nitrogen balance obtained by ingesting 0.6g of soy protein product per kg of body weight per day is equivalent to 0.4g of egg intake, so the protein and nitrogen balance is appropriate.

Other studies on humans have shown that the protein quality of soy protein products is similar to high-quality animal proteins, such as milk and beef. Studies on healthy young people have shown that the protein quality of soy protein isolate is similar to milk and beef, which is equivalent to egg 80% to 90% of these studies actually put protein intake and absorption in a secondary position. By testing two metabolic effects, soy protein concentrate for adults (medium intake of nitrogen) nitrogen absorption (95mg per kg body weight) is different from egg protein nitrogen absorption (92mg per kg body weight), which is worthwhile Attention. In the second study, soy protein concentrate was eaten for 82 days as the only protein source. The daily intake was 0.8 g per kg of body weight[7]. Nitrogen metabolism was as sure as the balance of all substances. It was concluded that adult soybean protein concentrates could As the sole source of protein to provide the body's nitrogen and amino acid needs. In short, long-term research on humans has shown that soy protein products have higher nutritional value for humans.

3.5 Application of soy protein products in special foods

3.5.1 Infant formula

Soy protein products in infant formula provide sufficient nutritional protein and other nutrients, one for infant formula from birth to 6 months is based on soy protein to provide the main protein source. In the formula, the digestion and utilization of milk protein and soy protein isolate are almost the same, and 2 kg of soy protein isolate per 70 kg of formula is equal to or more than the amino acid supply of equal calorie human milk. When plant protein is the only daily protein source for babies, the supply of vitamins, minerals and possibly amino acids also needs to be enhanced.

3.5.2 Meat and fish

Soy protein products are also used to increase the total daily protein intake. Mixing with animal protein can increase human nutrition. Adding soy protein to beef products will affect the value of protein utilization to varying degrees[8]; if soy protein is added to fish meat As the only source of protein for humans, it has a nitrogen balance similar to that obtained from the same amount of fish, and a study has also shown that a 50/50

ratio of soy protein isolate and fish meat mixture is equivalent to the nutritional value of fish meat and low fat. Combining low-cholesterol fish with soy products will be more beneficial to humans.

3.5.3 Special nutrition products

The content of amino acids, vitamins, and minerals determines the reliable nutritional value of soy protein products, but from the perspective of processing costs, stability of formulation, or medicine, it is impossible to obtain meat with higher nutritional value. However, soy protein products provide special food formulas for elderly patients, infants, hospital patients and post-operative patients. These formulas can provide comprehensive nutrition, a specific balance of calories, protein, fat and carbohydrates.

3.5.4 Soy protein products and cereal blends and cereal protein resources

Many soy protein products are mixed with grains to increase the nutritional value of the grains. The amino acids in the soy protein (lysine-rich, sulfur-restricted amino acids) and cereal proteins (sulphur-rich amino acids, lysine-restricted)[9]. Appropriate addition to grains will result in relatively unique synthetics. Soy flour has been successfully added to some breads. By adding 12% soy flour bread, the lysine content will be more than doubled, and the protein content will be increased to 50%. Mixing skim milk powder with soy protein concentrate at a certain ratio will result in a PDCAAS value of 10, and adding 10% soy protein concentrate to rice flour will increase his PDCAAS from 0.65 to 0.98; adding soy protein concentrate to wheat flour will give similar results.

3.5.5 Mineral content

The mineral content of several different soy protein products is shown in Table 4.

Table 4. Mineral content of soy protein products %

Component	Skim powder	Soy protein concentrate	Isolated Soy Protein
Potassium	2.4~2.7	0.1~2.4	0.1~1.4
Phosphorus	0.7~0.9	0.6~0.9	0.5~0.8
Calcium	0.2~0.3	0.2~0.4	0.1~0.2
Magnesium	0.2~0.3	0.3	0.08~0.09
Chlorine	0.1~0.3	0.7	0.18
Iron	0.01	0.01~0.02	0.01~0.02
Zinc	0.005	0.005	0.004~0.009
Manganese	0.003~0.004	0.005	0.002
Sodium	0.003~0.150	0.002~0.120	0.04~1.20
Copper	0.001~0.002	0.001~0.002	0.001~0.020

Soy flour and cereals contain less than 0015% sodium; soy concentrate

The sodium content of the protein-condensing product is 005%; according to different processing processes and different products, the sodium content of soy protein isolate is 0.04% ~ 120%.

3.5.6 Bioavailability of minerals (including iron)

Soy protein products are used to replace traditional protein resources, and fiber and grain are widely used in daily diets. Studies have shown that adding soy ingredients to human nutrition is of special benefit. When calcium phytate and magnesium phytate inhibit zinc utilization, there are more complex other ingredients, such as phytic acid and Calcium binding has a greater conflict with mineral absorption than combined with low calcium food intake, such as iron and zinc. Therefore, taking the phytate content of food into consideration and its relationship with mineral activity throughout the daily diet is important for nutritional assessment.

3.5.7 Energy

The metabolism of soy protein products can be calculated from the aspects of calories, fat, and protein by using energy, and their oxidative absorption of each part is calculated. Usually has the following available value: 4 calories per g carbohydrate, 4 calories per g protein, 9 calories per g fat, 7 calories per g lecithin. The energy value of soy protein products is shown in Table 5.

Table 5. Energy value of several soy protein products

Product	Energy value / (kcal / 100g)
Skim powder	327

Soy protein concentrate	328
Isolated Soy Protein	334

4. Cross-region operation management of combine harvesters

With the expansion of the scale and scope of rice harvesting across regions, the contradiction between supply and demand in the market for rice harvesting across regions has begun to change, from the original supply shortage to the overall balance and local oversupply. Many deep-seated problems have begun to emerge. An investigation of the rice harvester's cross-region harvesting situation in Jiangning District found that there are many problems in the development of cross-region operations, affecting the smooth development of cross-region operations in the region.

4.1 The main problems

4.1.1 Irregular order in the job market

(1) Severe "scattering" phenomenon

In recent years, due to the large agricultural machinery owners or robots

The cross-region machinery collection operation team organized by the agricultural machinery department went to other provinces and cities to enter the market, engage in services, and earn income. Because they go to the same area every year, they have established a good relationship with the local service organization association or the intermediary or farmers. Several years of practice in cross-region operation have accumulated some experience. Some robots think that cross-region operation is already a familiar way, and there is no need to participate in the service organization to go out uniformly[10]. It can also save hundreds of yuan in management fees and reduce costs. The pilot did not participate in the cross-region operation service team, and "elope" alone or went out in person with the company in advance. For example, in 2008, Jiangning District had 558 combine harvesters to participate in cross-zone operations, but only 101 combine harvesters received a "cross-zone operation certificate" as required, and the number of loose machines exceeded 4/5 of the total, impacting the normal The order of harvesting operations affects the balance of supply and demand in the entire harvesting market and harms the interests of organic and farmers. The loss of the "Cross-region Operational Permit" is another reason for the "scattered operation"[11]. On the one hand, the influx of "cross-region work permits" from other provinces into Jiangsu has resulted in the proliferation of "cross-region work permits". Because the agricultural machinery management departments in a few regions sold the "cross-region work permits" as a large amount of goods at low prices, some of the "cross-region work permits" were purchased by local people, and then these people remitted directly to organic households by mail, and some even Not far away, he sent the "Cross-region Operation Certificate" to the owner. On the other hand, some agricultural machinery management departments in the province have not standardized and strict management of the "cross-region work permits". They have not faithfully obtained and issued according to the number of teams of agricultural machinery management departments in various places, and have not strictly implemented the "cross-region work permits" in accordance with regulations. The "Issuance Pass" caused part of the "Cross-region Operational Permits" to flow directly into the owner's hands through the "back door", resulting in a large number of "personal permits" and "relationship permits." Cross-region operations have brought certain economic benefits. Certain agricultural machinery departments are unavoidable to commit "red eye disease". They know that they have limited human and material resources and do not have the ability to go out in teams. However, driven by benefits, they have adopted lower service fees, etc. The "preferential" policy will "pull" and "grab" local and surrounding harvester owners and operators to participate in cross-region machine harvesting service teams in a vicious competition. After issuing the "Cross-zone Operation Permit"[12], to save expenses, during the operation, only one or two staff members were sent to the operation site symbolically. Management and service work was not in place, and some only told the operator the operation site and driving route. It neither dispatches command vehicles nor arranges management service personnel to go out with the team, ignores the team, and lets the pilots "walk around". The negative impact of loose machine is that it disrupts the overall plan and arrangement of the job market, disrupts the charge price of the job market, causes the job price to fluctuate greatly, and easily leads to vicious competition in the machine-receiver market, which affects the entire cross-region operation Go smoothly and move forward. In addition, the loose behavior is not in line with the spirit of the Ministry of Agriculture's "Interim Measures for the Management of Cross-region Operation of Combine Harvesters".



Figure 1. Combine harvester

(2) Blocking or interception is a prominent problem often encountered in cross-zone operations.

In recent years, due to the rapid development of combine harvesters and uneven development in various regions, especially in economically underdeveloped areas, the lack of ownership makes it difficult to meet the needs of farmers. The contradiction between limited agricultural machinery and huge market demand has made District operation ", the market supply and demand relationship of agricultural machinery services is not balanced. During the harvest of crops, in order to avoid accidental farming, farmers use machinery to harvest crops as early as possible, often blocking or intercepting the machines on the roads in private, forcing the robots to stay and operate, and even group fights have occurred.

(3) Difficult to fulfill the operation contract

This is caused by two reasons: one is that the loose machine has impacted the normal order of the machine collection operation in the local area, and many of the pre-established operation contracts are difficult to be fulfilled; An operating contract has been established, which stipulates the number of induced machines, operating area, charging standards, and service items. However, in order to motivate the organic side, the induced machine often sets a large operating area and a high price, which is actually difficult to fulfill. As a result, the contract cannot be implemented, and the legitimate rights and interests of the operator cannot be guaranteed.

4.1.2 Irregular behavior of intermediary organizations

Intermediary organizations or intermediaries are mainly spontaneously generated. Although these people have a certain market economy mind, most of them have not received professional training, lack the necessary management knowledge, maintenance common sense, and have poor ability to coordinate and handle disputes. The intermediaries operating in some regions are of low quality. Some unqualified units and individuals organize cross-regional operation teams to go out to work. Irregular behaviors such as more fees and less services, only fees and no services, and repeated fees often occur. Brokers The team is still in a scattered and chaotic state, and most of them have no employment permits. They are "wild intermediaries".

4.2 Delays in supply and demand information and poor timeliness of the cross-regional job market

Information is the primary source for cross-region operations. Farmland operations have time differences, agricultural machinery has geographical differences, cross-regional operations have long fronts, large spans, and wide ranges. Some combine harvesters have battled thousands of miles from the north to the north. Due to insufficient information service work, market demand is the cultivation of crops in various places. Information such as area, harvest time, weather conditions, charging prices, and applicable equipment is difficult to understand and accurately grasp[13]. Although the agricultural machinery department releases wheat and rice cross-region harvesting market information at the beginning of each year, from the perspective of the survey, the information feedback is not timely, the information transmission is not smooth, the information scope is relatively narrow, and it cannot fully meet the ever-changing market demand. As a result, the information received by the cross-region machine is lagging and the timeliness is poor, resulting in uneven distribution of the cross-region operating machinery in some areas, and the interests of the operators are damaged, which does not truly meet the market demand.

4.3 Low operational quality of operators and low efficiency of mechanical operations

With the improvement of scientific and technological level, the technological content of agricultural machinery has increased. For example, the combine harvester has a complicated structure and high technical content, which requires higher technical level of the machine. However, in recent years, due to the sharp

increase in the number of combine harvesters, the training of agricultural machinery can not keep up with the growth rate of agricultural machinery, the training work seems relatively backward, and the training time is short. Driving on complicated roads and field operations are prone to accidents. In addition, there is no training at the harvest site, and crops require corresponding mechanical adjustments and operations due to different varieties, maturity, and humidity[14]. It requires the operator to explore and In summary, therefore, there are often problems with slow operating speed, large field losses, and many operating failures, which cannot fully exert the performance of the machine. Some trainers focus on machine operation and maintenance, and light traffic laws and regulations, which undoubtedly lays down hidden dangers in cross-region travel. Most operators only operate and use the whole machine without maintenance. Once a failure occurs, it is difficult to find maintenance personnel to deal with the machine failure in a timely manner, delaying the collection operation, and reducing the machine operation rate and service level.

4.4 Incomplete cross-region operation and service work

At this stage, China has not yet established a complete service network, and the marketization of agricultural machinery operation commission is still low. In areas with inter-regional operation reception service stations, the role of service reception stations has not been fully utilized. In cross-zone operations, due to the lack of active and extensive contacts with the governments and agricultural machinery management departments in cross-zone operation areas, problems often occur between the owner and the farmer due to the size of the operating area, the price of the machine, the quality of the machine, and the quality of the operation. Disputes hindered the smooth progress of cross-region operations.

4.5 Quality problems of combine harvesters

First, some domestic combine harvesters have low reliability, high failure rates, and after-sales services from manufacturers are not in place, and few domestic combine harvesters can operate continuously without failure. The quality follow-up survey conducted by the Ministry of Agriculture for three consecutive years from 1999 shows that the average working hours of the investigated models are not long, respectively 8.8h, 19.1h, and 21.5h, which are in line with relevant industry standards (hanging type is not less than 60h, self-propelled type is not less than 45h)[15] The distance is far away, which cannot meet the actual needs of agricultural production. Second, counterfeit and inferior harvester spare parts flooded the market, arbitrarily asking prices and not guaranteeing quality. Third, the manufacturers' "three guarantees" service work could not keep up, and there was a big gap between the service time limit, service scope and service quality and the requirements of the robot. According to incomplete statistics, of the 12 agricultural machinery product quality complaints in the district in 2008, 4 reflected the quality problems of combine harvesters, accounting for 33%. The harvest time was missed due to the failure of the machine, which further disrupted the harvesting plan, making farmers want to buy harvesters, but they were afraid to buy quality harvesters, which also affected the promotion of combine harvesters.

5. Management countermeasures

5.1 Regulating market order

Regulating market order is a top priority for doing well across regions. This problem is obviously not enough by the strength of the agricultural machinery department alone. Under the unified leadership of the party committee and the government, all relevant departments must cooperate closely and work in concert. It is necessary to increase the comprehensive management of road traffic and social security, take full responsibility for the organization and coordination, order maintenance, and mediation of disputes in cross-region work within the jurisdiction, protect the legitimate rights and interests of parties participating in cross-region operations, rely on institutional innovation, and improve relevant The laws and regulations have established a safe production management system for cross-region operations, an intermediary supervision system, an information collection and release system, market transactions and service specifications, and gradually formed a unified, open, competitive and orderly cross-region operation market system.

5.2 Do a good job in supporting services

The cross-region operation has strong fluidity and large span, and it is important to provide effective supporting services for the machine operators, which is also the unshirkable responsibility of the agricultural machinery department. In view of the manpower and material resources of the agricultural machinery department, it is difficult to implement tracking services in a comprehensive manner. The best way is to implement "territorial services"[16], where the pilot machine will provide supporting services such as machine accessories, maintenance, and dispute resolution to coordinate the relevant production enterprises in Three-guarantee service outlets and special service outlets are set up in key areas for cross-region operation. For large-scale, uniform models of cross-region operation service teams, they can send people and car tracking services

together with manufacturers or suppliers. Establish a short message system network, set up a special cross-area operation information service organization, improve the cross-area operation information service system, release the latest harvest information regularly every day, and improve direct service capabilities.

5.3 Changing functions

The agricultural machinery department should comply with the needs of market development, and change from direct team outing to regulate market order, provide market information, and coordinate the relationship between all parties, and change from participants in cross-region operations to managers, so that the role of agricultural machinery will be more Effective play, the role of resource allocation in the cross-region operating market is fully reflected. It is an inevitable choice for marketization to change the functions of cross-region operation organizations.

5.4 Widening the field of cross-region operations

In recent years, the level of agricultural equipment in various places has improved to varying degrees, and the traditional large-scale crops such as corn and wheat have become less and less acreage after the adjustment of the agricultural structure. Cross-region operation projects, this is the fundamental way to improve the economic benefits of cross-region operations.

6. Suggestions for regulating the management of cross-regional job markets

In response to some practical problems in the inter-regional operation market, the agricultural machinery management department should strengthen macro management, regulate the inter-regional operation market, and protect the interests of the machine operators to further improve the level of mechanization of rice and wheat harvest in our city.

6.1 Improve ideological awareness and strengthen organizational leadership

Cross-region operation management is an important function of the agricultural machinery management department under the new situation. It is the responsibility of the agricultural machinery management department to manage the harvesting machine for cross-regional harvesters from outside to protect the interests of farmers and robots. We must raise awareness of the importance of cross-region operations, establish a sense of the overall situation, and effectively do a good job in the management and service of external cross-region harvesters. The first is to do a good job of reception. The agricultural machinery management department should set up a cross-zone operation reception station to provide information services for inbound locomotives and contact the intermediary service organization (broker) to prevent its blind movement and disorderly operation. Service hotline to accept consultations and complaints from farmers and operators[17]. The second is to scientifically dispatch external cross-region harvesters. The areas with large harvesters and less harvesters are adjusted more, the areas with small harvesters and more harvesters are adjusted less or not. The areas with more local harvesters are not adjusted as much as possible. In order to ensure the operation volume of the harvester, the number and time of the transfer of the harvester is minimized, and the harvester operation efficiency is improved. In order to avoid the contradiction in the difference in operating quality between low-performance harvesters and high-performance harvesters, consciously take protective measures and appropriately delineate certain "special zones" to meet the operational needs of low-performance harvesters and avoid local (mostly low-performance harvesters) Robots conflict with foreign (mostly high-performance harvester)[18] robots. The third is to actively seek the support and cooperation of the public security, transportation, price and other departments, create a good working environment for machine harvesting, and severely crack down on the road to smash harvesters and intercept blackmailers.

6.2 Strengthen supervision and management and standardize the operation market

The first is to strengthen the construction and management of the machine-receiving intermediary service organization. We must actively encourage and support the healthy development of various types of intermediary service organizations, and gradually form agricultural machinery extension stations, township agricultural machinery stations, agricultural machinery associations, large agricultural machinery households, or village officials. Intermediary service network, providing diversified services for operators. To establish a credit record for an intermediary organization, each intermediary service organization (intermediary broker)[19] must go to the Municipal Agricultural Machinery Bureau for the record. The technical service personnel of the intermediary organization shall be trained in the policies and regulations of cross-region operations and the maintenance and repair technical training of the combine harvester, and each intermediary service organization shall be required to sign an intermediary service contract with the combine harvester driver to clarify the rights and obligations of both parties. The second is to strengthen the supervision of the cross-region operation market. It is strictly forbidden for combine harvesters and robots without licenses, driving licenses, and cross-region

operation licenses to participate in cross-region operations in our city. Regarding the “spread machines” that have arrived in the local area (the ones who have not come to our city through intermediary service organizations or intermediaries)[20], respect the wishes of the operators, and help them to contact the intermediary service organizations, integrate them into the unified management, and arrange their operations. The third is to strengthen the management of safe production across regions. Agricultural machinery safety supervisors should go deep into the field, preach safety common sense, check the operating status of locomotives, and prohibit unlicensed or unlicensed combine harvesters and driving operators from participating in the operation. Hidden dangers of agricultural machinery safety accidents to ensure the smooth operation of cross-region operations.

6.3 Innovate service mechanism and regulate service behavior

The first is to do a good job in information services. Prior to harvesting, all grass-roots agricultural machinery central stations should conduct in-depth investigations in various townships and village groups to fully understand the planting area of middle rice, harvest time, machinery supply and demand, and acceptable machine-receiving prices. Then based on the number of local harvesters, the number of harvesters to be introduced is calculated, and information about the harvesters is released to the outside. Every time a batch of foreign cross-area harvesters come in, they will actively provide driving directions to the operators, announce service telephone numbers and contacts, and guide them to reach their destinations as soon as possible and put them into operation in a timely manner[21]. The second is to improve intermediary services. Supervising intermediary service organizations and intermediaries should sign operating contracts with foreign robots according to the actual situation in various places to clarify the responsibilities and obligations of both parties. Intermediary organizations should strictly follow the regulations of the provincial price bureau when collecting intermediary fees, and resolutely put an end to the phenomenon of heavy fees, light services, only fees and no services, and more fees and less services. The third is to do a good job in technical services. During the harvest period, the agricultural machinery extension station should give full play to its strong technical strength, set up a machine collection service line, and carry out roving maintenance services to ensure that it is available on call and that it does not miss agricultural hours.

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