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Research, Analysis and Suggestions on the Comprehensive Utilization of Straw in Qiqihar City, Heilongjiang Province

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Abstract: To accelerate the comprehensive utilization of straw and realize the utilization and commercialization of its resources is an important measure to promote the development of circular agriculture, increase farmers' income and promote the development of emerging industries and agriculture. How should it combine with "big"? We will study and analyze the "economic and social problems", rural environmental improvement" and other problems, and put forward feasible suggestions. The second problem is the market price of straw resources. Mechanisms have not yet been established and there is a lack of policy incentives. At present, effective pricing mechanisms, market mechanisms, storage and transportation systems for straw resources have not been established in different regions. Third, the commercialisation rate of straw resources is not high. There is a lack of specific policies to promote the widespread use of straw. Although the industry is developing slowly and supporting technologies are lacking, the lack of convenient straw processing facilities due to time constraints has made it difficult for farmers to collect and process straw, resulting in significant economic losses for farmers. Fourthly, new technologies for the comprehensive use of straw are widely used, and there is a lack of labour-saving and practical technologies that are particularly suitable for promotion. Straw management by farmers alone is not enough. Fifth, the improvement of the main technical problems, both to save fertiliser and money, but the climate is becoming more arid, irrigation management techniques can not keep up, wheat seedlings have been "withered", resulting in a serious shortage of seedlings, abandoned seedlings.

1. Introduction

In recent years, with the continuous improvement of farmers' living standards and the promotion and use of new energy sources, biogas has become the main fuel used in rural applications, while the main role of straw as a farmer's fuel is to "return straw to the field". The reasonable and effective use of straw in Qiqihar City has the dual role of ecological effect, environmental protection effect and energy saving effect. Through expert consultation, household survey, public questionnaire sampling, etc., we have a comprehensive understanding of the social and cultural situation in Linyi City, and shape the "society" through research, analysis and suggestions.

2. Basic situation of straw production and utilization of the whole city

2.1 Statistical analysis of the annual straw output in the whole city

According to the statistics of the Bureau of Agriculture, in 2022, the total area of cultivated land in the city will be 16,211,300 mu, of which 10,632,500 mu will be planted with staple grains, with a total grain output of 4,551,700 tonnes, and the total straw output will be about 10,000,000 mu. Based on the total area of crops planted in the city, the total amount of straw is more than 9 million tonnes (excluding all kinds of forest waste that can be used). 2 tonnes of straw has a calorific value equivalent to 1 tonne of coal, and the calorific value of straw in the city is equivalent to 4.5 million tonnes of coal, accounting for about one fifth of the city's total energy consumption. In 2009, the city's energy consumption was 20.22 million tonnes of standard coal. Among the grain crops, wheat was planted on 5,202,400 mu, with an average yield of 389 kg per mu and a total of 1,943,000 tonnes of straw; maize was planted on 3,591,300 mu, with an average yield of 434 kg per mu and a total of 1,732,000 tonnes of straw; the total amount of straw per production unit was calculated according to the average straw coefficient of the maize harvested at that time, which was 600. 3 kg, a total of 366,400 tonnes; and potato was planted on 856,200 mu, with the total amount of straw per unit of production equal to 1 tonne of coal. area of 856,200 mu, the average grain yield potato mu yield 521 kg, the total amount of seedlings and vines 778,000 tonnes; peanut sown area of 2,552,300 mu, the average yield of 324 kg / mu, the total amount of seedlings and vines 894,400 tonnes.[1]

2.2 The urban straw comprehensive utilization project has attracted much attention

Qiqihar government attaches great importance to strengthening the comprehensive use of straw, adhere to the principle of catch and use, catch priority, use priority, promote combustion, comprehensive use of straw in the city. The relevant departments are gradually developing and promoting new technologies and measures related to the use of straw, the city's straw utilisation project has been effective. First, farmers are strictly prohibited from open burning and give priority to the use of land. The government should strictly prohibit straw burning, establish a target management responsibility system, promote the problems and countermeasures of cities, villages and families, and sign the responsibility of straw burning ban; Pay attention to each stage, take measures to strengthen the accountability system, and strictly implement the responsibility for straw burning. Relevant departments have increased rewards and punishments, strengthened law enforcement, and strengthened supervision and management of open burning, and the open burning ban has achieved important results. Second, government departments encourage and support the return of straw to the field, and guide and encourage farmers and social forces to invest in the comprehensive utilization of straw. Part of the straw is being returned to the field, and promotion is accelerating. Third, we have strengthened training and publicity, accelerated publicity and promotion of the comprehensive utilisation of agricultural products, and supported farmers in many ways to create conditions for them to increase their income.[2]

2.3 The city's main crop straw utilization forms are diversified

According to a survey of the city's seven jurisdictions and nine counties and cities, the city's straw utilisation rate for major agricultural products was 65.51%, an increase of 8.5 percentage points over the previous year and 3.01 percentage points lower than the provincial average. Due to the accelerated promotion and application of direct straw return to the field, the utilisation showed a diversified trend. The amount of straw returned to the field in the same province accounted for 4.63%

of the national total, an increase of 2.04% over the previous year, with an increase in organic matter content, and the consumption of straw returned to the field was 103.2% and 10,000 tonnes, accounting for 19.45% and 6.26% of the national total, respectively. The utilisation rate of straw accounted for 5.3% of the total utilisation rate of the whole state, 1.46 percentage points higher than the whole state. Fourth, the effective use of a variety of ways, which points out that "paper, straw textile and other subsectors will increase the use of straw, accounting for 7.01% of the total, accounting for 2.76% of the country". Compared to the previous year, the increase was 1.21%. In terms of straw as fuel for farmers, the city's consumption of straw fell to 14.18 per cent of the total, a decrease of 4.7 per cent compared to the previous year and an increase of 3.15 per cent compared to the country.[3]

3. On the comprehensive utilization of urban straw

Qiqihar is a large agricultural city and a major straw producer. Although the comprehensive use of straw has progressed rapidly in recent years, statistics show that 4.4 million tonnes of straw (excluding used forest residues) remains unused in the city. Although the government has repeatedly banned straw burning, statistics show that 12 per cent of farmers still burn straw (mainly wheat) in their fields and then dump it in fields, ditches, village entrances and roads. The main reason for this phenomenon is a lack of awareness among farmers about the full use of straw. Since ancient times, straw has played an important role in the countryside as fuel and fodder, but its resource value has not been fully exploited and the overall utilisation rate is low. It is not enough to rely on the government to promote straw use; relevant departments and experts are considering specific implementation plans, but they have not yet done a good job of analysis, and there are still challenges to implementation in this area. The second problem is the market price of straw resources. Mechanisms have not yet been established and there is a lack of policy incentives. At present, effective pricing mechanisms, market mechanisms, storage and transportation systems for straw resources have not been established in different regions. Third, the commercialisation rate of straw resources is not high. There is a lack of specific policies to promote the widespread use of straw. Although the industry is developing slowly and supporting technologies are lacking, the lack of convenient straw processing facilities due to time constraints has made it difficult for farmers to collect and process straw, resulting in significant economic losses for farmers. Fourthly, new technologies for the comprehensive use of straw are widely used, and there is a lack of labour-saving and practical technologies that are particularly suitable for promotion. Straw management by farmers alone is not enough. Fifth, the improvement of the main technical problems, both to save fertiliser and money, but the climate is becoming more arid, irrigation management techniques can not keep up, wheat seedlings have been "withered", resulting in a serious shortage of seedlings, abandoned seedlings[4].

4. Strengthen the city's straw comprehensive utilization of the ideas and suggestions

Qiqihar City is building a pilot resource-saving and environment-friendly society and promoting the extensive use of straw. This is an important initiative to increase farmers' income, which can be effectively combined with crop improvement to improve the rural environment. The comprehensive use of straw leads to industrialisation and realises the organic combination of economic, social and environmental benefits.[5]

4.1. Strengthen the guidance and policy support for the comprehensive utilization of straw

Since 2021, the General Office of the State Council and the General Office of the Provincial

Government have each issued documents on accelerating the formulation of the medium- and long-term development plan for the comprehensive utilisation of straw resources and on accelerating the development of the comprehensive utilisation of straw resources.2022 In November 2022, the National Development and Reform Commission (NDRC) and the Ministry of Agriculture (MOA) jointly convened a working meeting on "Promoting Support for Accelerating the Comprehensive Utilisation of Straw" to formulate guiding support policies for accelerating the development of the comprehensive utilisation of straw. In November 2022, the National Development and Reform Commission (NDRC) and the Ministry of Agriculture (MOA) jointly convened a working meeting on "Promoting Support for Accelerating the Comprehensive Utilisation of Straw" to formulate guiding support policies for accelerating the development of comprehensive utilisation of straw. The meeting clearly pointed out that "as a big city of straw production, we will combine the actual situation of our city to develop a response to the program, seize the opportunity of policy formation, and promote the comprehensive use of straw technology, equipment research and industrialization and promotion". Relevant departments should promote the use of straw, maximize the benefit of straw utilization in the whole society, reduce environmental pollution, expand the utilization and recycling industry chain of straw, and strive to make it greater and stronger.

4.2. Enhance the industrial capacity in combination with the urban development planning, and cultivate the processing industry with straw as the raw material.

Firstly, large enterprises rely on the Yixian panel production base to strengthen the research and development of new straw wall materials, such as straw artificial panels, composite panels, medium density panels, lightweight partition walls and other new straw wall materials. Government departments can cultivate processing enterprises using straw as alternative raw materials, provide tax and transportation subsidies for product sales and raw material transportation, and provide subsidies for afforestation funds according to the production scale of enterprises. Second, the relevant departments to diversify straw raw materials. Straw, wheat straw, sorghum straw, corn stalks and other grains are non-wood fibre resources that can be used as fibre raw materials for papermaking and play an important role in papermaking. Straw accounts for 33.1% of the total and no other straw is used. We need to diversify the ways in which straw is used as a fibre raw material for papermaking, taking into account environmental protection. The third factor is high added value. Fibre is a natural material. We process and extract starch, xylitol, furfural and other biodegradable cellulose fibres to create a complete industrial chain. The fourth is to support the willow weaving and straw processing industries, achieve sustainable industrial expansion and market development, and develop the city's traditional advantageous processing industry.

4.3 Give full play to the straw energy function and promote the development of circular agriculture

First, the promotion of straw biogas. At present, there are residential biogas projects and large, medium and small biogas projects in the city, with 356,000 residential biogas projects. Among them, the biogas project is calculated with an average of 8 square metres of biogas, with a building material area of 1,000 square metres and an annual consumption of about 168,000 tonnes of straw. In order to further adjust the layout and structure of the development of rural household biogas construction, combined with the promotion of urbanisation strategy, support the construction of rural communities. To meet the needs of large and medium-sized biogas construction, relevant departments should promote straw pyrolysis gasification to meet the needs of centralised gas supply for apartment buildings. The methane produced after treatment in this process will be straw into the pool for power generation, converted into high-quality fertiliser, and returned to the field as organic fertiliser, which can produce high-quality organic agricultural products. Second, we can use

biomass energy to support the development of biogas power generation. In the era of carbon economy, people's expectations of biomass power generation is getting higher and higher.2022, Longjiang County Animal Husbandry Bureau received the request from the district committee and government to build Guoneng Bio-Power Co. According to the report, Guoneng Bio-Power Co. Ltd. was commissioned to prepare a feasibility study report and decided to invest 300 million yuan in the construction. When completed, the project will maximise the use of straw and forestry waste, mainly collected within a 25-kilometre radius of the power plant. Additional investment will require technology promotion. Crops will be processed under constant temperature and pressure. Straw will be converted into rods and compressed into blocks or pellets to produce plastic fuel, which is 6 to 8 times smaller and has an energy density comparable to media fuel. Transport and storage capacity will also be improved to provide heat for rural leisure activities. Improve combustion performance to replace wood and coal and change the way farmers burn fuel. The biological function of straw should be fully exploited. Straw is rich in carbon, nitrogen, minerals, hormones and other nutrients, making it ideal for use as a substrate for various edible fungi. In this way, straw can support the development of the edible mushroom industry and reduce the economic demand for straw.

5. We attach great importance to straw returning to the field and are actively promoting it for returning to the field

Firstly, publicity on the role of straw return to the field has been increased to raise farmers' awareness of straw return technology. By returning straw to the field, crops and micro-organisms get the nutrients they need. Measurements show that half of the straw produced from one mu of land is returned to the field, and the land contains 1 kg of organic matter, 20 kg of nitrogen and ammonia nitrogen, ammonium bicarbonate, ammonium bicarbonate and calcium superphosphate equivalent to the addition of potassium chloride, and 11 kg of calcium superphosphate and calcium superphosphate, which are complementary elements that increase soil fertility and water-holding capacity, and promote soil formation. We can improve particle structure and physical properties: promote plant growth through the physiological activities of microorganisms and weeds, neutralize alkalization, improve soil, decompose pesticide residues and heavy metals, and in doing so improve the quality of agricultural products. Secondly, to make more farmers understand the role and benefits of straw return to the field, it is necessary to strengthen a variety of publicity activities and increase political support. Following the implementation of the Straw Return Law and the introduction of a subsidy system for cornfield ploughing equipment, straw return machines have become increasingly popular. However, straw returners are only used during the busy farming season and have a long service life due to their single-use characteristics. In Longjiang and Baizuan counties in Heilongjiang Province, two national modern agricultural facilities have been built. Due to the short payback period, low motivation of the investor and insufficient total number of straw returners, it was decided to introduce technical machinery to help farmers. The adoption rate of straw return technology in the project area reached 100%, increasing income more than reducing costs. Third, promotion. Different field return techniques have been developed according to local conditions, crop conditions and conditions. Accelerated growth and field return techniques should be strongly promoted. In areas with serious environmental problems, dung is excavated and crop straw is piled at the edge of the field with the right amount of animal manure and sludge to regulate the carbon and nitrogen ratios and the amount of water. Straw bioreactor is a composting technology that promotes straw bioreactor technology to produce organic fertiliser by adding a certain percentage of water, microorganisms, bacteria, enzymes, grasshoppers, Xinyi 6 and fermented straw. Ingredients such as bacteria and catalysts produce carbon, thereby eliminating carbon dioxide, improving fertiliser efficiency, increasing soil temperature, suppressing pests and diseases, and reducing the use of chemical fertilisers and pesticides.

6. Further accelerate the development of ecological and environmental protection aquaculture industry in Qiqihar city

First, relevant departments continue to vigorously promote the development of large-scale, standardized and environmentally friendly agriculture. Qiqihar City is a large-scale farming city, there are currently 969 bio-environmental pig farms, fermentation area of 765,000 square metres, bio-environmental pig stock accounted for more than 55% of the total pig stock. At present, Qiqihar City, based on the achievements in pig environmental protection breeding, other livestock and poultry industry should also promote and develop cotton seed and other environmental protection breeding technology, resource utilization is to create a "fermented bed", and actively use forest waste as the main raw material. Straw fermentation mainly refers to the use of straw, but also includes silage, micro-storage, kneading and other processing methods. The spinning, charring and shaping technologies we promote play an important role in turning straw into high quality feed and improving the nutritional value of straw. Simple, labour-saving, economical, easy long-term storage, balanced, can be used throughout the year, saving granular feed, Qiqihar feed industry needs to strengthen the support and development of straw feed conversion, build a straw feed conversion system suitable for the characteristics of Qiqihar feed, accelerate the development of the production market, and promote the comprehensive use of straw. Second, we should manage straw, manage fallow farmland and promote the comprehensive use of straw.

7. Conclusion

We must fully support the development of social services for straw utilisation. First, a centralised rural straw collection and logistics service system should be established. We will build a rural household biogas service system, expand the capacity of centralised straw collection and logistics services, and help cooperatives set up straw collection stations. Straw transport vehicles are not included in household agricultural machinery and will be sold in instalments. Secondly, the government should support the mechanization of agricultural management, the formation of collective organizations, and the mechanization of the whole process of collective harvesting, harvesting, gathering, and packing." In Japan, South Korea, Europe and the United States and other countries, where straw can be crushed and returned to the field, used as silage, are used to bale harvesting, collective harvesting, the establishment of crushing, harvesting, packaging and other agricultural machinery integrated service cooperatives, aimed at including mechanical protection, crushing, silage, silage cellar storage and other methods. We can use multi-beam branch transport to maximize the use of equipment and uniformly plan different equipment configurations. Third, the straw crusher has independent intellectual property rights, we have a variety of models and specifications suitable for the characteristics of Qiqihar City, can solve different problems, so we have to support the development and implementation of baling machinery, coal making machinery and silage machinery.

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