

# Comprehensive Utilization Policies of Crop Straw at Home and Abroad and Its Implications for Xinjiang

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**Abstract** This paper summarizes crop straw utilization policies at abroad from the aspects of investment support policies, tax revenue and unsecured loan policies, and reviewed China's crop straw utilization policies from the aspects of technical training, project subsidies, straw collection, storage and transportation system construction and socialized service system construction. Combined with the actual situation of Xinjiang, this paper puts forward policy formulation suggestions on crop straw comprehensive utilization.

**Key words** Crop straw, Home and abroad, Xinjiang, Policy

## 1 Introduction

Crop straw is rich in nitrogen, phosphorus, potassium and organic nutrients, and is the main by-product of agricultural production<sup>[1]</sup>. The comprehensive utilization of crop straw plays an important role in stabilizing agricultural ecological balance, promoting farmers' production and income increase, and alleviating the pressure on energy and environment<sup>[2]</sup>. China is the world's largest crop straw production country, and the annual crop straw production reaches 805 million t<sup>[3]</sup>. In 2020, the annual crop straw production in Xinjiang reached 31.268 million t<sup>[4]</sup>, but there are still problems such as single form of comprehensive utilization and low benefit.

This paper summarizes the relevant policies for comprehensive utilization of crop straw at home and abroad, and analyzes the existing problems and policy needs of comprehensive utilization of crop straw in Xinjiang, in order to lay a foundation for improving the comprehensive utilization rate and benefit of crop straw in Xinjiang.

## 2 Comprehensive utilization policy of crop straw at abroad

Policies related to comprehensive utilization of crop straw at abroad were formulated earlier, including investment support policies, tax revenue and unsecured loan policies, etc.<sup>[5]</sup>.

**2.1 Investment support policy** (i) Research and development investment. Advanced technology is the guarantee of straw resource development and utilization. In 2000, the US government

adopted the *Biomass Research and Development Plan*; in 2007, the US government invested 125 million US dollars in cellulosic bioenergy research; in 2008 – 2012, the US government continued to invest 118 million US dollars to do straw-related research. In order to encourage innovative technology or new product research and development for comprehensive utilization of straw, the UK government provided a financial subsidy of 70% of the total cost for relevant enterprises or institutions<sup>[6]</sup>.

(ii) Industrialization demonstration project of straw off field utilization. In the process of straw collection, storage and transportation (pre-production), the South Korean government gives direct compensation to the purchase of straw collection and storage machinery, and the subsidy ratio is 38.5% of the cost<sup>[7]</sup>. In the process of project construction and equipment purchase (production), the United States has subsidized 355 million US dollars only in straw cellulosic ethanol. In the link of product sales and consumption (post-production), Germany has formed a fixed electricity price reduction mechanism and a linkage system of additional electricity price collection, and subsidies are given to combustion stations with both power generation and heating functions, and enterprises adopting new technologies.

(iii) Subsidies for returning straw to fields. In South Korea, the subsidy for returning straw to fields is 20 000 won/667 m<sup>2</sup>. In Australia, the purchase of no-till seeding machinery can get 50% subsidies, and agricultural machinery improvement, technology demonstration and personnel training can get 70% subsidies.

**2.2 Tax revenue and unsecured loan policies** Tax revenue and unsecured loan can promote the development of straw industrialization and improve the market competitiveness of enterprises. The United States provides tax breaks for biomass power generation and straw cellulosic ethanol projects. EU countries have adopted biomass energy tax exemption (Finland, Germany) and differential carbon tax policy (Italy) to promote the development of biomass energy industry. Spain implements loan interest relief for biomass

Received: June 12, 2023 Accepted: August 15, 2023

Supported by Natural Science Foundation of Xinjiang Autonomous Region (2021D01F06).

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energy power generation projects.

### 3 Policy for comprehensive utilization of crop straw in China

**3.1 The No. 1 central document attaches importance to the comprehensive utilization of straw** China's No. 1 central document released in 1982 mentioned the comprehensive utilization of straw for the first time, and proposed the implementation of straw returning to the field in order to regulate soil chemical and physical properties and increase soil organic matter. The No. 1 central document from 2004 to 2022 (except 2011) all mentioned the comprehensive utilization of straw, especially in the past 5 years, the comprehensive utilization of crop straw has been paid more and more attention. In 2018, it was clearly proposed to promote the comprehensive utilization of crop straw; in 2019, it was proposed to promote the resource utilization of straw to promote ecological circular agriculture; in 2020, it was proposed to promote the comprehensive utilization of straw to control the rural ecological environment; and in 2021, it was proposed to fully implement the comprehensive utilization of straw to promote the green development of agriculture. In 2022, it is proposed to continue to support the comprehensive utilization of straw to promote the green development of agriculture and rural areas<sup>[8]</sup>, which provides an important basis for the formulation of various policies on the comprehensive utilization of straw.

**3.2 Typical policies for comprehensive utilization pilot of straw** In 2016, China carried out pilot projects for comprehensive utilization of crop straw in 10 provinces (autonomous regions), including Hebei, Inner Mongolia and Heilongjiang, to explore technical routes, modes and mechanisms for sustainable, replicable and promotable comprehensive utilization of regional straw. In 2017, the comprehensive utilization and treatment action of straw in Northeast China was carried out, focusing on improving the specialization level of collection, storage and transportation, the standardization level of comprehensive utilization, and the level of straw agricultural transportation and market utilization, and a number of demonstration counties and model counties were established. Pilot work had been carried out across the country<sup>[9]</sup>.

In 2019, the Ministry of Agriculture and Rural Affairs carried out a pilot project to create an ecological compensation system for straw utilization in Heilongjiang Province. In 2020, the scope of the pilot was expanded to "one province and 6 counties (districts)" such as Heilongjiang Province and Lishu County of Jilin Province, to explore a long-term operating mechanism that adapted to different regional characteristics. In 2021, 10 model counties with ecological compensation system for straw utilization were constructed in 8 provinces (autonomous regions) including Shanxi Province and Inner Mongolia Autonomous Region, providing valuable solutions for promoting the national agricultural support and protection policy from production to ecology<sup>[9]</sup>.

**3.3 Types of straw comprehensive utilization policies** (i)

Technical training. Technical training for farmers and herdsmen can effectively promote the in-depth development of comprehensive utilization of straw, which is mainly organized and implemented by local governments or agricultural administrative departments, with extensive participation of agricultural scientific research institutions, universities and other social entities. Shicheng County of Jiangxi Province used 10% of the matching funds to carry out technical training of straw comprehensive utilization. (ii) Project subsidy. Project subsidy refers to the policy subsidy for farmers, cooperatives and enterprises that implement comprehensive utilization of straw under the support of the central financial special subsidy for comprehensive utilization of crop straw, agricultural resources and ecological protection subsidy funds and other projects as well as the self-raised funds of local governments. The content of subsidies mainly includes straw silage, straw returning to the field and other comprehensive utilization subsidies as well as straw collection, storage and transportation subsidies. (iii) Construction of straw collection, storage and transportation system. Straw collection, storage and transportation system construction is a straw collection, storage and transportation network and supporting facilities built in order to ensure the collection, storage and transportation of straw in the process of straw utilization. In order to encourage all kinds of social capital to invest in the construction of straw collection, storage and transportation system, Jinzhai County of Anhui Province adopts the collection and storage mode of "straw utilization enterprises + collection and storage station brokers + farmers". (iv) Construction of social service system. The construction of socialized service organization for comprehensive utilization of crop straw is a series of supporting policies adopted by local government in order to mobilize social subjects to participate in straw resource utilization. Dongming County of Shandong Province used 20% of the project funds for social service organization construction of straw comprehensive utilization. (v) Advanced award. The advanced reward is the local government's reward to the entities or related staff of straw comprehensive utilization demonstration, in order to give play to its demonstration driving effect and incentive effect. Tunxi District of Anhui Province gives cash rewards to enterprises representing Tunxi District to participate in the Anhui Straw Industry Expo. (vi) Subsidies for the purchase of agricultural machinery and tools. Agricultural machinery and tool is the key to improving comprehensive utilization efficiency of crop straw, such as field straw chopper, paddy straw tiller, hay cutter, baler and so on. In Zhao County, Hebei Province, the maximum amount of subsidies for the comprehensive utilization of straw agricultural machinery and tools is 50% of the equipment purchase funds.

### 4 Suggestions on policy formulation of crop straw in Xinjiang

In 2020, the annual crop straw production in Xinjiang reached 31.268 million t, and the straws of corn, cotton and

wheat reached 10.710 6 million, 9.322 5 million and 5.878 1 million t, respectively, accounting for 82.87% of the total<sup>[4]</sup>, showing great potential for comprehensive utilization of crop straw.

There are still problems in the comprehensive utilization of crop straw in Xinjiang. First, comprehensive utilization of cotton straw is performed in a single direction. Xinjiang has a huge output of cotton straw, but basically all of them are returned to the field, and the ratio of feed and fuel utilization is low, which is inconsistent with Xinjiang's policy of vigorously developing animal husbandry and reducing carbon emissions. Second, the scientific and technological content of comprehensive utilization of crop straw is insufficient, resulting in low benefit. The comprehensive utilization of crop straw in Xinjiang is mainly extensive processing and use, and it is not enough in fine processing and accurate use. Third, crop straw collection, storage, transportation and supply system is not perfect. The spatial pattern of crop straw storage and processing system construction in Xinjiang is not scientific enough, resulting in increased collection and transportation costs.

In view of the above problems, the following suggestions are put forward for the formulation of crop straw policy: (i) Increasing the policy support for scientific research investment and demonstration in cotton straw feed and fuel conversion, and improving the level of crop straw feed and fuel conversion in Xinjiang; (ii) increasing the policy support for the efficient use of crop straw, such as process research and equipment introduction of straw fine feed processing, straw gasification, straw materialization, *etc.*, to improve the added value of comprehensive utilization of straw; (iii) increasing policy support for construction of collection, storage and transportation system.

(From page 12)

5 Conclusion

Agricultural credit policy is an important part of China's agricultural and rural development, and it is also the foundation and guarantee to promote the rapid development of agriculture and rural areas. By analyzing the current situation of agricultural credit policy in Dingxi City, it is found that there are some problems in the process of implementing agricultural credit policy in Dingxi City, such as inconsistent implementation standards, insufficient innovation ability of agricultural credit policy, and inadequate publicity of agricultural credit policy. In order to improve the enthusiasm of farmers and micro-enterprises for loan, this paper puts forward some strategies and suggestions in view of the above problems. These suggestions can promote the publicity of agricultural credit policy in Dingxi City, enhance farmers' understanding of agricultural credit policy, and strengthen the role of agricultural credit policy in promoting agriculture, farmers and rural areas.

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