



# Sustainability of returning wheat straw to field in Hebei, Shandong and Jiangsu provinces: A contingent valuation method

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## ARTICLE INFO

### Article history:

Received 22 August 2018

Received in revised form

21 November 2018

Accepted 23 December 2018

Available online 27 December 2018

### Keywords:

Contingent valuation method (CVM)

Ordered choice model (OCM)

Returning wheat straw to field (RWSF)

Wheat straw utilization

Willingness to accept (WTA)

## ABSTRACT

In China, returning wheat straw to the field (RWSF) is the most popular way of utilizing wheat straw. RWSF can not only improve soil quality, but also help to control agricultural pollution from wheat straw burning. However, the increased production cost caused by RWSF reduces farmers' enthusiasm to adopt this approach. This study estimated farmers' willingness to accept compensation (WTA) for RWSF by using the contingent valuation method (CVM), and identified determinants that influence farmers' WTA by using an ordered choice model (OCM). It aimed to determine how much compensation should be given to farmers for encouraging them to adopt RWSF and which factors affect their WTA. The results showed that, currently, the increased cost caused by adopting RWSF was 743 RMB/ha, and which was fully burdened by farmers. Although more than 90% of the surveyed farmers adopted RWSF, only 3.8% of these farmers were willing to adopt RWSF voluntarily without any compensation. The farmers' WTA of adopting RWSF was 479 RMB/ha, and it was much higher than the current subsidy rate of 300 RMB/ha in Jiangsu, which could not effectively encourage farmers to adopt RWSF voluntarily. Farmers' WTA is not only positively affected by the increasing production cost caused by RWSF and negatively influenced by the benefits resulting from RWSF, but also restricted by social-economic characteristics such as age, education, income etc. It is costly for the Chinese government to subsidize all the farmers adopting RWSF, letting farmers to become aware of the long-term environmental value of RWSF is an effective measure to motivate them to protect environment responsibly by adopting RWSF. These findings are useful in improving the current provincial subsidy policies or designing new subsidy policies nationwide for RWSF, and helpful in encouraging farmers more sustainably adopting RWSF and promoting cleaner wheat production.

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## 1. Introduction

China is the largest country of wheat production as well as wheat consumption in the world. In 2015, 24 million ha of cropland was planted with wheat in China, and 130 million tons of wheat was produced (National Bureau of Statistics of China, 2016), accounting for approximately 1/5 of the total global wheat

production. On the consumption side, 114 million tons of wheat was consumed by China in 2015. Along with continuing population growth, the global demand for wheat will increase for at least another 40 years (Godfray et al., 2010), and China will consume 162 million tons of wheat by 2030 (Li et al., 2014), with an increase by 25% from 2015. This means that more wheat should be produced in the future.

A large amount of wheat straw are produced along with wheat production, and how can more wheat straw be utilized effectively? In 2015, 140 million tons of wheat straw was produced in China (National Bureau of Statistics of China, 2016). Wheat straw can be utilized as fertilizers, fodders, fuel, building materials, etc. (Sanchez and Royse, 2009; Liu et al., 2010; Zhang et al., 2014). On the other

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