An Empirical Analysis of Farmers' Rabbit Breeds Purchase and Its Influencing Factors

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Abstract In this paper, based on the survey data on farmers in 14 provinces and cities nationwide provided by China Rabbit Research System, we analyze the farmers' rabbit breeds selection, purchase channels and the demand for new varieties of rabbits as well as the problems in the course of rabbit usage. We make an empirical analysis of the factors influencing farmers' rabbit demand, and put forth the recommendations for farmers' rabbit breeds usage and to improve the promotion of new varieties of rabbits.

Key words Farmers, Rabbit breeds usage, Influencing factors

1 Introduction

The key to breeding rabbits lies in the selection of good varieties of rabbits. In terms of the technical level, although China has made certain achievements in rabbit breeding technology, the genetic breeding technology, modern breeding technology, product processing and other technologies need to be greatly improved. The rabbit breeding system seriously lags behind in China, lacking the supporting system with full intellectual property rights. From an entire agricultural view point, in the actual process of promoting agricultural technology in China, farmers' demand for technology is ignored, and the promotion work is out of joint with farmers' real demand. Therefore, fully understanding the farmers' demand for agricultural technology is of great significance. There are few studies of Chinese scholars on rabbit breeds demand, but the previous studies on farmers' technology needs provide a reference for this article. In general, the factors influencing farmers' demand for technology are divided into four categories: farmers' individual (family) features, technology - induced factors, risk attitude and information[1-2]. In terms of the method, scholars have mostly chosen binary Logistic model to analyze the factors affecting farmers' demand for agricultural technology. Taking oil-tea camellia cultivation industry in Guangdong Province as an example, Wang Hao (2012) analyzes the factors influencing farmers' demand for different types of technology, and finds that farmers prefer high - yielding technologies with immediate effect and there are different factors influencing their demand for different types of technology[3]. In addition, from the perspective of farmers' endowment, there are scholars studying the factors influencing farmers' demand for agricultural technology[4-5]. These studies play an important role in providing a reference for the selection of variables and choice of research methods. In this paper, based on the research and survey data on farmers in 14 provinces and cities nationwide conducted by China Rabbit Research System (CRRS) in 2012, we analyze the farmers' rabbit breeds selection, purchase channels and the demand for new varieties of rabbits as well as the problems in the course of rabbit usage, and make an empirical analysis of the factors influencing farmers' rabbit demand. On this basis, we put forth the strategies and measures for the promotion of high quality varieties of rabbit.

2 Data sources and descriptive analysis

2.1 Data sources The data used in this article are from the survey on farmers conducted by CRRS in 2012. The questionnaire involves farmers' basic situation, farmers' rabbit breeds purchase channels, factors affecting rabbit breeds purchase and demand for new varieties. The survey data are from 350 samples of 14 major rabbit-producing provinces and cities in China. After the examination and screening of data, 312 effective samples are finally selected, with effective sample rate of 89%.

2.2 Descriptive analysis The basic situation of farmer samples can be shown in Table 1. The average age of respondents is 44.23 years, the average area of rabbit farm is 7.99 mu (which is 0.52 hectare), and the average income is about RMB 380thousand yuan. The distribution of respondents is as follows: 91 in Southwest China; 100 in North China; 99 in East China; 22 in Northeast China. The number of rabbits purchased by the respondents annually is 170; 68% of farmers have a demand for introducing new varieties of rabbit.

2.2.1 Farmers' rabbit purchase channels. In order to understand farmers' specific usage of rabbit breeds, we survey their rabbit purchase channels. The survey finds that the breeding farm is the most important purchase channel. 72% of farmers purchase rabbits from the rabbit breeding farm, 35% of farmers breed rabbits on their own, and there is a relatively small proportion of farmers purchasing or breeding rabbits through other channels. The farmers exchanging rabbit breeds with others account for 16%, and farmers purchasing rabbits through mode of "company + breed-

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ers" only account for 6%.

Table 1 The basic situation of rabbit breeding farmers

Variables	unit	Value
Age	Year	44.23
Rabbit farm area	Hectare	0.52
Rabbit farm income	RMB thousand Yuan	380
Southwest China	No. of farmers	91
North China	No. of farmers	100
East China	No. of farmers	99
Northeast China	No. of farmers	22
Is there demand for new varieties of	1 = yes	212
rabbits	0 = no	100
Number of rabbits purchased annually		170

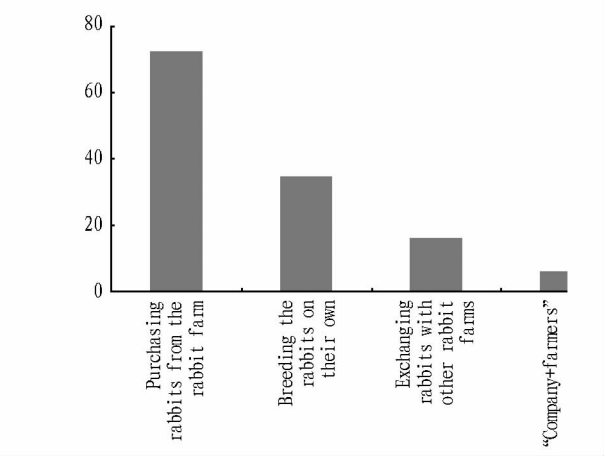

Fig. 1 Farmers' rabbit purchase channels

In field research and survey, we need to further learn more about the reasons for the farmers' choice of the above purchase channels. The main reasons include expert advice, farmers' experience and neighbor's recommendations. 50% of farmers choose the purchase channel due to the expert advice; 34% of farmers choose the channel based on their own experience; 21% of farmers choose the purchase channel following the neighbor's recommendations; 10% of farmers considers the purchase convenience; 5% of farmers choose the purchase channel randomly due to the lack of breeding techniques, seldom affected by media publicity; only 1% of farmers choose the rabbit purchase channels according to the media publicity.

2.2.2 The main factors that farmers consider when choosing rabbits. The survey shows that nearly 74% of farmers are concerned about rabbit breeding capacity, and 54% of farmers are concerned about rabbit breeding quality, indicating that the farmers are most concerned about rabbit breeding function; the rabbit price is not the most important factor affecting farmers' purchase, and only 36% of farmers mainly consider price factor; 12% of farmers mainly consider the convenience of purchase.

2.2.3 The services of cooperatives and agricultural technological organizations (ATOs) for the farmers' breeding or choice of rabbits. We focus on the survey of rabbit services of rabbit breeding

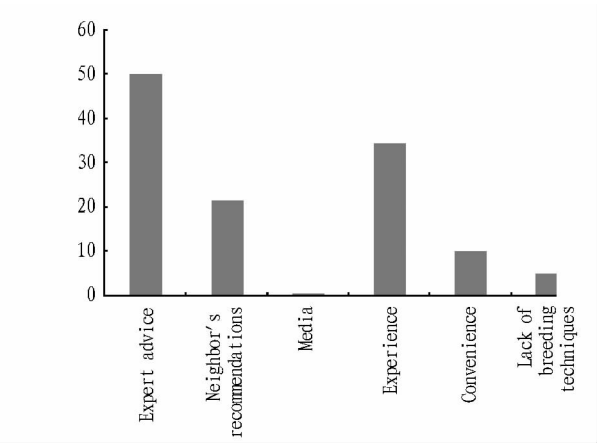

Fig. 2 The reasons for farmers' choice of rabbit purchase channels

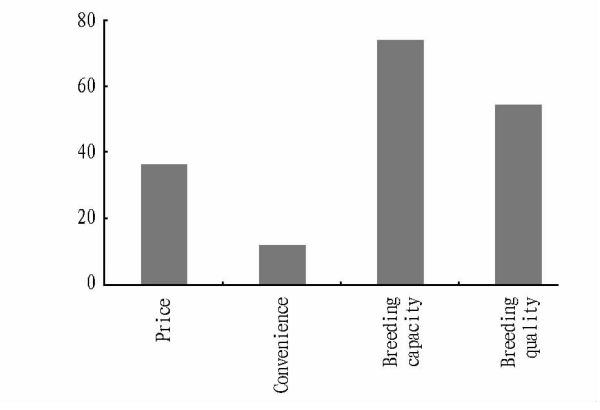

Fig. 3 The main factors that farmers consider when choosing the rabbits

cooperatives and agricultural technological organizations. Only 3% of farmers say that there are no special rabbit breeding cooperatives and agricultural technological organizations in local areas, and other farmers say that the cooperatives and agricultural technological organizations give support to rabbit breeding. From the survey, it is found that in terms of rabbit breeding or choice, the most important role of cooperatives and ATOs is variety recommendation, breeding technology guidance, and rabbit market information service, accounting for 56%, 54% and 45% respectively. 21% of farmers believe that the greatest help provided by cooperatives and ATOs to them is rabbit procurement service.

3 Empirical analysis

3.1 Model specification In this paper, we introduce a two-step way to analyze farmers behavior. In the first step, we build Logit model to test whether farmers choose new varieties of rabbits (1 = need; 0 = no need), and the form of model is as follows:

$$logit(p) = \ln(\frac{p}{1-p}) = \beta_0 + \beta \sum X_i + \varepsilon \quad (i = 1, 2, \cdots,)$$

where p is the probability of farmers having the need for new varieties of rabbits; $\frac{p}{1-p}$ is the ratio of the probability of farmers having the need for new varieties of rabbits to the probability of farm-

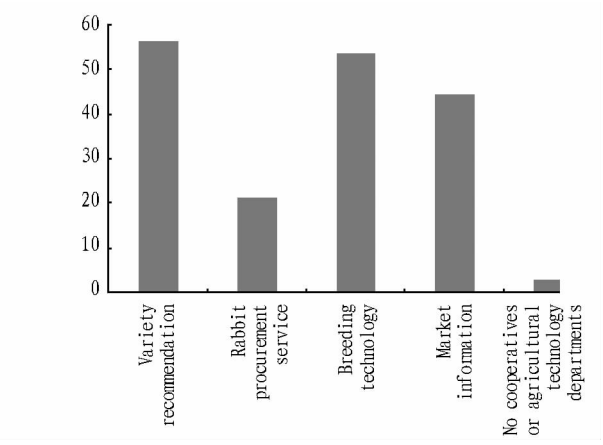

Fig. 4 The services of cooperatives and ATOs for the farmers' breeding or choice of rabbit breeds

ers having no need for new varieties of rabbits; ε is the random error term; X is the factor affecting farmers' need for new varieties of rabbits.

In this paper, we select the following variables: farmers' age, farm size, farm gross income in 2012, rabbit purchase channels, factors considered in the choice of rabbits, and the rabbit breeding guidance of cooperatives or agricultural technological organization. In the model, is the degree of influence of the independent variable X_i on the dependent variable farmers' need for new varieties of rabbits.

In the second step, we build multiple linear regression model to analyze the factors influencing the number of rabbits purchased by farmers, and the model is as follows:

$$y = a + \sum_{i=1}^{n} \beta_{Xi} + \varepsilon$$

where y is the dependent variable, representing number of rabbits annually purchased by farmers; the independent variable X_i represents the factor affecting number of rabbits purchased by farmers; a and β_i are parameters to be estimated; ε is the random error term. Based on related literature, here we select the following variables: farmers' age, farm size, farm gross income, rabbit purchase channels, factors considered in the choice of rabbits, and the rabbit breeding guidance of cooperatives and ATOs.

3.2 Results

3.2.1 Factors influencing farmers' demand for new varieties of rabbits. In this paper, we use Eviews 6.0 to perform the Logit model test, and the results are as shown in Table 2.

Table 2 Model estimate results of factors influencing farmers' demand for new varieties of rabbits

	Variable	Coefficient	*Z*-value	*P*-value
	C	-1.732 9	-1.993 2	0.046 2
Rabbit farm features	Farmers' age	0.052 1	3.197 3	0.001 4
	Rabbit farm area	-0.002 0	-0.324 6	0.745 5
	Rabbit farm income	0.001 0	0.271 8	0.785 7
Factors considered in the choice of rabbits	Breed price	-1.135 1	-3.217 7	0.001 3
	Breeding capacity	0.272 3	0.756 5	0.449 4
Guidance of cooperatives and ATOs	Variety recommendation	1.779 3	4.315 1	0.000 0
	Rabbit purchase service	1.551 1	2.713 5	0.006 7
	Technical guidance	-0.060 5	-0.174 6	0.861 4
	Information service	-0.173 0	-0.521 2	0.602 2
Regional factors	North China	1.103 5	1.834 0	0.066 7
	East China	-0.852 3	-1.507 6	0.131 7
	Southwest China	-2.093 0	-3.052 8	0.002 3

From the results, it can be seen that the main factors influencing farmers' demand for new varieties of rabbits include farmers' age, breeding price, and the rabbit breeding guidance of cooperatives and agricultural technological organization. In addition, there are also differences across regions.

(i) The rabbit farm features have significant impacts on farmer's behavior. The coefficient of farmers' age is significantly positive, indicating that the breeding experience has a positive impact on the demand. The rabbit farm size and rabbit farm income are not significant, indicating that rabbit farm size and rabbit farm income are not the main factors affecting farmers demand for new breeds.

(ii) Among the factors considered in the choice of rabbits, the breeds price has a significant impact, with the coefficient of -1.14, indicating that the higher the breeds price, the smaller the demand for new varieties. The rabbit breeding capacity is not significant, indicating that the existing rabbit breeding capacity has no significant impact on farmers' demand for new varieties of rabbits.

(iii) The guidance of cooperatives or ATOs on rabbit breeding also has certain influences on farmers' demand for new varieties of rabbits. The model results show that the rabbit variety recommendation of cooperatives or ATOs has a positive significant effect, indicating that cooperatives and agricultural technological organization play an important role in variety guidance for farmers. The rabbit procurement service of cooperatives and ATOs also promotes farmers' demand for the new varieties. The rabbit technical guidance and rabbit information provision of cooperatives and agricultural technological organization for farmers have no significant impact on the demand for new varieties of rabbits. This indicates that the most effective services provided by cooperatives and ATOs on rabbit breeding are variety recommendation and rabbit procurement for farmers.

(iv) From the test results of regional variables, farmers' de-

mand for new varieties of rabbits shows significant regional differences.

3.2.2 Results of factors influencing the quantity of rabbits purchased by farmers. From the model estimate results in Table 3, the main factors affecting the number of rabbits are rabbit farm features, while rabbit acquisition channels, and factors considered in the choice of rabbits have no significant impact.

(i) The impact of rabbit farm features on the number of rabbits is significant. The farmers' age, rabbit farm area and rabbit farm income pass the test, and these three factors are significant, with the coefficients of 3.03, 1.05 and 3.13, respectively, indicating that the rabbit farm income has a very significant effect on the purchase quantity. The larger the rabbit farm, the larger the number of rabbits annually purchased by farmers. The impact of age indicates that the experience has a positive impact on the purchase of rabbit breeds.

(ii) The rabbit acquisition channels and the factors considered in the choice of rabbits do not pass the test, indicating that the impacts of these factors are not significant. Variety recommendation from cooperatives and ATOs positively affects farmer's behavior, however, rabbit breeds purchase service from cooperative or ATOs are not significant. The role of this factor need be further explored in future studies.

(iii) The test results of regional variables show that there are regional differences, and especially the Southwest of China is the largest rabbit breeding area, with obvious geographical features.

Table 3 Model estimate results of factors influencing the number of rabbits introduced by farmers

	Variable	Coefficient	T value	Probability
	C	-99.5188 3	-1.1833 46	0.237 6
Rabbit farm features	Farmers' age	3.034 292	2.080 347	0.038 3
	Rabbit farm area	1.054 283	1.777 713	0.076 5
	Rabbit farm income	3.139 192	9.298 08	0.000 0
Rabbit acquisition channels	Breeding by farmers themselves	22.979 74	0.726 188	0.468 3
	Exchanging rabbits with other rabbit farms	-29.261 57	-0.740 677	0.459 5
Factors considered in the choice of rabbits	Breeding price	-21.169 32	-0.679 703	0.497 2
	Breeding capacity	-25.619 65	-0.778 224	0.437 1
Guidance of cooperatives and ATOs	Variety recommendation	-64.757 25	-2.047 234	0.041 5
	Rabbit purchase service	-65.680 16	-1.399 138	0.162 8
Regional factors	North China	47.381 3	0.787 584	0.431 6
	East China	68.964 85	1.138 455	0.255 8
	Southwest China	151.783 1	2.300 722	0.022 1

4 Conclusions and recommendations

4.1 Conclusions In this paper, we conduct the empirical analysis of the factors affecting farmers' purchase for new varieties of rabbits and the factors affecting their behaviors. Studies show that rabbit farm features, factors considered in the choice of rabbits, rabbit breeding service and guidance of cooperatives or ATOs for farmers and regional differences have different impacts on farmers' rabbit demand. The factors affecting farmers' demand for new varieties of rabbits include farmers' age, breeds price, rabbit varieties, rabbit recommendation from cooperatives or ATOs, purchase service and regional differences. The support from cooperatives or ATOs has great impacts on farmers' demand, but rabbit farm features do not. However, the main factors affecting the purchase quantity are rabbit farm features (farmers' age, breeding scale and rabbit farm income). The rabbit acquisition channels and factors considered in the choice of rabbits have no significant impacts. The rabbit variety guidance from cooperatives and ATOs has negative impacts on the introduction of rabbit breeds.

4.2 Recommendations

4.2.1 To support the development of cooperatives. Through the above analysis, it is found that cooperatives play significant role in promoting new varieties of rabbits and providing the rabbit purchase services to farmers. Therefore, the government should give cooperatives high priority and tap the potentials of cooperatives so as to protect the vital interests of rabbit raisers.

4.2.2 To stabilize breeds price. Based on the analysis of factors affecting the demand for new varieties of rabbits, the breed price affects farmer's behaviors significantly. Therefore, market ways should be found to stabilize rabbit breed price. These ways include providing price and related information promptly, helping farmers to make production decision, encouraging farmers to organize etc.

4.2.3 To strengthen demonstration of older farmers. The results show that age is a significant factor affecting farmer's decision whether to purchase new breeds. Therefore, in order to improve the marketing and extension of breeds government should select certain older farmers to publicize their performance. This can guide other farmers to make scientific decision.

4.2.4 To give high priority to southwest area. The results illustrate that southwest area is key region; this area is also the major producing area of rabbits and its products. Therefore, southwest region should be given higher priority, especially Sichuan province and Chongqing city etc.

4.2.5 To help farmers reduce cost and increase income. From the results we can see that during the decision of whether to buy the guidance from cooperative or experts is significant. However, in the quantity decision model the guidance from the cooperative or experts is not significant, but income plays significant role. This shows that income is the ultimate determinant. Government should help farmers to make use of local resources so as to control cost, and help farmers to explore market through promoting so as to increase their income and profit.

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income; c) ASPs had positive effect on the growth of disposable farmers' income; d) the transferring rate of ASPs to farmers' income was low. This was mainly due to the large rural population in China.

5 Policy recommendations

Oriented from the analyzing summary above, the recommendations for future China ASP policies are proposed.

5.1 Promoting the level of ASPs to increase the farmers' income The current ASP system in China, which is constituted by four subsidies, minimum purchasing prices on grain and wheat, has a positive effect on promoting the farmers' income. However, due to the large population in China' rural area, the level of ASP on each farmer is low. The effect of ASP on decision making in agricultural production is limited. According to the commitment of China to WTO, the agricultural support value cannot exceed 8.5% of total value of production. The current support level is far below that limit. Thus, to ensure the food security, it is necessary to encourage the farmers to increase grain production, accomplish the industrialization, and avoid falling into the middle - income country trap. China has to promote the level of agricultural support constantly.

5.2 Adjusting the type of support and focusing on GSSE In 2012, the weight of PSE on farm's income was 15%, which was approaching the average level of OECD members of 19%. Weights in Japan, South Korea in Asia and some countries with self - sufficiency targets are much higher than this level. Although China's ASP levels do not reach this level and not even mention to reduce the support like developed countries, it should be noticed from the perspective of the long term. Concentrated limited financial resources on grain, and GSSE support can optimize the agricultural support structure in China, and improve the consistent development and competition of agriculture in the future.

5.3 Stabilizing the polices as laws In US, EU, Japan and other developed countries, ASPs are made and implemented as laws. Besides, there is a certain amount of budget proposed along with each policy. These policies cannot be amended due to external factor changes. The consistency of policy ensures the implementation of them and the forecast of agricultural producers. Taking Japan as an example, in 1999, it proposed the new general agricultural support policy as Basic Law of Food, Agriculture and Rural Areas. It is required that a plan has to be made every five years to ensure the implementation of the law. In 2000, 2005 and 2010, three Basic Plan of Food, Agriculture and Rural Area were launched sequentially. China can borrow the experience from these countries, complete the law system on agricultural support policies and avoid the low efficiency or waste due to the large and complex administration system.

5.4 Accelerating the process of urbanization Large rural population held back the level of the agricultural support in China. Thus, reducing the number of farmers can help to increase their income at the same level of support. Although the labor transfer from rural to urban areas may lead to many other problems, such as social security system, social stability, reducing number of rural population is a trend in the process of industrialization, and it could contribute to the growth of farmers' income.

5.5 Establishing evaluation systems for policies China has not reached the stages to reduce agricultural support. However, reasonable and proper level of support has to be monitored to promote the efficiency of government budget. Evaluation systems for policies are needed and experience from developed countries can be borrowed to set the level of support. Government will not burden unnecessary stresses and the agricultural producers will also not rely heavily on agricultural support in the long term.

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