

# Analysis of Investigation on Ebian Spotted Cattle and Suggestions

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**Abstract** Ebian spotted cattle has the ability to adapt to the local natural ecological environment, and is one of the excellent local cattle breeds in Sichuan. Ebian spotted cattle is a breed of cattle for both service and meat use and formed through long-term natural selection and artificial selection. Because of the weak development and utilization of this breed, the economic benefits of excellent breeds have not been fully brought into play, and farmers' enthusiasm in breeding is poor, so that the number of Ebian spotted cattle has reduced year by year. In order to strengthen the protection, development and utilization of Ebian spotted cattle as a local excellent breed, combined with the third national survey of livestock and poultry genetic resources in 2021, Ebian spotted cattle was investigated, and a comprehensive, scientific and objective analysis of its population numbers was conducted. Besides, reasonable suggestions were put forward.

**Key words** Ebian; Ebian spotted cattle; Local fine varieties; Quantity; Analysis; Suggestions

Ebian Yi Autonomous County is located in Xiaoliangshan District in the southwest of Sichuan Province, and adjacent to Liangshan Yi Autonomous Prefecture and Mount Emei (a famous Buddhist tourist resort). It is the central producing area of Ebian spotted cattle. In recent years, due to the weak development and utilization of this breed, the economic benefits of excellent breeds have not been fully brought into play, and farmers' enthusiasm in breeding is poor, so that the number of Ebian spotted cattle has decreased year by year. If some scientific and effective measures to protect the breed are not taken, the degradation of Ebian spotted cattle, an excellent local breed, will be accelerated, so that Ebian spotted cattle will become an endangered species resource.

## Basic information

### Formation of the breed

Ebian spotted cattle is a breed of cattle for both service and meat use and formed through long-term natural selection and artificial selection of Yi people<sup>[1]</sup>. It can adapt to the local natural ecological environment, and is one of the local breeds with excellent livestock and poultry genetic resources in Sichuan Province. It has been raised for more than 100 years. Previous studies on the hemoglobin polymorphism of Ebian spotted cattle showed that Ebian spotted cattle are a separate type separated from the original local cattle herd, and the relationship between Ebian spotted cattle, Hainan cattle and Nanyang cattle is very close<sup>[2]</sup>.

Ebian spotted cattle was listed in the *Annals of China Cattle*

*Breeds and List of Livestock and Poultry Resources Not Being Exported* in 1986. In 1987, Ebian spotted cattle was included in the *Annals of Livestock and Poultry Breeds in Sichuan*. During the second national survey of livestock and poultry breeds in 2006, Ebian spotted cattle was listed in the *List of Protected Livestock and Poultry Germplasm Resources in Sichuan Province*.

### Central producing area and distribution

The center production area of Ebian spotted cattle in Ebian Yi Autonomous County, and it is distributed in the surrounding Mabian County, Jinkouhe District, Hanyuan County, Ganluo County, Meigu County and other places. In Ebian, ebian spotted cattle is mainly concentrated in Lewu Township, Heizhugou Town, Jinyan Township, Dabao Town, Hongqi Town, Xinlin Town and other areas, and also scattered in other townships.

### Basic natural conditions of the central producing area

Ebian Yi Autonomous County, which is located between the Sichuan Basin and the Yunnan – Guizhou Plateau, is a typical mountain area. In the county, the area of woodland is about 184 666.6 hm<sup>2</sup>, and forest coverage rate is 78.8%, ranking first in the province. It covers an area of 2 382 km<sup>2</sup>, and has jurisdiction over 13 townships. In the county, the elevation of the main peak of Ma'anshan is the highest, up to 4 288 m, while the lowest elevation is 469 m. The quantity of Ebian spotted cattle is also gradually increasing from low altitude to high altitude, and it is mostly concentrated in middle mountain areas.

Ebian Yi Autonomous County has a subtropical humid monsoon climate. The temperature varies with the altitude, and the vertical difference is obvious. It has characteristics of abundant rainfall, more clouds, high humidity, less light, long frost-free period, four distinct seasons, late spring, short summer, early autumn, and long winter. The annual average temperature is 16.5 °C, and the annual average precipitation is 800.9 mm, while the annual average sunshine hours are 1 049 h. The soil is mostly sandy, and organic matter content is between 1.1% and 2.9%. The main food crops are corn, rice, potato and small grains.

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## Physical features

Ebian spotted cattle has a characteristic coat color, and mainly have yellow and white flowers and black and white flowers, very few yellow, black and white three colors, and dots or blocky spots can be distributed on the whole body. Among the local cattle breeds, Ebian spotted cattle has a medium size. The bull is sturdy, and has strong sense of muscle and wide and thick head, while some have hump. The cow is symmetry, and has narrow long head. It has developed dewlap, and most cattle have horns, while some have no horns. Due to a long history of hillside grazing, it is agile, and can move and feed on steeper hills.

## Feeding management and population change

The breeding structure of Ebian spotted cattle is basically divided into peasant breeding, large household breeding and breeding in Ebian spotted cattle farms. The number of Ebian spotted cattle bred in the farms is about 150, and the feeding and management method is the combination of grazing and enclosure feeding. It is grazed from April to November, and taken care of every day; the temporary cattle sheds in the grazing area are supplemented with salt. From December to next March, it is enclosed for fine feeding management. Each large breeding household raises 20 – 80 heads, and a few households raise around 100 heads. The feeding mode is mainly grazing feeding, It regularly goes up the mountain to supplement salt. Only in winter after the cattle go down, grazing management and supplement feeding are conducted around the colony house. Free-range farmers raise less than 20 heads, and feeding management is based on free range. It is enclosed in the colony house overnight sometimes. In winter, it is also grazed and fed in low mountain areas.

The number of Ebian spotted cattle in Ebian changed from more than 3 500 in 1985 to more than 7 400 in 2005<sup>[3]</sup> and then to more than 3 400 in 2021.

## Quantity change

The change in the number of Ebian spotted cattle groups in Ebian reflects the change of farmers' breeding concept, market demand and policy guidance to some extent.

In the 1970s and 1980s, due to the traditional concept of breeding and eating, the awareness of germplasm resource protection was weak, and the understanding of resource value was not high. In order to solve the problem of people's food and clothing and meet the needs of meat, eggs and milk, a large number of foreign varieties were introduced in China, resulting in a sharp reduction in the number of pure local varieties. After entering this century, many species resources in China have become endangered resources, and the protection of germplasm resources has gradually been put on the agenda. Therefore, various localities issued corresponding policies to give incentive protection, and Ebian spotted cattle is also included. Under the stimulus and guidance of policies and measures of governments and competent departments at all levels, the number of Ebian spotted cattle has been greatly improved. The conservation area for Ebian spotted

cattle was established in 2012, and the breeding farm of Ebian spotted cattle was built in 2015. In recent years, the problem of people's food and clothing throughout the country has been comprehensively solved, and farmers have begun to pursue the economic benefits of breeding. Ebian spotted cattle is bred under the same stocking mode, with a long feeding cycle and low economic benefits, so that many farmers introduce varieties with fast growth, short feeding cycle and high economic benefits to replace Ebian spotted cattle or carry out mixed culture and hybrid improvement. As a result, the population of Ebian spotted cattle has gradually declined.

## Suggestions

### Establishing a joint linkage mechanism between departments at all levels

**Provincial, municipal and county government departments** The breeding work of Ebian spotted cattle is aimed at farmers and breeding farms of Ebian spotted cattle in the county. Ebian spotted cattle breeding has always been in a state of loss, which greatly affects farmers' breeding enthusiasm. Breed preservation and breeding work requires a large amount of supporting funds, and research on breeding and improvement need to be supported by funds. In order to improve the breeding enthusiasm of farmers and ensure the normal development of breed preservation work and related scientific research work, governments at all levels should attach great importance to it. Combined with the actual situation of Ebian spotted cattle breeding, protection and scientific research and cultivation in Yi area, it is recommended that provincial governments should increase the financial support for the protection and scientific research and cultivation of Ebian spotted cattle, and city and county governments provide supporting policies and funds to ensure the smooth progress of relevant work.

**Research institutes and universities** There are few studies on quality inspection and breeding and improvement of Ebian spotted cattle, and even less scientific and technological achievements. To guide the grassroots to carry out breed preservation, cultivation, development and utilization work smoothly, scientific research institutes and colleges can give practical programs, and it is recommended that major scientific research institutes and colleges actively carry out research and analysis on the development and utilization of Ebian spotted cattle varieties, maintain good communication with the local competent authorities, and give reasonable guidance programs based on the actual situation at the grassroots level. Scientific research institutes should establish gene banks to incorporate high-quality frozen semen, frozen embryos and other genetic materials (tissues, cells, genetic material, *etc.*) into the preservation and management to provide guarantee for future scientific research and cultivation and ensure that the genes of Ebian spotted cattle are not lost.

**Management department of animal husbandry industry** The traditional management of Ebian spotted cattle breeding in Yi area of Ebian County has no economic benefits, and farmers often introduced other breeds for mixed breeding, which brings great

difficulties and challenges to the breeding work of Ebian spotted cattle. In order to ensure the smooth development and reasonable development and utilization of breeding work, it is suggested that the management department of livestock industry should communicate with provincial and municipal scientific research institutes and universities, formulate and utilize scientific and reasonable plans for breed preservation, breeding, development and utilization, strengthen the strict management of protected areas and breed preservation farms, allocate the number of groups, rationally arrange breed preservation subsidy funds, adopt modern science and technology to supervise and manage breed preservation groups, build experimental breeding bases for cultivation and improvement outside the protected areas and breed preservation farms, intensify publicity for breed preservation and development, introduce enterprise capital, and take effective measures to promote the increase, cultivation, development and utilization of Ebian spotted cattle to achieve the dual tasks of breed preservation, development and utilization.

**Reserves and breeding farms of Ebian spotted cattle** Due to the impact of benefits, the management of reserves and breeding farms of Ebian spotted cattle is difficult, and the confidence is insufficient. In order to maintain the development of breeding quantity and purity in a good direction, the government should increase subsidies and policy support, while farmers and breeding farms in the protected area should obey the leadership and arrangement of the government and industry authorities, strengthen the scientific management and breeding of Ebian spotted cattle, eliminate the weak and sickly Ebian spotted cattle in time, improve the number and purity of Ebian spotted cattle, and realize the purpose of living gene preservation in protected areas and breeding farms.

**Breeding farmers** The breeding farmers in the protection area shall conduct breeding in strict accordance with the requirements of the government and the competent authorities of the industry, and strictly prohibit the introduction of other varieties for mixed culture or hybridization, so as to maintain the purity and quantity of varieties. It is suggested that non-protected areas in the township where the protected areas are located should carry out captive hybridization on the basis of maintaining the number, and the hybrid offspring can not be kept for breed use in the township, and other rural farmers in the non-protected areas can carry out reasonable development and utilization.

#### **Development and utilization suggestions**

The purpose of breed conservation of Ebian spotted cattle is for the future development and utilization, and breed conservation should be combined with development and utilization, namely promoting the development with breed conservation, promoting breed conservation with the development.

**Government-led cultivation and improvement** Under the leadership of the government, a breeding system should be established in the protected area, and mixed culture and hybridization should not be carried out. Experimental bases for breed breeding

and improvement should be set up outside the protected area. Breeds with distinctive advantages such as similar size, fast growth and good meat quality should be selected and introduced for hybridization and improvement. It is needed to collect and analyze the hybrid advantages, breed hybrid varieties, introduce the market-oriented commodity cattle varieties after comprehensive evaluation, and formulate a feasible breeding and feeding method.

**Participating together to build a brand** It is necessary to encourage large breeding farmers, cooperatives and enterprises to undertake the cultivation and breeding of commodity cattle, form a production and breeding mode of "enterprises + cooperatives + farmers", jointly create characteristic brands with the help of the government, cultivate and set up sales stores, form a one-stop mode of cultivation, production, breeding and sales, expand the breeding group, and maintain market supply.

**Improving the number and conducting ecological farming** The reasons why Ebian spotted cattle is difficult to promote breeding and increase the number are mainly that the growth rate is slow, and the sales price is no different from that of ordinary yellow cattle. First of all, it is needed to take measures to increase the number of bred cattle, make use of the beautiful environment of Ebian and people's consumption demand to carry out scientific and reasonable breeding, vigorously publicize scientific and ecological breeding, increase the sales price, and encourage farmers to enhance the confidence of breeding, so as to increase the number of bred cattle.

## **Conclusions**

To sum up, changes in the number of Ebian spotted cattle are greatly affected by economic benefits and government support. In order to effectively protect, develop and utilize Ebian spotted cattle, it is necessary to rely on active coordination and communication among governments and departments at all levels, establish linkage mechanism, formulate reasonable and effective protection, development and utilization plans, and carry out relevant work around this goal for a long time. Led by the government, enterprises should participate in building brands, developing marketing strategies, and improving the number and income of farming, thus forming a virtuous cycle of promoting the development with breed conservation, promoting breed conservation with the development.

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