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Presenter Information

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Overview of grassland and its development in China

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Key points :

1. About 400 million hectares of grasslands occur in China, which accounts for 41.7% of the country's total land area. Various types of grassland/rangeland are represented in China with abundant forage plant resources, but productivity varies significantly among different types of grassland.
2. Since the 30 years of reform and opening up, material progress has been seen in protecting the grassland in China. The grassland law and regulations have been accomplished, the grassland management official teams have been enlarged, large projects implementation in grasslands have benefited the area significantly, the grassland economy has been growing fast, and the ability in science and technology has been increased.
3. Several challenges of grassland development need attention for the development of a grassland industry, including the severe situation of grassland ecology, the marked contradiction between grassland protection and utilization, over population and shortage of grassland resources, the unreasonable exploitation of grassland, the underdeveloped mode of production in stockbreeding system, and the natural calamities in grassland area, etc.
4. China has drafted the developmental strategy of grasslands to define the objectives and steps needed in the future in order to protect and utilize grassland resources in a reasonable way.

Key words : grassland, protection, development, science and technology, development, strategy

Resource of grassland in China

1. Area and distribution

China is a country with a large area of grassland. There are about 400 million hectares of grassland, which account for 41.7% of the country's total land area, 2.5 and 3.3 times that of forest and arable land, respectively.

If we draw a line in the map of China from the Great Xingan Mountain areas to the east side of Tibet-Qinghai Plateau, we can see two parts of China, the northwest part and the southeast part. The grassland is mainly located in the northwest area, which mainly contains mountains and plateaus in the arid and semi-arid pastoral areas. The 320 million hectare of grassland in this region accounts for 80% of the country's total grassland area. The southeast part, however, is mainly hilly grassland covering 80 million hectare, accounting for 20% of the country's total grassland. About 75% of the grassland is distributed in the arid and semi-arid pastoral areas, including Tibet, Inner Mongolia, Xinjiang, Qinghai, Sichuan and Gansu, of which Tibet has the largest grassland area with about 82.05 million hectare, then Inner Mongolia with 78.80 million hectare, Xinjiang with 57.26 million hectare, Qinghai with 36.3697 million hectare and Gansu with 17.9042 million hectare (Figure 1). The south part of China is mainly the agriculture area with few grasslands.

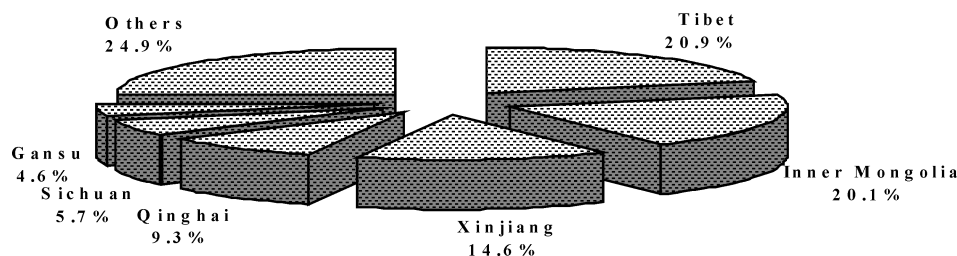


Figure 1 Area proportion of China main grassland region.

2. Grassland types and resources

China, with a vast territory, encompasses the tropical, subtropical, warm-temperate, mid-temperate and cold-temperate types from south to north. The annual precipitation decreases from 2000 mm in southeastern coast to below 50 mm in the west, while the altitude increases from 100 m below sea level to more than 8000 m above. These complex and diverse natural conditions form a rich variety of grassland.

According to the standards for Chinese grassland classification, it can be divided into 18 categories, namely temperate meadow, temperate steppe, temperate desert grassland, temperate grassland-like desert, temperate desert, alpine meadow, alpine

grassland , alpine meadow-like grassland , alpine desert grassland , alpine desert , warm tussock , warm shrubby tussock , tropical tussock , tropical shrubby tussock , drought hot tree-less grassland , lowland meadow , maintain meadow and marshes . The area of alpine meadow is largest with 63 .72 million hectares ,accounting for 16 .2% of the country's total grassland , following the temperate desert , alpine grassland , temperate steppe , lowland meadow , temperate desert grassland and others with 45 .06 , 41 .62 , 41 .09 , 25 .22 , 18 .92 million hectares ,accounting for 11 .5% , 10 .6% , 10 .6% , 6 .4% , 4 .8% of the country's total grassland , respectively . The remaining 12 types of grassland are 40% .

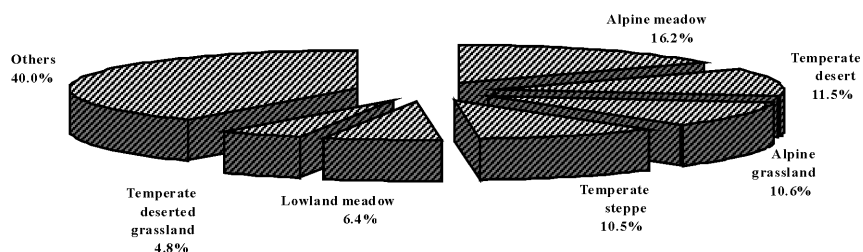


Figure 2 Ratio of Chinese grassland types .

3 . Forage plant resource of grassland

There are 6704 forage species belonging to 1545 genera and 246 families . According to the statistics on forage families in China , there are 100+ species in Legume , Grass , Composite , Sedge , Rose , Goosefoot , Lily and Knotweed families , whilst 1238 and 1148 species belong to the Legume and Grass families , respectively .

Table 1 Forage resources in Chinese grassland .

family	species	Proportion%
Legume	1238	18 .47
grass	1148	17 .13
Composite	538	8 .03
Sedge	358	5 .34
Rose	230	3 .43
Goosefoot	198	2 .95
Lily	195	2 .31
Knotweed	143	2 .13
Others	2578	40 .34
Total	6704	100

4 . Grassland productivity

According to the statistics of Ministry of Agriculture , the average annual hay production of China in 2007 was about 760 kg/ha , and the livestock carrying capacity was 0 .59 sheep unit/ha . The Strategies for utilization and protection of the grassland separates grassland in China into four parts which are semiarid and arid region in the north , the semi-humid and humid region in the northeast , the Tibetan Plateau high-cold region , and the meadow and steppe in the south . The arid and semiarid region is located in northwest China ,northern area of north China , and westen area of northeast China with the annual precipitation below 400 mm . Precipitation also following an east-west-trend , which is the same trend of productivity . The types of grassland are mainly temperate steppe , temperate desert grassland , temperate desert . The annual hay productivity is 200-1000 kg/ha with a livestock carrying capacity of 0 .2-0 .5 sheep unit/ha . The semi-humid and humid region in the northeast has favorable water/thermal elements with annual precipitation above 400 mm and also has high vegetation cover , good grass quality and high productivity . The grassland type is mainly temperate meadow , warm tussock and warm shrubby tussock . The annual hay productivity is 1000-1800 kg/ha with a livestock carrying capacity of 1 .0-1 .6 sheep unit/ha . The Tibetan Plateau high-cold region located in the Tibetan Plateau with the altitude above 3000 m , has low productivity due to the elevation , short frost free periods and cold temperatures . The grassland type is mainly alpine meadow , alpine grassland and alpine desert . The annual hay productivity is 100-300 kg/ha with a livestock carrying capacity of 0 .1-0 .3 sheep unit/ha . The meadow and steppe in the south China has a relatively warm climate and rich water resources with annual precipitation above 1000 mm . The growing season is long and the productivity is high . The grassland type is mainly tropical tussock and tropical shrubby tussock . The annual hay productivity is 2000-3000 kg/ha with a livestock carrying capacity of 2 .0-2 .5 sheep unit/ha .

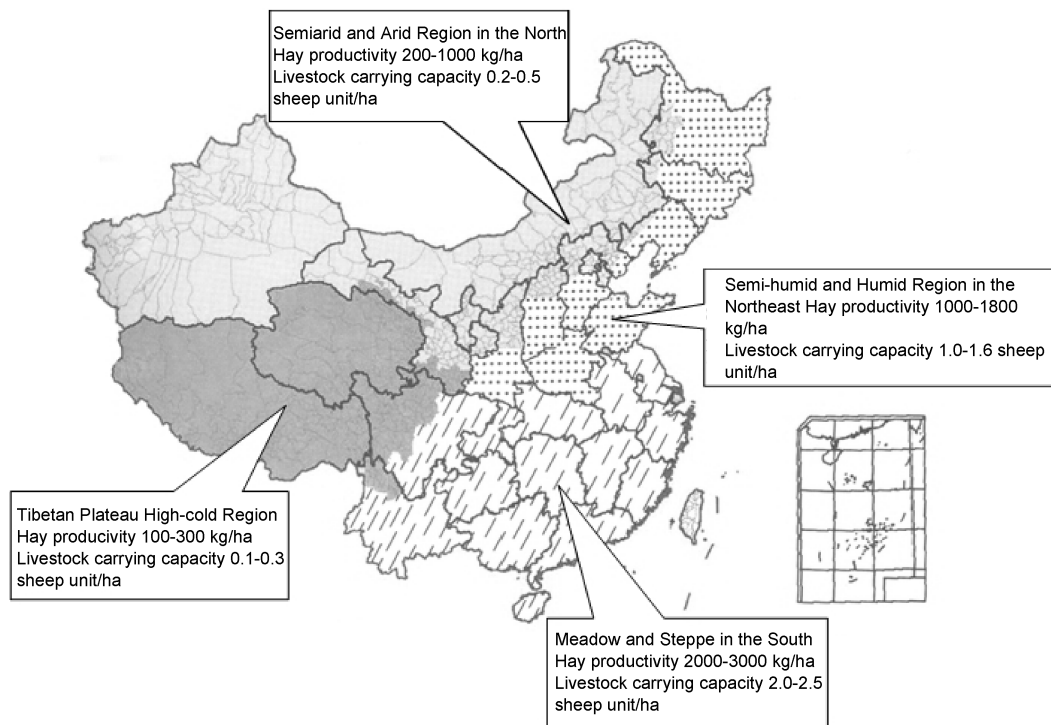


Figure 3 Carrying capacity pattern chart of different grassland classes .

Grassland conservation and development

In order to protect the grassland and to improve the grassland environment , the national government has been paying more attention to grassland conservation and development . Since the reform and opening up , especially the entry of the new century , there are marked progresses in grassland conservation and development .

1 . Grassland law and regulation development

Since the building of the legal system in China , the first " Grassland Law " was promulgated in 1985 , and amended in December 2002 . The Ministry of Agriculture introduced the " the management of grass and livestock " and " practices of grass seed management " , the " management of levy review and approval of grassland requisition " , the " management of collecting licorice Ephedra grass " and some relatively supporting laws and regulations . Inner Mongolia , Heilongjiang , Sichuan , Ningxia , Gansu , Qinghai , Tibet , and other provinces introduced regulations on the grassland area . At present , the improved grassland law and regulation have been developed , providing legal basis for the grassland management and protection .

In addition , a series of laws concerning the grassland resources and ecosystem protection have been unveiled in China during this period , including " environmental protection law " , " law of preventing and controlling sand " , " agricultural law " , " pastoral law " , " law of rural land contract " and " wildlife protection law " . These laws provide specific stipulations for the grassland protection and management in various areas .

2 . Grassland organization policies

Since the 1980s , the national government has implemented the household contract system in grassland as a basic policy . It gives the farmers and herders the right to operate their grasslands independently . Farmers and herders have the initiative of protecting as well as reasonably utilizing the grassland , which shows their main role in grassland protection and development . At present , 70% of the whole available grassland area is in the household contract system .

The policy for grassland protection , forage and animal balance and banning grazing has been implemented by the national government in order to perfect the management policies . Some concrete measures of improving grassland productivity have also been put forward . At the same time , mechanisms for ecological compensation and resources utilization have been sent forward .

3 . Management team development

The governments at all levels are responsible for the management of grassland in China . Since 2003 , grassland monitoring and

management has been gradually established and improved from banner (County) to provincial and Central governments in the management system . At present , more than 794 grassland monitoring institutions are located in the country , including national level 1 , provincial level 24 , prefectures-level 116 , county level 653 , and almost 10 ,000 grassland Supervisors . Most of these institutions were established after the " Grassland Law " was amended and passed in 2003 . Grassland management agencies at all levels combat all kinds of illegal destruction to grasslands making them an important force in protecting grasslands . According to statistics from 2003 to 2007 , nearly 50 ,000 cases of illegal activities occurred , the rising trend of such cases was curtailed effectively . At the same time , a support team for the development of a grass system has also been initiated . The nationwide number of above county level grassland technology promotional agencies is over 900 , and the technical promotion staff is over 10 ,000 . The three agencies , namely the grassland management agency , the law enforcement monitoring agency and the techniques extension agency , perform their duties and cooperate with each other to promote the development of Chinese grassland management .

4 . Project development on grassland

Since entering the new century , the national government has been adhering to the scientific development concept and increasingly investing in the grassland protection . Since 2000 , the central government has invested more than 10 billion RMB to grassland vegetation recovery including grass seed bases establishment , grassland fencing , grazing ban on heavy degraded areas , and sandstorm control around Beijing and Tianjin . The project of vegetation recovery was initiated in Inner Mongolia , Sichuan , Yunnan , Gansu , Qinghai , Ningxia , Xinjiang , Tibet , Guizhou , Xinjiang , and 8 .5 billion RMB was invested from 2003 to 2007 . Prior to 2007 , the paddock area was 38 million ha , sown pastureland was 10 .86 million ha and over 16 million ha were occupied by improved grassland . Several major developmental projects have achieved positive ecological , economic and social benefits and have promoted the transition of production methods . With the implementation of the project , the grassland and livestock grazing balancing system , the improvement of livestock breeds and upgrading of management level have been implemented at the same time . At present , the country has 20% of the grasslands under a grazing banning system and the vegetation recovery has been remarkable .

5 . Grassland industry development

The grassland industry includes grassland animal husbandry , grass seed industry , grass production and processing industry and turf industry . Of all the herbivorous livestock products of China , beef production reached 7 .5 million ton , which accounted for 11 .7% of the world's beef output in 2006 ; lamb production reached 4 .7 million ton , which accounted for 34 .6% of the world's lamb output ; the production of beef and lamb has increased by 40 .8% and 71 .4% since 2000 . Milk output including dairy cow , goat and buffalo is 33 .03 million ton , accounting for 5 .1% of world's output . Milk production of dairy cow is 31 .94 million ton , the number of cows is 13 .63 million , respectively 3 .86 and 2 .79 times as many as there were in 2000 . In recent years , the country has built a number of grass seed farms which meet the requirements for the development of grasslands . At present , there are more than 190 grass production and processing enterprises in China with annual production capacity of more than 4 .6 million ton . Exports of grass products have also increased annually , becoming the new highlights in export trade . The turf industry , emerging as a newly developing industry in the past 20 years , enjoys a rapid growth . The number of enterprises in turf industry has exceeded 5000 . The grassland industry development also benefits many other relevant industries such as food , textile , leather making , pharmaceutical , chemical , papermaking , energy , pesticide and machinery . This plays an important role in increasing labor employment and peasants' income .

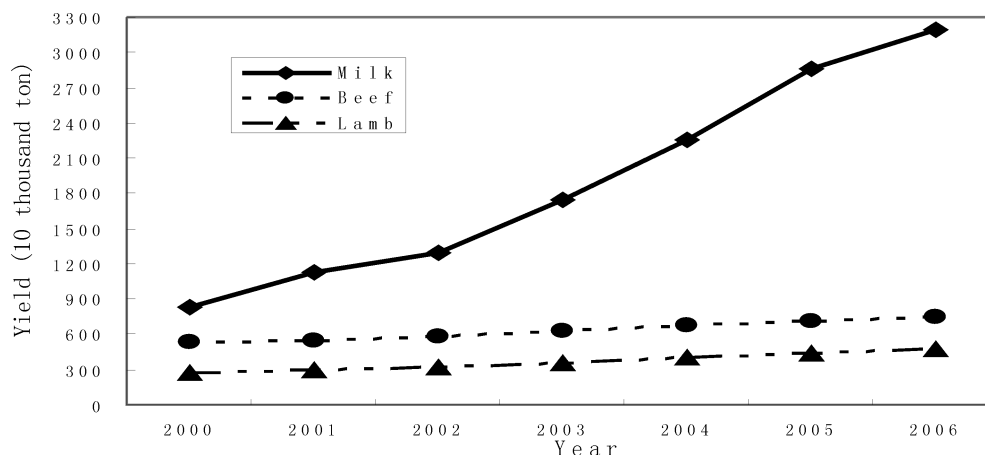


Figure 5 China Beef and Lamb production and Milk yield from 2000 to 2006 .

Grassland science and technology research

1 . Science and education system

After 50 years , China's grassland education courses have changed gradually from a single to a comprehensive system with teaching specialist , undergraduate , master's and Ph .D . levels . At present , there are more than 40 institutions with a grassland major with more than 1 ,500 teachers . The number of students in this major is more than 13 ,000 , of which more than 1 ,900 are post-graduate students with more than 440 doctoral candidates . While training and educating professionals about grasslands , these universities take advantage of their situation and make great achievements in scientific research . At the same time , professional scientific research institutions are also enjoying advancing development . In the late 1950s , the Chinese Academy of Agricultural Science and the National Institute of Animal Husbandry in provinces and autonomous regions have established forage research centers . In 1964 , the Chinese Academy of Agricultural Science organized China's first national grassland professional research institution-Institute of Grassland Research in Hohhot , Inner Mongolia . At present , the country has established a National Grassland Research Institute , five provincial-level Institutes of Grassland , 4 provincial and ministerial key laboratories , 20 Grassland Research Centers , 2 National Field Stations . The grasslands scientific research institutions have also played an important role in educating master and Ph .D students . Professional colleges and scientific research institutions work together to form the China grassland science , technology and educational system . In addition , the technology promotion departments at all levels and enterprises are playing an increasingly significant role in transforming the scientific research into practice . They actively participate in the relevant scientific research and worker training which has become an important component in China's grassland science , technology and education area .

2 . Innovation capacity

As for the grasslands scientific theory innovation , the China grassland science education fellows have developed a set of grassland scientific theories , such as grassland ecology , pasture taxonomy , grassland taxonomy , forage breeding , the cultivation of pasture , grassland management , forage seed science , grass production and processing of products , turf-school science , benefiting from the essence of the grasslands scientific theory in the world . Modern biotechnology , information technology and other advanced applications of science and technology have been applied to continuously improve China's grassland science and technology innovation capabilities . For example , biotechnology has been fully used in forage breeding research , molecular biology technology in pasture genetic resources research , remote sensing , geographic information systems and global positioning system (3S technology) , as well as computer technology in grassland resources monitoring and disaster warning study .

As for the operating mechanisms in grassland science research , technology transfer and educations , there are more and more communication and contact in grassland professional colleges and universities , scientific research institutions , technology promotion body , administrative departments , law enforcement agencies , as well as grass industry enterprises , working with each other in personnel training , science and technology research , technology promotion , technical service , the integration of resources to gradually establish and promote the formation of a common development in grassland science and technology , education and health .

3 . Achievement in science research

After the unremitting efforts of generations of grassland science education fellows , we have achieved fruitful grassland research results . In the area of forage germplasm resources and new breeding research , we have collected more than 10 ,000 forage germplasm resources , and cultivated and audited nearly 400 new species of forage . In efficient utilization of technology in the grassland in South , we have worked out a comprehensive way of managing the improved natural grassland , sown pasture and livestock grazing . In the area of forage seed production and the industrialization of technological research , we have develop methods for cultivation of alfalfa and other forages and the harvesting and packaging technology and related machinery . In the development of information technology research , the successful application of 3S technology has been used in grassland areas for monitoring dynamic disasters and early warning , monitoring major projects in grassland development , remote sensing and quick search of grassland resources , and monitoring livestock balance . In forage biotechnology research , we have worked with the technology of tissue culture , transgenic breeding , marker-assisted breeding and other technical problems , and modern molecular biological techniques to evaluate forage germplasm resources . In turfgrass research , we have implemented research in establishment and management of golf courses and football pitches , meanwhile positive progress has also been seen in breeding anti-adversity species . In grazing management research , we have analysed the mechanism of grassland degradation and the impact of grazing on the vegetation , and tried to optimize the reasonable use of grassland resources . In pest control research , we have successfully developed a combination method of biological control , chemical control and physical combat techniques . These achievements not only further enrich the theoretical foundation of China's grasslands science , but also play an important role in grassland management practices .

Current challenges in China

Although some significant advances have been made in protecting grassland in China and in the education and research areas , considering the whole picture , the Grassland Industry in China is still at a primary stage and many challenges await us in the future and these are summarized below .

1 . Severe situation of ecology

Influenced by the natural effects of the global warming and arid climate and some artificial factors , 90% of the grasslands in China show degeneration in various degrees . The sandstorm , desertification and soil and water loss are making the situation severe . Although there has been some recovery of grassland condition in the major development projects , the deteriorating trend of grassland condition is not under control .

2 . The protection cannot meet the development and utilization of grassland

In China , the grassland environment is becoming worse , and needs to be protected immediately . However , the pressure of population is still high with increasing livestock numbers and unreasonable use . Consequently , while part of the grassland has been protected , the entire area is suffering degeneration . The sustainable development can hardly be realized if the situation isn't changed by means of protecting the ecological environment and allowing the vegetation to recover on grassland as soon as possible . In addition , the economy in the grassland area lags far behind the others which indicate we must accelerate the development so as to fulfill the goal of becoming a well-off society in this area . Grassland is the main area supporting a large amount of poverty in our country , where there is 70% of the poor and 70% of the rural towns as reported by the National Strategy of Poverty Reduction . We all know that the grassland industry is the traditional superior industry in this area , and it is also irreplaceable . Developing the grassland industry , however , would make it more difficult to protect the local environment . Hence , only when we manage the protection and the utilization properly , may we implement the development of ecology and economy at the same time .

3 . Population of people and livestock increase with shortages of grassland resources

For one thing , the proportion of the grassland is shrinking . Since the last century , grassland in northern China has moved back almost 200 km to north and 100 km to west . In recent years , the decrease rate of grassland in China has been 1 .5 million hectares per year and the situation worsens . For another thing , the number of people and livestock on grasslands is increasing every year . In 2006 , the number of cattle and sheep on China's grassland was 2 .7 times and 3 .5 times , respectively , of that in 1978 . Thirty four percent of China's grassland are overgrazed , 17% higher than in the 1980s . During the recent 50 years , the population in pasturing areas has grown several fold . Presently , the population in Inner Mongolia , Xinjiang , Qinghai and Gansu is 4 .24 times , 4 .03 times , 3 .66 times and 2 .72 times of that in the 1950s , respectively , even in Tibet the population is more than 2 times of that in 1951 . The grassland provides the basic subsistence for the peasants to produce and survive . However , due to the increasing number of people and livestock and the shrinking area of grassland , there must be growing pressure and impact on the existing grassland .

4 . Unreasonable utilization of grassland resources

Due to the economic interests , non-agriculture uses such as coal mining , collecting grassland wild plants , and illegally utilizing grassland have not been fully stopped . Since the 1950s , areas of non-agriculture uses have totaled about 20 million hectare . As a result of little precipitation and the arid climate , nearly 50% of these disturbed grasslands have become bare or sandy land . Some wild plants such as glycyrrhiza , Chinese ephedra and caterpillar fungus are removed from the grassland , which substantially reduces the wild plant resources and seriously damages the grassland ecological environment . Still , there is unreasonable exploitation of water in some area , causing the downstream lakes to dry up and the disappearance of oasis and external vegetation .

5 . The lagging production mode of animal husbandry

The grassland animal husbandry was under extensive management with undeveloped management and low interests . For a long time , the animal husbandry mainly relied on natural grassland grazing . Further more , the infrastructure on the grassland area is so undeveloped that the situation of agricultural production relying on nature is unchanged . Scientific utilization of grassland has not been effectively implemented in the majority of areas . Sown pastures only occupy less than 3% of the total grassland area . The degradation of livestock breeds and decline in production are obvious . Nevertheless , the economic increase of traditional grassland animal husbandry depends on the increase in number of livestock which not only damages the grassland resources but also produces low income .

6 . Frequent occurrence of natural disasters

Severe disasters happen in China every year , for instance , grassland fires , pest outbreaks , snowstorms . Over the last decade , on the average annual grassland fires occurred hundreds of times , and there were 30 severe fires . Some areas suffer from rodents and pest , about 40 million hectares and 20 million hectares , respectively . Over the past 50 years , there were over 60 snowstorms and 26 droughts in Inner Mongolia , Xinjiang , Tibet , Qinghai , Sichuan and Gansu . Frequent occurrence of natural disasters causes huge economic losses each year , and the direct economic loss resulting from livestock deaths is several billion RMB .

Grassland development strategy

For reasonable protection of the grassland resources , and the promotion of the ecological , economic and social sustainable development , China's Ministry of Agriculture has prepared a strategy for the future sustainable development of grasslands , and

proposed the strategic thinking , strategic objectives and strategic measures to protect the building of China's grasslands for the future .

Strategic thinking

Grassland protection should convert from the dominance of economic benefits to the balance of economic , social , ecological benefits , as well as ecological priorities . Measures should also be taken to promote the conversion of the prairie grassland's economic growth mode , animal husbandry production and the lifestyle of farmers and herdsmen , to speed up the implementation of key projects of grassland protection and development , to promote scientific and technological progress and industrial development , to establish a complete security system to support and enhance grassland sustainable development capacity , and to promote the development of production , affluent life and good ecology for the grasslands .

Strategic objectives

1 . Overall objective

Through utilization of fences , grassland improvement , sown pasture establishment , scientific farming , as well as improved livestock grazing , resting and rotational grazing and a series of comprehensive measures , we can stop the degradation of the grassland gradually , we can help the grassland ecological environment continue to improve , make further improvement of grassland agricultural and pastoral industry and economic structure , effectively enhance the ability of grassland sustainable development , complete the support system for grassland protection , and preliminarily establish healthy ecosystems in which humans live harmoniously with the natural resources and environment , and finally achieve the goal of " green prairie grassland animal husbandry-up , and the farmers and herdsmen become rich " .

2 . Specific tasks

By 2010 , the total area of fenced grassland should reach 100 million hectares , the area of improved grassland 40 million hectares , and the area of sown pasture 20 million hectares . Grazing prohibition , resting , and rotational grazing should be used in 40 percent of the country's available grassland . The area of natural grassland overstocked with livestock should decrease from the current 34 percent to below 25 percent . A total area of more than 110 million degraded , desertified , and salinized grassland should be treated .

By 2020 , the total area of fenced grassland should be 150 million hectares , 60 million hectares grassland should be improved , and sown pastures should be 30 million hectares . Accumulated improvement from reducing degradation , desertification , salinization should be more than 165 million hectares . Grazing prohibition , resting , and rotational grazing should be utilized in 60 percent of the country's usable grassland . Natural grassland and livestock become balanced , grassland vegetation recovers , and grassland productivity increases significantly .

Strategic measures

1 . Enhance the government's emphasis , and increase investment in the development of the protection of grassland

The development of grassland protection should be taken into the consideration and be given active support , when governments at all levels formulate the economic development planning and industrial development policies . The mechanism in which government investment acts as the mainstay for investing in the grassland ecological development should be developed . Special funds should be established to ensure steady growth of the developmental input for the protection of grasslands . At the same time , we should actively encourage domestic and foreign enterprises , social organizations , and the farmers and herdsmen to personally invest in pasture protection development .

2 . Complete the system of laws and regulations , increase the intensity of the implementation of laws and regulations

According to the " Grassland Law " , supporting laws and regulations should be formulated and completed for grassland protection , grassland surveys , grassland statistics , grass seed management , and management of grassland occupation and levy . We should speed up revision and perfection of local grassland regulations , improve operability and effectiveness of the law , strengthen grassland law education , constantly enhance the legal quality of the farmers and herdsmen , and enhance social awareness of the law to protect grasslands . We should increase the intensity of the implementation of laws and regulations in grassland protection , be strict in grasslands law enforcement monitoring , and control the illegal destruction of the grasslands in accordance with the law .

3 . Promote sound grassland household contract system and expedite the implementation of various systems for the grassland protection

We should further improve the implementation of the household contract system in grasslands , give the peasants and herders the long-term utilization rights , and fully mobilize their enthusiasm and creativity to protect grasslands . As for the grasslands under the contract , we will strengthen the management and standardize the transfer of management rights ; as for the grassland yet on the contract , we will accelerate the implementation . While continuously improving the household contract system , we are fulfilling the basic grassland protection , grazing balance system , and the reasonable use of grassland resources .

4 . Plan the protection and major development project

According to the national grassland protection and building planning", we will speed up nine projects, namely the implementation of grazing ban, managing the sources of sandstorms in grasslands, vegetation recovery in desertified areas, grass seed industry, disaster prevention and reduction, development and utilization of grassland, Grassland Nature Reserve building, and nomadic settlement. Strengthening the management of the developmental projects, improving project quality and efficiency, and promoting the grassland ecological restoration and enhancing grassland production capacity, and improving conditions in pastoral areas of infrastructure allow us to be able to achieve comprehensive economic development in pastoral areas.

5 . Strengthen monitoring and management team and raise the level of management in accordance with the law

We will establish and improve the monitoring and management of grassland institutions to further perfect the national, provincial, prefecture, and county grassland monitoring and management system. We will also improve grassland management authority infrastructure and grasslands law enforcement. We would strengthen the grassland professional and technical training for monitoring and management to enhance operational capacity of grassland Supervisors.

6 . Establishing the grassland eco-compensation mechanism and the paid system in using grassland resources

On the grassland ecological protection areas, it is the Government who will provide certain economic compensation to the farmers and herdsmen to ensure not to reduce their income, and thereby mobilize their enthusiasm in protecting grassland. At the same time, also in accordance with the "users pay" principle, we will charge the users of grassland resources.

7 . Develop sown pasture and upgrade the animal husbandry production level

In rural areas, we have actively promoted the use of food crops and pasture rotation. A "ternary" planting structure has been established and the area of high-quality forage planting has been expanded. In the agro-pastoral and semi-pastoral areas, we will transform farming land which is not suitable for cultivation to grassland to ease the pressure of grazing on the natural grassland. At the same time, we will make full use of free land, sloping land, saline land, and low-yielding farmland, coastal beach, and other lands which are not suitable for grain production to develop the grassland agriculture.

8 . Accelerate scientific and technological progress and innovation

Fully concerning the critical technical issues of grassland protection, such as grassland degradation and rat pest control, adapted species in forage breeding, sown pasture development, and ley farming technology, we will strengthen research and strive to make breakthroughs. Accelerating the promotion of research achievements, and establishing a system with enterprises as the main body, market-oriented, and the combination of production and technological innovation, we can promote the transformation of scientific and technological achievements and constantly improve the technological content of pasture protection. We also attach great importance to enhancing the education level of peasants and herdsmen and giving full attention to the peasants and herdsmen in pasture protection.

9 . Increase scientific and technological exchanges and cooperation and promote rural development of all countries

We will continuously expand new areas cooperatively through introducing technology, exchange of delegations and scholars to give lectures, organizing symposiums, exchanging genetic resources and information in a variety of ways. We will organize international cooperative work to make breakthroughs in "bottleneck" problems. We should help each other, in accordance with the principle of mutual benefit, to strengthen and expand regional cooperation and to achieve the common development of all nations.

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