

# RESEARCH ON THE COUPLED DEVELOPMENT STRATEGY OF AGRICULTURE, FORESTRY, GRASS AND ANIMAL HUSBANDRY IN THE LOESS PLATEAU

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**Abstract:** The “farming-based” agriculture and animal husbandry in the Loess Plateau is facing sustainable development issues. The primary and secondary relationship between agriculture and animal husbandry should be replaced. Adjust the "focus on farming " Integrated into "pastoral-based"; agricultural and animal husbandry resources are re-allocated through the coupling of agriculture, forestry, grass and irrigation, Implement grass-irrigation first based on the idea of grassing first if grass is suitable, irrigation first if irrigation is suitable, and forest first if forest is suitable. Implement development strategies and gradually form grass and shrub (wood). The forest three-dimensional ecological barrier and the complementary structure of related industries. The animal husbandry industry in the Loess Plateau should develop an eco-friendly animal husbandry with unique paths and innovative mechanisms. It should promote the operation mode of house-fed and semi-house-fed animal husbandry, with large breeding households as the main body and cooperatives as the link. The breeding community is used as a platform to cultivate the main body of animal husbandry production and operation in the Loess Plateau. Focusing on the coupled development of agriculture, forestry, grassland and animal husbandry, we will vigorously strengthen industrial cultivation, policy support, and project Project investment, interest guidance and other support points will form a "four-wheel drive" development pattern of animal husbandry in the Loess Plateau.

**Keywords:** Loess Plateau; Animal husbandry; Coupling of agriculture; Forestry; Grass and animal husbandry

## 1. THERE ARE STRUCTURAL PROBLEMS IN THE DEVELOPMENT OF AGRICULTURE AND ANIMAL HUSBANDRY ON THE LOESS PLATEAU

The Loess Plateau is the birthplace of Chinese civilization. It has long transformed the original The advantage of focusing on grassland animal husbandry has turned into the development of planting industry in barren mountains and ravines. disadvantages. Before the policy of returning farmland to forest and grassland was implemented, there were some problems in the Loess Plateau. When a large area of land was unsuitable for farming, it was estimated that it accounted for one third. Due to large-scale agricultural farming and blind reclamation [1], resulting in irrational land use, coupled with loose soil and frequent heavy rains in the Loess Plateau, resulting in serious vegetation damage and soil erosion, low productivity, and Industry development is restricted. It can be said that the laws of ecological change are to a certain extent determines the law of industrial development, violates the law of ecological change and violates the economic The laws of economic development are the same, which seriously restricts the development of industries in the Loess Plateau region. Animal husbandry plays an important role in sustainable agricultural development and ecological environment construction in the Loess Plateau. occupies an extremely important position in animal husbandry, among which forage production is the The basis of industry, restore grass and irrigation to the greatest extent, Objectively, it can enhance animal husbandry grass production potential, It also lays the foundation for the development of the animal husbandry industry [2]. The livestock output value accounts for a high proportion of the total agricultural output value in developed countries, and more than 60% of the livestock output value is converted from pasture [3]. The Loess Plateau region should take the opportunity of returning farmland to forest and grassland to break through the "grain as the key link" The mindset is to develop animal husbandry as the leading direction, with agriculture and forestry as useful supplements and improvements, coupling systems such as agriculture, forestry, pasture, and animal husbandry to promote the development of regional agricultural circular economy. This article considers the existing problems in the development of agriculture and animal husbandry on the Loess Plateau, discusses it from the aspects of reallocating agricultural and animal husbandry resources, implementing grass and irrigation first to develop animal husbandry, accelerating the pace of animal husbandry reform, and strengthening the coupled development of agriculture, forestry, grass and animal husbandry systems, and clarifies the Loess Plateau. Loess on the earth is concentrated in semi-arid areas on the outer edges of temperate deserts and in mid-latitude forest steppe and desert steppe zones in the northern and southern hemispheres, accounting for 10% of the world's loess. It accounts for about 9.3% of the earth's land area. To the south is the Qinling Mountains. It reaches the Yinshan Mountains in the north, including Qinghai, Gansu, Ningxia, Inner Mongolia, Shaanxi, Shan West, Henan 46 from 7 provinces (districts) Prefectures (leagues, cities) 282 counties (Flag, city) [4], with a total area of approximately  $63 \times 10^4$  km<sup>2</sup>, accounting for China's territory area 6.6% [5]. The average thickness of loess accumulation is 80 m above, Thicker than 200m. Soil

and water loss is extremely serious in the Loess Plateau. The annual sediment output through the Yellow River is  $16 \times 10^8$  tons, which is the amount of the Nile River. 30 Times, Mississippi River 90 times. Statistics show that loess is high The original average erosion modulus is  $4\ 000\ t \cdot km^{-2}$  about, Some areas have erosion patterns Count up to  $10\ 000\ t \cdot km^{-2}$ , the ratio of the watershed area covered by loess to the valley area exceeds 25%, with the most serious areas reaching 56.7% [ 6].

Most areas of the Loess Plateau are pastoralist-farmer interlacing areas or transition zones [7-8]. 3000 Over the years, the Loess Plateau has basically continued the trend of "pastoralism, pastoralism, and pastoralism" The production mode of "agricultural combination" [9]. No matter who the ruler of the region is or what kind of territorial expansion policy is implemented, this production mode has no Big changes occur. However, due to the large increase in immigrants from the Central Plains since the Ming and Qing Dynasties, the people's The pressure for people to survive continues to increase, and the Loess Plateau begins to accelerate its trend towards species-based Agricultural production dominated by plant industries has resulted in a decline in the structure of pastoralists and farmers and the ecological carrying capacity There is a serious imbalance, and the grass-fed livestock industry is shrinking with the degradation of grassland resources. Comparison of the interlacing or transition of animal husbandry and agriculture industries in the Loess Plateau over a long period of time Slowly, it was not until the end of the Qing Dynasty that the planting industry completely squeezed the animal husbandry. The tilt, especially the "grain as the key link" after liberation, intensified this squeeze. The Loess Plateau's agricultural structure of "farming as the mainstay, grain as the key link, and animal husbandry as the supplement" began to solidify. The area of forest and grassland has been greatly reduced. The increasingly scarce forest and grass resources cannot support so many livestock. With such a large population unable to survive, farmers and herdsman had no choice but to open up wasteland and shift from "grazing- based" to "farming-based" [10].

The "mainly farming" situation on the Loess Plateau has created a series of problems. according to According to statistics in 2000, the output value of the Loess Plateau's planting industry accounted for more than 10% of the total agricultural output value. 60%, the output value of animal husbandry only accounts for 60% of the total agricultural output value At about 20 %, the output value of the animal husbandry industry is nearly 10 percentage points lower than the national average in the same period. The output value of the planting industry is much higher than that of the animal husbandry industry. The transformation of the agricultural structure obviously lags behind the national level. Compared with developed countries, the gap is even greater [1 1]. " Focus on farming " has resulted in the continuous deterioration of the ecological environment. The river water has stopped flowing from seasonal to year-round, and the vegetation has degraded into barren ridges and bare mountains where wind and sand are raging. Cattle and sheep eat grass roots and eat saline-alkali soil, and some farmers and herdsman are forced to join the ranks of ecological immigrants. The natural conditions for developing grassland animal husbandry are generally lost. Therefore, in order to change the "farming-based" model in the agricultural structure, we should rationally utilize grassland resources, develop animal husbandry on the Loess Plateau, and reallocate agricultural and animal husbandry resources to reverse the long-standing disadvantages of traditional agriculture.

## **2 COUPLING AGRICULTURE, FORESTRY, GRASS AND ANIMAL HUSBANDRY TO REALLOCATE AGRICULTURAL AND ANIMAL HUSBANDRY RESOURCES**

The problem of "mainly farming" in the Loess Plateau has caused the traditional extensive and backward animal husbandry to stagnate. Therefore, the development of animal husbandry in the Loess Plateau requires By constructing a new coupling structure of agriculture, forestry, grass and animal husbandry, the relationship between animal husbandry and agriculture The system should be fundamentally straightened out and the relationship between grass and forest should be consolidated on a fundamental basis, especially It needs to reallocate the unique agricultural and animal husbandry resources of the Loess Plateau at the strategic level. Comprehensively adjust the external structure of agriculture and the internal structure of animal husbandry [12].

### **2.1 Replacement of Primary and Secondary Relationships between Agriculture and Animal Husbandry**

In recent years, agricultural structural adjustment has often been limited to "multiple changes" within the planting industry. The adjustment of "with less", "advance with retreat", and "big with small" involves agriculture and animal husbandry. There is not much thought about the adjustment of industrial relations between industries. Less actual action. root according to Analysis of National Rural Statistical Yearbook data from 2004 to 2009 (Table 1), The output value of agriculture and animal husbandry in the Loess Plateau increases year by year, and the total grain output and total meat output Output is also increasing year by year, but for many years the output value of animal husbandry only accounts for 1% of the agricultural output value. 40%, the total meat output is not high, This shows that the Loess Plateau area is still dominated by agriculture Mainly, the development of animal husbandry is relatively slow. therefore, Adjustment of the primary and secondary relationship between agriculture and animal husbandry, It is a fundamental, strategic and historical adjustment and is the key to realizing the realization of agriculture and animal husbandry on the Loess Plateau. an inevitable choice for sustainable development of the industry. Agricultural structure adjustment in the Loess Plateau Get out of the "two-layer skin" thinking of focusing on agriculture and focusing on animal husbandry. Sexuality and "disconnection" work misunderstandings, actively replace them at a higher level The main and auxiliary relationship between planting and breeding industry adopts modern ecological high-quality and efficient livestock Animal

husbandry replaces the traditional extensive and backward planting industry with low yield and low efficiency. In particular, the unitary structure of "grain as the key link" must be adjusted to "grain and grass economics and forest feeding". The five-element coupling structure.

Table 1 2004-2009 Annual agricultural and animal husbandry output value and output in the Loess Plateau region

Year	Gross output value of agriculture (×10 8 yuan)	Gross output value of animal husbandry (×10 8 yuan)	Total grain output (×104 t)	Total meat output (×104 t)
2004	494	208	2544	229
2005	531	234	2479	261
2006	603	250	2659	269
2007	704	293	2535	224
2008	817	352	2792	210
2009	897	368	2844	237

## 2.2 Adjust and Optimize the Internal Structure of Animal Husbandry

The Loess Plateau region should adjust the development of ecological animal husbandry, regard the development of grass-feeding animal husbandry as the first carrier of establishing a coupling structure, and integrate grain-consuming The pig and chicken breeding industry has been reduced to a secondary species or industrial supplement. using traditional thinking Look, the development of grass-feeding animal husbandry seems to be in conflict with the ecological restoration and protection of grassland. However, the power source and dialectical relationship between industrial demand and resource supply are precisely Just nurture it. Historically, the livestock industry on the Loess Plateau has long been based on grass-eating livestock. Lord, later the grassland vegetation declined sharply and degraded, so we had to open up wasteland to grow food. The number of grass-fed livestock continues to shrink, and the high-grain-consuming pig and chicken breeding industry gradually increases. Grassland slopes are turned into cultivated land, leading to a vicious cycle of ecology and industry. ring. According to measurements, every 1 hectares of grassland, can lead to 3 hectares of grass Former desertification, 7 hectares of grassland degradation [13]. And currently China The proportion of herbivorous animals is low, In particular, the proportion of beef is only 9.1%, far lower than the world average 26.3% [14]. The moderate development of herbivorous livestock in the Loess Plateau is actually based on the laws of nature and the laws of the development of the livestock industry. From a macro perspective, this is in line with the country's policy guidance to ensure food safety. From a medium perspective, It is a natural way to realize the traditional advantages of raising grass-eating livestock on the Loess Plateau. The return of the industry, a micro-view of the development of grass-fed livestock on both the planting and breeding industries Structural adjustment is feasible.

## 2.3 Handle the Relationship Between the Ecological Environment and Agricultural and Animal Husbandry Resources

The pressure of poverty on residents in the Loess Plateau has long been greater than the pressure of ecology, and the continuous deterioration of the ecology has greatly increased the pressure of poverty. Two major pressures make the urgency and importance of reallocating agricultural and animal husbandry resources through coupling structures more prominent. The development of animal husbandry in the Loess Plateau, First, we must adhere to ecological priority, and second, we must adhere to increasing income as the basis, further clarify the construction direction of the coupling structure of agriculture, forestry, grass and animal husbandry, properly handle the relationship between man and nature, the relationship between ecological protection and construction and increasing the income of farmers and herdsmen, and the relationship between ecological animal husbandry and poverty alleviation.. Since the implementation of key ecological restoration projects during the "Tenth Five-Year Plan" period, recent  $0.067 \times 10^8$  The forest vegetation has been restored on hectares of deserted ditches and slopes. The cumulative grass planting area of the fence reaches  $0.09 \times 10^8$  hectares, the situation of continuous decline in vegetation quantity and quality has changed. Based on the centralized allocation of agricultural and animal husbandry resources in ecological animal husbandry, and organically combining ecological priority with increasing income, this is the correct path for establishing a new relationship between agriculture and animal husbandry on the Loess Plateau. Poverty alleviation and development require industrial carriers, and ecological construction also requires industrial carriers. Combining the two carriers into one can produce a multiplication effect, which is also an important focus in building a coupling structure of agriculture, forestry, grass and animal husbandry on the Loess Plateau.

## 3. GRASS AND SHRUBS (WOODS) ARE THE LEADING DEVELOPMENT PATH FOR ANIMAL HUSBANDRY.

The ecological environment of the Loess Plateau is showing a deteriorating trend. For example, precipitation has decreased, and soil organic matter content has increased from 30-50 g·kg<sup>-1</sup> down to no foot 10 g·kg<sup>-1</sup>, forest and grass coverage rate decreases, etc. According to statistics, in Shanxi, Ningxia, Shaanxi, Gansu and other provinces (autonomous regions) where pastoralists and farmers intersect, degraded grasslands The area of land accounts for the total area of grassland More than 80%, In some areas, grasslands have even become completely desertified and have lost their ecological functions and utilization value. because Therefore, the development of animal husbandry on the Loess Plateau must be carried out in an orderly manner starting from planting grass and shrubs (trees). In other words, building a coupling structure for agriculture, forestry, grass and animal husbandry In the structure, grass and irrigation pioneers must be in an important position as the "leader". great strength Adjust the original unreasonable planting industry structure and encourage the cultivation of crops in areas with poor conditions. Return farmland to cultivated grass on sloping land to guide farmers to farmland with better conditions Plant high-quality pastures on the land, and plant shrubs in large areas in the wasteland and ravines. want Break the shackles of "taking grain as the key link" and get rid of the misunderstanding of "focusing on farming", and promote grass irrigation through the implementation of grass irrigation priority measures such as grass irrigation restoration and grass industry support. Development of animal husbandry on the Loess Plateau. through More than 10 years of investigation and research have found that grass and shrub vegetation has the dual function of protecting and restoring the ecology and ensuring the sustainable development of animal husbandry. Restoring the ecology in the order of grass, then irrigation, and then forest is more effective than forced afforestation from the beginning. good. Therefore, "grass planting and irrigation" should become the foundation project for the coupling of agriculture, forestry, grass and animal husbandry on the Loess Plateau. Of course, in theory, forests play a better role in soil and water conservation than grass and shrubs, but the annual precipitation in most counties on the Loess Plateau is only 400 mm, and even the precipitation in some counties only 300 mm, the survival rate of afforestation is generally low [15]. Some experts and scholars believe that annual precipitation 500 mm The following places are not suitable for planting trees. The benefits of planting grass and irrigation are emphasized, while the feasibility of planting trees is denied. Behavior. The survival rate of tree planting in some areas of the Loess Plateau is less than 50%, save Insufficient rate 20% [16], the cost of planting one plant is as high as several hundred yuan, which is quite Yu Zhan 0.067 The cost of hectares of grass and irrigated land. However, it is not lower than Trees cannot be planted in places with 500 mm of rainfall. Instead, there must be a process of grass and irrigation first, and specific conditions and planting management and maintenance techniques must be considered. Planting grass and irrigation The cost is only 10% - 20% of the cost of planting trees, and the survival rate of planting grass and irrigation is higher than that of planting trees. 40% - 60%. It can be seen that the benefits of planting grass and irrigation are obviously better than planting trees, especially the ecological benefits and economic benefits of planting grass and irrigation. Benefits can be taken into consideration, and the annual income from growing high-quality forage can exceed that from growing grain. Income, planting Caragana and other shrubs can be achieved as long as measures such as cropping and processing are effective and If you apply, there will be better returns in a few years. Planting grass and irrigation can provide ecological livestock The development of animal husbandry provides high-quality feed and reduces the grazing of livestock by farmers and herdsman. Conducive to the protection of the ecological environment. At the same time, planting grass, planting irrigation and afforestation While laying the foundation, it can gradually form a three-dimensional ecological structure of grass and shrub forest. structure to achieve comprehensive coupled development of agriculture, forestry, grass and animal husbandry. According to the statistical analysis of the results of ecological construction projects such as the comprehensive management pilot project of small watersheds on the Loess Plateau in the Yellow River Basin, grass irrigation with different vegetation types The forest configuration ratio is shown in the table 2. In the grassland vegetation zone and forest steppe vegetation zone, The proportion of shrubs and artificial grass is significantly higher than that of woodland. Especially in grassland vegetation Artificially planted grasses and shrubs account for 1% of the total vegetation in the belt. 90%, while in forest plants There are also appropriate proportions of shrubs and artificial grasses in the belt. It can be seen from this that The Loess Plateau chooses the strategy of grass and irrigation first. Implement large-area grass planting and irrigation equipment It is feasible and necessary. To adapt to local conditions, step by step, From a practical point of view, it is advisable to return grass to grass and plant grass. It is advisable to plant caragana and sea buckthorn, It is advisable to plant suitable tree species. Especially in places with low rainfall and low tree planting survival rates, Choose suitable shrubs and herbs to gradually restore higher coverage Spend, Water and soil erosion have been significantly curbed, Vegetation has been initially restored, Even regional microclimates can undergo positive changes. Especially caragana and sea buckthorn These two shrubs, It has strong resistance to drought and sandstorms in the Gobi Desert. ability, low planting cost, The survival rate is high. Use drought-tolerant and sand-fixing shrubs such as caragana and sea buckthorn, Then, through project promotion and other means, large areas will be planted The task of afforestation has been implemented. Gradually form a plant with complementary advantages between grass, shrubs and arbors. status barrier.

Table 2 The proportion of grass, shrub and forest structures in different vegetation zones

Vegetation zones	Forest	Economic forest	Shrub	Grass plantation
The grass vegetation zone	5	5	50	40
The forest-grass vegetation zone	20	15	40	25
The forest vegetation z one	60	18	10	12

## 4 Practical Improvements and Gradual Changes in Livestock Production Methods

Livestock grazing is a typical feature of traditional animal husbandry, which is beneficial to the production of green organic animal food, but has a direct negative impact from the perspective of protecting the fragile ecological environment. The livestock industry on the Loess Plateau has long been a low-cost and low-efficiency free-range operation. Cattle and sheep are allowed to graze on grass and fed with water. When the grass is gone and the water is gone, the cattle and sheep chew grass roots and bark. Due to lack of enough food, and nutrition, resulting in a longer production cycle. If the backward production methods of animal husbandry are not fundamentally changed and it is difficult to build a coupling structure of agriculture, forestry, grass and animal husbandry, the ecological environment will continue to deteriorate, thus hindering the development of animal husbandry on the Loess Plateau.

### 4.1 Transformation Process of Livestock Production Methods

There have always been two different opinions on the transformation of production methods. One is radical and progressive, advocating revolutionary changes through government mandates and administrative means; the other is pragmatic and progressive, advocating reform and reform measures through policy guidance and market operations. the author thinks,

The transformation of animal husbandry production methods in the Loess Plateau should take the second route. That is to say, the path of pragmatic improvement and gradual change is easy first and then difficult. Because the backward livestock production methods are passed down from generation to generation by farmers and herdsmen, it is difficult to change in the short term. Livestock farming can be relatively traditional; But it cannot be extensive and backward that damages the ecological environment. It should be an intensive combination of reasonable traditional elements and practical modern elements. As an economically backward, In the Loess Plateau where farmers are poor, the improvement and transformation of livestock production methods must fully consider the objective realities and possibilities, and actively guide, demonstrate and cultivate the transformation of livestock production methods. For example: yellow feeding → yellow silage → silage is the route to change the feed habit; planting corn → planting alfalfa → planting special high-quality feed is the route to change the planting habit; free range → semi-captive → Captive breeding is a way to change breeding habits.

### 4.2 Improvement of Livestock Production Methods

To transform the livestock production mode on the Loess Plateau, we can start by advocating and promoting pen feeding and semi-fed feeding [2], this process should effectively use administrative means, but more economic means should be used to strengthen the interest-oriented pulling force. Relevant government departments should take the initiative to use preferential policies and measures to support farmers and herdsmen to provide infrastructure conditions for indoor and semi-indoor feeding, such as: providing housing construction subsidies and silage cellar construction subsidies for farmers who are indoor and semi-indoor feeding. Biogas project construction subsidies, etc. Especially in the Loess Plateau areas, accelerating the transformation of livestock production methods from free grazing to mountain grazing bans change. The feasibility and operability of mountain closures and grazing bans must be fully considered, and the combine the laws of ecological construction with the laws of animal husbandry development, and pay attention to farmers and herdsmen Production and living habits should be adopted in stages and steps according to different categories. Implement it in an orderly manner with a comprehensive layout and scientific slicing. At the same time, positive Explore new ways of grazing and farming and allow seasonal grazing within a certain range and delineate suitable areas for rotational grazing, adopt indoor and outdoor grazing and seasonal grazing, Effective measures such as combining rotational grazing.

### 4.3 Gradual Reform of Animal Husbandry Production

To build a coupling structure for agriculture, forestry, grass and animal husbandry, we must focus on the main tasks of animal husbandry production and management. Pragmatic and progressive reforms in physical education. According to statistics, after many With years of development, the quantity and quality of large breeding households have improved, becoming Develop the most dynamic growth point of ecological animal husbandry. Loess Plateau Animal Husbandry The production and operation should be based on large breeding households, with professional livestock production Zushe serves as an integrated platform. Efforts should be made to consolidate and expand the production scale of large breeding households model, improve breeding technology and management level, and set an example for the majority of farmers Fan and driving effect. Guide large farmers to take the lead in establishing livestock production majors The cooperative implements unified supply of improved seeds, unified purchase of feed, and unified labor Physical epidemic prevention, unified sales of products, etc., to protect farmers in market circulation benefits and lay the foundation for promoting the coupled development of agriculture, forestry, grass and animal husbandry.

The traditional pattern of animal husbandry in the Loess Plateau is that there are many farmers and few breeding enterprises. At present, in the face of various problems existing in the development of animal husbandry, we should choose and expand large-scale breeding, support local large-scale breeding farms, expand the construction of enclosures and other facilities, introduce improved varieties for breeding and promotion, and use entrepreneurial management ideas and methods to deal with The breeding farm was restructured and renovated. Support breeding farms, lengthen the

industrialization chain, and create "small leading" breeding enterprises that can drive one or several villages to couple agriculture, forestry, grass and animal husbandry. At the same time, the construction of breeding communities, especially the construction of innovative livestock and poultry production organizations based on farmers, is also a pragmatic move towards the intensification of ecological animal husbandry on the Loess Plateau. The construction of breeding communities should have a set of standardized standards and specific methods. In accordance with the requirements of "reasonable design, scientific layout, and moderate scale", supporting pens, feed fields, pastures, silage pools, artificial insemination rooms, veterinary rooms, Manure treatment facilities or biogas digesters are equipped with necessary infrastructure such as mowers, crushers, harvesters and disinfection equipment. Breeding communities are a new model for integrating free-range farmers into the large-scale breeding industry. Concentrated feed and order production serve as technology carriers to accelerate the pace of industrialization and scale of animal husbandry [14]. Processing and circulation should be regarded as a key link in the development of animal husbandry, and healthy and large-scale breeding should be promoted. Increase the added value of livestock and poultry products. In order to improve the comprehensive benefits of animal husbandry on the Loess Plateau, It is also necessary to create a brand with large scale, good reputation and strong influence. Integrate breeding, processing and sales, allowing the coupled development of agriculture, forestry, grass and animal husbandry to play an active role in the industrial chain.

## **5 STRENGTHEN THE SUPPORT POINTS FOR THE COUPLED DEVELOPMENT OF AGRICULTURE, FORESTRY, GRASS AND ANIMAL HUSBANDRY**

### **5.1 Strengthen Industrial Cultivation**

Over the years, the problem of industrial vacancy has failed to attract due attention in some areas. Pay attention to the fact that poverty alleviation lacks industrial connotation, and regional development lacks an industrial base. foundation, urbanization construction lacks leading industries, and ecological construction lacks industrial contracts. combine. Agriculture, forestry, animal husbandry, and grassland farming on the Loess Plateau all need to be strengthened Industrial foundation, putting industrial development in the first place, coupling various industries The main areas of joint layout form synergy. Among them, ecological animal husbandry is the The main line of industrial construction is an industrial development platform with a high degree of coupling and correlation. To cultivate the industry, we can first seek breakthroughs in the grass industry and dairy industry, and then focus on Develop and expand livestock industries such as beef cattle, mutton sheep, and cashmere goats, such as 1998 The number of cattle in Chifeng City is  $88.8 \times 10^4$ , and the number of fine-wool sheep is  $228 \times 10^4$ . Only, the output value of animal husbandry reaches  $17.6 \times 10^8$  Yuan, the city adopts short-term fattening to produce high-end and high-quality meat, and uses scientific and reasonable management methods to achieve The development of animal husbandry [17]. In the future, we can accelerate the development of forest industries such as sea buckthorn, caragana, red dates, and walnuts. Laying a solid foundation for these industries will help the loess industry The coupled development of agriculture, forestry, grass and animal husbandry forms a strong support for the original animal husbandry industry.

### **5.2 Strengthen Policy Support**

Building the coupling of agriculture, forestry, grassland and animal husbandry is inseparable from the correct guidance and specific policies. Physical support. The construction of the coupling structure of agriculture, forestry, grass and animal husbandry should rely on three major elements : 1. The first is to rely on policy support; the second is to rely on project investment; the third is to rely on technology promotion. Among them, project investment and technological promotion require policy guidance. realize agriculture and forestry The coupling of pasture and pasture must be implemented in all aspects through the powerful lever of policy. Livestock farming on the Loess Plateau. Governments at all levels should become a coupling link between agriculture, forestry, grassland and animal husbandry The direct driving force for building construction, assuming irreplaceable leadership responsibilities and Organizational Responsibility. At the same time, there must be ecological management and restoration policies, as well as The immigration and relocation policy should also encourage and support the secondary and tertiary industries and social forces. Policies for massive investment in ecological animal husbandry, etc. Policies in all aspects must be coordinated The policies of provinces, cities and counties should be integrated with the national policies. Policy reality After the policy has been implemented for a period of time, the performance of the policy must be evaluated and researched and formulated. and implement more effective policies.

### **5.3 Strengthen Project Investment**

The construction of the coupling structure of agriculture, forestry, grass and animal husbandry should be regarded as the "basket" for the construction of various projects. Related projects should be coordinated and arranged in this "basket", and departments and units should be coordinated. Actively implement water and soil conservation control projects, take small watersheds as governance units, adopt methods such as contracting, leasing and transfer, and implement "mountain, Measures to simultaneously develop water, fields, grass, forests and roads. Build small dams in valleys to retain sediment, prevent sediment from flowing into the downstream river, and deposit upstream sediment into "dam land". Convert sloping farmland into horizontal terraces to Reduce the speed of water flow and promote the on-site deposition of loess to increase soil fertility. By converting slope fields into terraced fields, we will build an ecological

network system that combines high, medium and low plant planting, and blends planes and three-dimensional spaces. In the core area and buffer zone of the river source Carry out natural vegetation enclosing and reseeding, and implement relevant large watershed and main stream management.

Focus on the implementation of integrated agriculture, forestry, grass and animal husbandry projects, and actively explore the breeding industry, Planting industry, forestry and grassland industry are closely compatible with each other. Magnify the elements of "agriculture", Lengthen and extend the agricultural industry chain; enhance the efficiency of "forest" elements, while continuing to strengthen the ecological functions of forestry, vigorously develop economic forests, commercial forests and understory economies, and promote forestry industrialization; diffuse "grass" elements, Promote the all-round development of grassland - grassland - grass slope - grass industry; Enhance the elements of "animal husbandry" and put the development of eco-friendly animal husbandry at the forefront of the construction of the coupling mechanism for agriculture, forestry, grass and animal husbandry. The coupling of the four major elements of agriculture, forestry, grass and animal husbandry is not single and isolated, but should be an organic whole that enters into each other and conditions each other.

Vigorously implement ecologically healthy large-scale breeding projects to promote the goal of friendly and harmonious development of animal husbandry and "ecology - resources - environment". Actively develop ecological recycling breeding of livestock manure, grain and grass, livestock marshes, grain and grass [18], establish a "benign breeding plus" recycling mechanism, and improve the level of livestock production and the market competitiveness of livestock products. Create an agricultural and animal husbandry circular economy based on livestock and poultry breeding, organic fertilizer manufacturing as the carrier, and green and clean production as the purpose. Process the straw and forestry by-products of some crops into residue, residue, cake, Meals, etc. are used as feed. By returning the digestate to biogas and the biogas residue to the fields, organic agriculture is fed back to lengthen the industrial cycle chain and achieve coordinated development of agriculture, forestry, grass and animal husbandry resources sharing, complementary advantages, and cyclical interdependence.

#### 5.4 Pay Attention to Benefit Guidance

Under the conditions of market economy, finding support points for the coupled development of agriculture, forestry, grass and animal husbandry requires government promotion, but this does not mean that the government can take care of all matters. Substitute and omnipotent. Government promotion must rely on interest support, that is, construction The goal should be closely related to increasing the efficiency of animal husbandry, especially increasing the income of farmers and herdsman. combine. Even ecological protection and construction should not become simple public welfare behavior, but to allow farmers, herdsman and enterprises to benefit from it. Profit driven The effective transmission of dynamic forces through market mechanisms will enable the majority of farmers and herdsman to and enterprises consciously promote and promote ecological animal husbandry. This kind of interest supports It is more effective than government executive orders.

#### COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

#### REFERENCES

- [1] Shan L, Xu B C. Study on constructing stable artificial grassland in Semi-arid Area of Loess Plateau. *Acta Prataculturae Sinica*, 2009, 18(2): 1-2.
- [2] Wang G H, Zhang X S. A perspective of developing an ecogeographical-adjusted and herbivore-based pastoral industry for the Chinese Loess Plateau. *Acta Ecologica Sinica*, 2003, 23(10): 2017-2026.
- [3] Shi S X, Du L Z. Conception of developing grass industry in Loess Plateau. *Pratacultural Science*, 2003, 20(1): 29-31.
- [4] Dong L. On the forming reason of loess in Yili Xinjiang and distribution law. *Shanxi Architecture*, 2008, 34(19): 95-96.
- [5] Xu Z J, Lin Z G, Zhang M S. Loess in China and Loess landslides. *Chinese Journal of Rock Mechanics and Engineering*, 2007, 26(7): 1297-1312.
- [6] He Y T, Lang H L. Significance and strategies of vegetation construction on the Loess Plateau. *Research of Soil and Water Conservation*, 2009, 16(4): 30-38.
- [7] Li W J. The research on Chinese Ecotone between agriculture and animal husbandry and population distribution. Lanzhou: Lanzhou University, 2011.
- [8] Wang Q. Thoughts on the structural readjustment of agriculture in the gullyarea of the Loess Plateau hills. *Journal of China Agricultural Resources and Regional Planning*, 2001, 22(5): 51-53.
- [9] Liu D S. The land use and environment variation during the last 2000 years in the Loess Plateau. *Quaternary Sciences*, 2004, 24(2): 184-190.
- [10] Gao Y P. Analysis on rise and fall of animal husbandry in the Loess Plateau. *Shaanxi Journal of Agricultural Sciences*, 1987(1): 38-40.
- [11] Ren J Z, Lin H L, Wei L. Grassland farming is an important approach for the sustainable development of agriculture in Gansu province. *Acta Agrestia Sinica*, 2009, 17(4): 405-412.

- [12] Wan L Q, Hou X Y, Ren J Z. The application of system coupling in grassland agro-system in China. *Chinese Journal of Eco-Agriculture*, 2004, 12(1): 162-164.
- [13] Li Y Q, Xie H, Fan G L. Research on promoting the development of grass animal husbandry in the West China. *Issues in Agricultural Economy*, 2001(9): 46-48.
- [14] Xie S H, Wang J M. Research on promotion of sustainable development of animal husbandry. *Issues in Agricultural Economy*, 2005,7: 65-68.
- [15] Wan L, Ma Q, Zhang J J, Fu Y L, Zhang X P. Precise comparison of spatial interpolation for precipitation using KRIGING and TPS(Thin plate smoothing spline) methods in Loess Plateau. *Science of Soil and Water Conservation*, 2011, 9(3): 79-87.
- [16] Wang Z Y. Main factor and countermeasure effected on survival rates of afforestation in Loess Plateau. *Shanxi Forest Science and Technology*, 1998(4): 28-29.
- [17] Bao L M, Du F L, Yuan Y. Study on sustainable development of animal husbandry in Inner Mongolia. *Issues in Agricultural Economy*, 2002(Supp): 34-36.
- [18] Du F, Cheng J M. Sustainable development of husbandry in agricultural and husbandry interlaced belt of Loess Plateau. *Journal of Soil Water Conservation*, 2001, 15(6): 113-120.