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# High Standard Capital Farmland Construction Based on Grain Security

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**Abstract** In the context that global grain security is still in very severe situation, the grain security situation in China is not optimistic as well. The "Red Line of Farmland Area" cannot completely solve the grain security problems in China. We still need to seek new breakthroughs in the quality and yield of farmland. The construction of high standard capital farmland is the important premise to guarantee national grain security. On this basis, this paper has summarized the difficulties we are facing in the construction of high standard capital farmland, and has proposed the methods and measures to construct high standard capital farmland and lay a solid foundation for grain security in China.

**Key words** Grain security, Farmland quality, High standard capital farmland

## 1 Analysis on Grain Security Status

**1.1 Global grain security is in severe situation** For most of the past ten years, global grain consumption has always been higher than grain yield. According to the forecast of the Food and Agricultural Organization (FAO), the world grain production in 2016 is around 2.521 billion tons, declining by 0.2% (4 million tons) from last year. The main reason for this decline is that the expectation for world wheat production yield has been reduced - the world wheat production has been revised downwards by nearly 10 million tons to 712,7 million tons since last month. This is 2.8% lower than in 2015, reducing by 20 million tons. It is predicted that by 2030, the grain demand will be 30% to 40% higher than in 2014. A new round of global grain crisis seems to be inevitable.

According to the latest annual report of the Food and Agriculture Organization (FAO), the number of hungry people in the world has dropped to below 800 million for the first time, reducing by 216 million as compared with the early 1990s. And in the meantime, the world's population has been increased by 1.9 billion. According to FAO, people suffering from hunger mainly concentrate in East Africa, Latin America and Caribbean areas, while these areas have made great progress in getting rid of hunger. In the developing countries, the rate of malnutrition has dropped from 23.3% 25 years ago to 12.9% today. However, the malnutrition in sub-Saharan Africa is still among the top of the world. On average, a quarter of the population cannot get enough food.

## 1.2 Grain security situation in China is not optimistic

**1.2.1** Grain security has potential pitfalls in the context of "consecutive increase for twelve years". Data released by National Bureau of Statistics shows that the national grain yield was 621.435 million in 2015, increasing by 14.408 million tons at the rate of

2.4%. The consecutive increase of grain yield for 12 years is a remarkable achievement, attracting worldwide attention. Although the grain yield in China is still growing by the numbers, the grain security situation shows no optimism. Since the reform and opening-up, the living standard of people has improved significantly, and the dietary habit of urban and rural residents has transferred from "well fed" to "eating well". The demand for meat, milk and eggs continues to rise, which leads to an increasing demand for feed grain. As a result, the total demand for grain will continue to grow. With the opening up of "Two-child" policy in China, the population will continue to grow in the future. And under the influence of consumption structure upgrade due to improvement of people's living standard as well as the tightening of natural environment resources, the rigid demand for grain in China will continue to increase. The contradiction between supply and demand will be more obvious.

This has been reflected by our grain import. In 2015, the net grain imports increased by 38% on an annual basis. The imports of barley and sorghum had rapid increase. On the basis that the net imports were kept at 13 million tons for two consecutive years in 2012 and 2013, the net grain imports reached 18.747 million tons in 2014, increasing by 40% a year. According to our traditional definition and caliber of grain, the total grain imports in 2014 reached 100 million tons, including 71.40 million tons of soybean import, 19.52 million tons of cereal import and 8.67 million tons of tuberous crop import (dried cassava mainly). If the 5.41 millions tons of corn distillers were included in the category of grain as corn products, the grain imports would reach 106 million tons.

**1.2.2** Farmland area is on a declining curve, threatening food security. The study in the law of diminishing land returns indicates that, on the premise of the same techniques and other factors, the incremental output (marginal return) of the same area of land will decrease sooner or later as the input of a certain factor is

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incrementally increased. Thus it can be seen that, the output from a unit area of farmland has an upper limit. The idea that "the more we dare, the more the land will yield" is not realistic. Therefore, in order to guarantee grain security, it's essential to ensure a certain area of farmland.

But in fact, as shown in Fig. 1, national farmland area is on a declining curve from 2009 to 2013, which has seriously threatened our grain security.

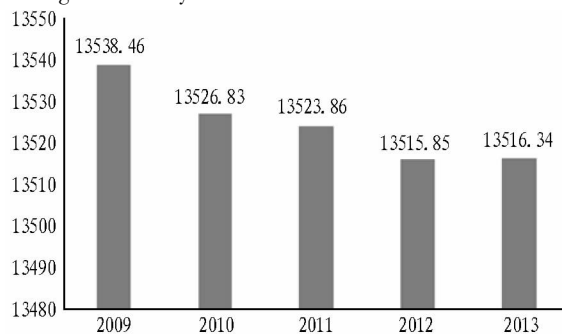


Fig. 1 Changes in national farmland area from 2009 to 2013

**1.2.3** The overall farmland quality is low. According to the second national land survey regarding farmland quality grade, the average quality grade of nationwide farmland is 9.96, showing a generally lower level. The top-grade land area is 3852400 ha, accounting for 2.9% of the total national farmland area evaluated; high-grade land area is 35862200 ha, accounting for 26.5% of the total area; medium-grade land area is 71493200 ha, accounting for 52.9% of the total area; and the low-grade land area is 23864700 ha, accounting for 17.7% of the total area.

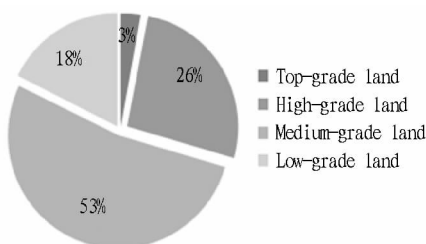


Fig. 2 Proportion of national farmland area at each quality grade

At present, we are facing a very severe farmland situation, no matter regarding the amount or quality. If the situation cannot get improved, there will be a lack of premise and guarantee to ensure grain security in China. With the decreasing of farmland quantity, the major way to increase grain yield is to improve farmland quality. This is why the high standard capital farmland has emerged.

The construction of high-standard farmland is a comprehensive land reclamation activity carried out mainly by means of improving the basic soil productivity of farmland, improving the roads and water conservancy infrastructure *etc.*, strengthening the ecological protection of farmland and further deepening the later-period management and maintenance of farmland. As a new approach and new initiative to guarantee grain security in China, the

construction of high standard capital farmland not only helps to increase grain yield, but also conforms to the new rural construction at present.

But a lot of problems have also emerged during the construction of high standard capital farmland.

## 2 Existing issues in the construction of high standard capital farmland in China

### 2.1 Capital investment doesn't match the endowment of farmland resources

At present, the agriculture-related funds used for high standard farmland construction mainly include the land-use fees of newly-added construction land, land leasing revenue for agricultural land development, farmland conversion tax, and the 10% land leasing revenue for the construction of water conservancy works. Most of the funds above come from land leasing revenues. Among these funds, most of them are used by various regions themselves, except that the 30% newly-added construction land use fees allocated by the central government are inclined to the major grain producing areas by means of central finance transfer payment. According to statistics, in 2009, 2/3 of the land leasing revenue nationwide came from coastal provinces. In the developed areas like Beijing, Tianjin, Shanghai, Jiangsu and Zhejiang *etc.*, the land leasing revenues have been ranking forefront over the years. In these areas, the farmland area is small, agricultural production is in better conditions, and the effective farmland irrigation area ratio, agricultural mechanization degree as well as the unit area grain yield are relatively higher. As a result of this, they have surplus funds due to less missions of high standard farmland construction. But in Henan, Heilongjiang, Jilin, Hubei, Hunan, Xinjiang and some other provinces, the land leasing revenues are relatively lower. They have large farmland area or are rich in farmland reserves. The farmland water conservancy and transport facilities are not complete. The effective farmland irrigation area ratio, agricultural mechanization degree and the unit area grain yield are relatively lower. In these areas, the financing gap is big due to heavy burden of high standard farmland construction. From this, the "inversion" phenomenon between interregional funds investment and high standard farmland construction missions has formed.

### 2.2 Investment is decentralized while comprehensive efficiency can hardly play its role

Despite a few provinces where special funds are centralized for the construction of high standard capital farmland, in most of the other areas, related work is carried out by various departments respectively. This has resulted in decentralized investment and low investment standard, while the comprehensive efficiency of agriculture-related funds can hardly play its role. Therefore, the most important problem for the construction of high standard capital farmland is to make the best of the limited funds, improve the satisfaction of the masses and solve the problems with most concern and in most urgent need of the people.

### 2.3 Labor resources are inadequate

The construction of high

standard capital farmland is the organic combination of "hardware" construction and "soft power" construction. That is to say, the construction of high standard capital farmland requires high-quality cultivators, administrators and operators with chain-like distribution. The high standard capital farmland can develop towards a healthy and orderly direction only with the promotion of new varieties and new techniques in the project area, proper scale of operational mechanism as well as market-oriented cooperative organization with flexible and effective operation. But with the progress of industrialization and urbanization, some new phenomena have presented new challenges for the construction of high standard capital farmland. For example, "non-grain" farmland, "non-agricultural" industry, "multiple job-holding" farmers and "sideline" agriculture have emerged in some rural areas. With the continuous flowing of young labor force in rural areas to the cities, the number of left-behind elderly people, women and children in rural areas has increased greatly. With "women", "children" and "old people" as the most common groups, it's difficult to motivate enough labor force to participate in project construction. In some project areas, the families in shortage of labor forces offer funds instead of labor to hire professional teams for mechanized construction. And in some other project areas with difficulty in raising funds from farmers and with inadequate labor input, the engineering standard and construction progress have been greatly affected. Farmers in some areas have reduced the multiple crop index or changed from the original intensive cultivation to extensive operation, and some of them have even left the farmland uncultivated. The farmers in these areas have very strong willingness to carry out the construction of high standard capital farmland and hope to promote moderate scale management by this way.

**2.4 The degree of farmland fragmentation is high with complex ownership conditions** In China, farmland in China is finely-divided and cluttered. The field ridge proportion is more than twice as that of the moderately developed countries at intensive level. The average land lot area is only 0.087 ha, which is 3.8% of the average land plot area in the Netherlands. This is a serious constraint to the development of agricultural modernization, and is also a huge obstacle we are facing in the construction of high standard capital farmland. On the one hand, in order to reduce the degree of land fragmentation, improve the probability of irrigation and ensure smooth paths, field ridge coefficient must be reduced to merge small land lots to big ones. In the meantime, the irrigation & drainage facilities and the roads built will occupy the original farmland. All these are very sensitive and complex, as they are related to ownership adjustment and concerned with farmer's land rights. In order to prevent disputes, some areas have only made the ownership adjustment over the land occupied for farmland water conservancy works, but the situation of fragmented land lots in project area has not been changed. On the other hand, some areas have completed ownership adjustment by means of land reclamation and have formed the standardized strip fields with grid. But as the area of land contracted by farmers is quite

small, ridges have been built again as the boundary between households. The land is fragmented again, and the quantity of effective farmland has been reduced because of this.

**2.5 Construction period is long with improper later-period management** The construction of high standard capital farmland requires long cycle and long span of time. In addition, some primary-level organizations look up to construction and down on management with a lack of long-term management mechanism in later period. This results in: (i) Improper quality control. For example in a few projects, the control over raw materials, construction technology and concealed work acceptance *etc.* is not strict. (ii) Improper supervision work. Some projects are not measured according to specified standard, the supervision content is not complete and data collection is not standardized. Besides, some of the supervision personnel have inferior professional competence with low level of probity and self-discipline. Because of this, the level of construction project has converted from high standard into low standard, much less for a high-quality project. (iii) Improper management in later period. Due to a lack of later-period management for many projects built, the quality of consolidated land declines again. Great engineering damages and inadequate operation have finally resulted in unsustainable utilization of high standard capital farmland. As most villages and towns have relatively weak economic foundation without specialized management authority, personnel and funds, they cannot raise sufficient funds to carry out dredging, restoration and other maintenance work. Also, the vast scattered and conservative farmers have low enthusiasm to construct high standard capital farmland and are not willing to make investment, resulting in a lack of management subject and management funds in the later period. Because of this, the life cycle and service efficiency of farmland infrastructure has been reduced.

**2.6 The circulation of land management right is in poor situation** The circulation of land contractual management right can be interpreted in both broad and narrow senses. In the narrow sense, the circulation of land contractual management right means that the person having the right of land contracting management transfers the land contractual management right to the others. In this way, the transferee obtains the land contractual management right, while the transferor no longer has this right. This is one of the ways to obtain land contractual management right. In the broad sense, the circulation of land contractual management right also includes the condition that the person with the right of land contracting management separates the contracting right from management right. The right holder can keep the contracting right while only transferring the management right to the others. The result of this transfer mode is that the transferee obtains the land management right, while the transferor is still the subject of land contractual management right. According to the Property Law, the transfer of land contractual management right is specified in the broad sense. The transfer modes of land contractual management right not only include transfer and interchange, but also include subcontracting, leasing, stocking right sharing and mortgage *etc.* In

spite of the above, the land contractual management right can be transferred in various ways on the basis of the basic laws. However in the actual situation, there are still a lot of obstacles in promoting the legal and orderly circulation of land contractual management right.

### 3 Measures for high standard capital farmland construction based on grain security

#### 3.1 Improving the investment mechanism

(i) Increasing investment and promote the integration of funds. According to the principle of "constant channel, proper management, comprehensive arrangement and respective effect evaluation", guide and integrate the agriculture-related funds for the construction of high standard capital farmland. Lay emphasis on the basic, critical and leading industries and fields to give full play to the comprehensive benefits of the funds; at the same time, innovate the fund raising mechanism, motivate various departments, and make overall arrangements on the infrastructure funds for irrigation and water conservancy, land consolidation, soil reclamation and farmland forest net construction *etc.*

(ii) Speeding up fund raising for high standard capital farmland construction. According to the principle of "those who make the investment will get the benefits", encourage the enterprises and public institutions, local village collectives as well as the individuals to participate in the construction and protection of high standard capital farmland. Innovate the way of fund raising, take the form of multiple channels and multiple levels, give play to the initiative of various investment subjects, and gradually form the farmers-dominant investment mechanism oriented by national investment with active involvement of all social segments.

(iii) In combination with land circulation, encouraging private funds to invest the construction of high standard capital farmland and expand fund channel continuously. At present, there is still a certain funding gap for the construction of high standard capital farmland, and the funds need to be raised by means of multiple channels. We need to give full play to the new production and operation entities like family farms, leading specialized households and farmers' cooperatives in the construction of high standard capital farmland. Market operation pattern needs to be explored actively to attract social funds and encourage various regions to construct high standard capital farmland by means of "substituting subsidies with rewards", "subsidies after construction" and "subsidies with construction".

(iv) Establishing a complete reward and punishment mechanism as well as the measures for funds management and comprehensive evaluation to improve funds utilization efficiency. For the regions with good financial fund management, high investment and superior construction effect, the subsidies and rewards can be increased in later period; while for the regions with poor fund utilization effect and improper work done, corresponding penalty will be imposed and subsidies will be reduced in later period; meanwhile, risk-constraining mechanism needs to be established to improve the

fund utilization efficiency; strengthen the efforts of discipline inspection and supervision to ensure that the construction funds are used for specified purpose only in a safe and effective way.

#### 3.2 Mastering the task goal and clarifying the content standard

(i) Overall goal. Strengthen the furnishing level of basic facilities, and improve the production conditions for scale and mechanized agriculture. In this way, enhance the resistance to natural disasters effectively, improve ecology landscape and guarantee grain production security. Besides, fulfill the basic objective tasks for the construction of high standard farmland as defined in the process of land reclamation planning, thus to ensure the sustainable utilization of the high standard farmland.

(ii) Specific objectives. Optimize land layout and utilization structure to ensure that land utilization satisfies intensification and economizing requirements; expand the area of high standard farmland and improve farmland quality effectively; promote the concentration and linkage of land areas to give full play to scale benefits; improve the construction of field infrastructure to provide better agricultural production conditions; enhance supervision and management to ensure the sufficiency and rationality of land utilization.

(iii) Construction content. The construction of high standard farmland mainly includes the maintenance of ecological environment, field roads, land leveling, land protection as well as irrigation & drainage. In this way, ensure that all the land lots and plough layers will border upon roads, trenches and ditches, and make sure that all the cultivation areas can be connected with rural residential areas.

(iv) Construction standard. In relevant farmland construction specifications, the standards concerning farmland engineering construction have been specified. For example, the construction rate of field infrastructure shall be lower than 8%; the field surface height of irrigable ridged field shall not exceed  $\pm 5\text{cm}$ ; the service life of infrastructure shall exceed 15 years; enhance the maintenance of the plough layer, the thickness of which shall not be less than 25cm; the slope cropland with slope ranging between 5 and 5 degrees must have the terraces built at the terracing rate of over 50%; the effective soil layer thickness of farmland shall not be less than 50cm; and the flood control standard shall apply to the protection zone with rural areas as the core. Meanwhile, stick to the criteria including flood drainage, linking trenches, lined-up trees, drought irrigation, connected roads and square fields. Construct high-quality farmland that satisfies modern operation mode and agricultural production with strong anti-disaster ability, high and stable yield, concentrated continuous fields, favorable ecology and well-equipped facilities by means of land reclamation. In this way, provide more reliable guarantee for grain production security.

**3.3 Optimizing management mechanism** Strengthen the whole process management over projects and funds in the construction of high standard capital farmland, and improve the level of scientific and refined management. Constantly implement and im-

prove the management system covering the whole process including project planning design, construction, acceptance & handover and operation management as well as the financial management system with county-level financial reimbursement as the core. (i) Define the management subject and responsibility of high standard capital farmland and improve the management system. Guide and encourage the leading specialized households, family farms, farmers' cooperatives, rural water cooperation organizations, industrialized leading enterprises and village collectives to participate in the management of project infrastructure. Also, encourage the primary-level service organizations of land, water conservancy, agriculture (farm machinery) and forestry to participate in project management and give technical instructions to the management subjects; with "clear ownership and distinct management right" since the beginning of construction planning, contract the ditches, pipe network, power and irrigation facilities of the project area and clearly define the management responsibility; organize project setting, implementation and acceptance according to relevant regulations. Strictly enforce the project legal person system, bidding and tendering system, contract system, project supervision system, announcement system and other related systems to ensure legal procedure, openness & fairness, clear responsibility and proper monitoring. Besides, introduce the expert evaluation mechanism to strengthen the acceptance evaluation of high standard capital farmland and offer rewards and punishments. (ii) Reform the property right system of high standard capital farmland facilities. Clarify the ownership and use right and implement the operation and management funds to achieve harmony among the owner, administrator and beneficiary. Fully arouse the enthusiasm of mass farmers to participate in the management work, make good use of the management funds and ensure the honesty and self-discipline of management staff. Moreover, part of the management funds can be included in the financial budget to monitor the actual effect of project management. (iii) Build up the supervision information platform. Strengthen the foundation work including information collection and analysis, and speed up the construction of information system. By means of the remote land resource monitoring "map" and comprehensive monitoring platform, record the information regarding high standard capital farmland in the monitoring system in a timely, comprehensive and accurate way by virtue of the sharing mechanism of inter-department management information system. Ensure real-time information query, comparison, collection and analysis, and achieve information exchange and sharing as well as its scientific management and utilization.

**3.4 Improving public participation mechanism** Improve the public participation mechanism and guarantee the dominant position and legal interests of farmers. A complete and mature public participation mechanism helps to guarantee the dominant position and legal interests of farmers, and can ensure the compliance of high standard capital farmland with the production requirements of local farmers and the local actual conditions. First of all, related departments need to strengthen the publicity of high standard cap-

ital farmland construction and make its content and meaning well known to the vast farmers. Introduce the relationship between high standard capital farmland construction and the self-interests, thus mobilizing their enthusiasm and initiative for participation to the maximum limit. Secondly, seek the opinions of the farmers. For various aspects of the construction projects including site selection, planning design, field investigation and the circulation of land contractual management right, go deep among the masses to carry out investigation and improve the overall effect of farmer's participation. Third, build up a scientific and reasonable conflict coordination mechanism. As the construction of high standard capital farmland involves the vital interests of thousands of households, various contradictions and conflicts may occur in the layout of farmland infrastructure and the adjustment of land contractual management right. Therefore, a scientific and effective conflict coordination mechanism must be established to fully guarantee the legal interests of farmers and improve their living standard. No doubt, the construction of high standard capital farmland is a magnificent cause that will benefit not only our present generations but also future generations. It carries broad and far-reaching significance for our grain security and the achievement of the sustainable development of human society. The construction of high standard capital farmland involves many details. It's neither a separate project area construction nor an isolated field independent of the society. But rather, it needs to be integrated into the integral development of new rural construction and urbanization. Only with the strength gathered from all aspects, remarkable construction effect can be achieved and the vital interests of farmers can be truly guaranteed from the root.

**3.5 Circulation of land management right** In order to ensure the orderly and normal circulation of land contractual management right, the circulation system must be improved. For the improvement of the circulation system, first of all, we need to recognize the importance of promoting the circulation of land contractual management right from the concept, and get rid of the fuzzy understanding on system improvement. The improvement of land contractual management right system should be conducive to protecting farmer's interests, releasing farmers from the land with corresponding benefits obtained but not sticking the farmers to the land. The protection of farmers' property rights, increase of farmers' income, adjustment of agricultural production structure, achievement of modern, mechanized and scale agricultural operation or the realization of urbanization cannot be separated from the circulation of land contractual management right.

First, confirm the rights of farmers to the contracted land. Second, strictly follow the circulation principle of land contractual management right; stick to the principles of equality, voluntariness and compensation; insist on the agricultural use of land; ensure that the transferee has agricultural management ability. Third, build the market of agricultural property right transaction and enhance the service and supervision functions of the government.

4 Conclusions

The huge size of population and grain demand has determined that solving the food problem on the basis of domestic farmland resources is always the foundation of development. To ensure grain security in China, the 120 million ha of farmland is the red line that can never be crossed. Therefore, farmland protection doesn't only mean defending the quantity, but also improving the quality. For this purpose, the government has introduced a series of policies related to farmland construction and protection to stabilize farmland quantity, improve farmland quality and realize grain self-sufficiency. However, there is still a large area of farmland with quality and basic conditions far inferior to the requirements of high and stable yield and the modern agricultural production system. Constructing a certain scale of high standard farmland to form high-yield, stable-yield and high-efficiency core farmland resources is an effective way to sustain our grain safety and accelerate agricultural modernization. It is of great significance to deepening and expanding the connotative meaning covering farmland quantity, quality and comprehensive ecological protection etc.

The construction of high standard capital farmland contributes to achieving the linkage among farmland standardization, mechanization and scale as well as the improvement in agricultural machinery work capacity, farmland irrigation & drainage ability and farmland productivity. It is of great significance to improving farmland quality and productivity, and is an important initiative to guarantee national grain security, speed up modernized agriculture development and promote new rural construction.

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