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Development Visions and Policies of China's Agriculture Toward 2050

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Abstract: To achieve common prosperity, we need to equalize labor productivity between agriculture and non-agricultural sectors. China's agricultural labor productivity is less than one-third of that in the manufacturing and service sectors. Our analysis of China's agricultural development trend suggests that it is essential to strengthen specialization within agriculture to ensure national food security. Particularly, the cropping sector needs to take a new path for future development—20% of large-scaled farms being responsible for 80% of agricultural products or contributing to 20% of added value, and 80% of small-scaled farms being responsible for 20% of agricultural products or contributing to 80% of added value. Large-scale farms specialize in producing bulk agricultural products to ensure grain security, while small-scale farms specialize in producing high-value agricultural products to ensure income growth. Eventually, labor productivity of large- and small-scale farms will converge to achieve common prosperity. This is inevitable for China's future agricultural development and is an ideal vision in line with national realities. However, transforming to the new path is an arduous task, and the government needs to make strategic deployments and develop corresponding safeguards and incentive measures. Particularly, it is necessary to establish separate policy-supporting systems for large- and small-scale farms, accelerate urban-rural integration, improve the efficiency of markets for land transfer, optimize the innovative system for agricultural science and technology as well as for improving human capital, and establish a guaranteed organizational system to realize agricultural modernization.
Keywords: future agriculture; planting industry; 80/20 pattern; agricultural labor productivity

1 Introduction

Institutional innovation, technology progress, marketization reform, and infrastructure investment have significantly contributed to agricultural and rural transformation in China [1]. The reform and opening-up policies have fundamentally assisted the realization of national food security and propelled structural transformation of Chinese rural economy over the past four decades. This also helps to narrow the gap in agricultural technologies between China and major developed countries that have achieved successful rural transformation. Between 1978 and 2019, total agricultural output has grown at the rate of 5.4% which is far higher than that of the population (1%), contributing to improve national food security. Underlying rapid output growth, agricultural total factor productivity grew at the rate close to 3% [2], and high-value and high-protein products have substantially increased its proportion [3]. Despite major achievements in agricultural development, China still face many challenges for realizing the strategic target of agriculture and rural modernization. For a society of common prosperity to be built by the middle

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of this century, particular efforts are required to balance development between agriculture and other sectors (manufacturing industry and service sector). On one hand, the national food security is still constrained by the increasing demand in the long run and the slower growing pace of the total input into agriculture and agricultural productivity. This necessitates rolling out a scientific layout of agricultural production and further improving agricultural productivity. On the other hand, agricultural development in China remains burdened by the pressure on agricultural resources and the environment, external shocks due to extreme climates and weather conditions, and rural–urban imbalance.

These issues could be addressed by accelerating the agricultural modernization process. It requires the convergence of labor productivity between agriculture and non-agricultural sectors, and strengthening specialization within the agricultural sector to guarantee national grain security, improve and optimize the supply structure of agricultural products, and realize common prosperity for all citizens. In the future, the breeding industry will take the lead in agricultural modernization. Meanwhile, the cropping industry needs to significantly increase its labor productivity and transform to the 20%-80% pattern, in which 20% of large-scale farms being responsible for 80% of agricultural products or 20% of added value, while 80% of small-scale farms being responsible for 20% of agricultural products or 80% of added value. To achieve this goal, there should be strategic deployment from the government during the 14th Five Year Plan period with supportive policies.

There have been several academic researches on the development vision and countermeasures for Chinese agriculture [4,5]; however, their focus is mainly on predicting the supply-demand trend for agricultural products, with little discussion on how to improve agricultural productivity and achieve agricultural transformation. Predictions for agricultural production and consumption in the future vary largely due to their different perspectives; therefore, it is difficult to reach a consensus on the future development vision for Chinese agriculture. This paper proposes a development vision for Chinese agriculture based on a global agricultural development trend analysis, responding to this issue. It explores the strategic planning and macro-policies for future agricultural development in China and the transformation of the planting industry to a 20%-80% pattern from the perspectives of the agricultural labor force and new agricultural technologies. This study focuses mainly on output by taking crop farming and breeding as the main areas with the largest impact on the future development of Chinese agriculture. Furthermore, our discussions are primarily about crop farming when approaching the issue of agricultural development vision and related contents.

2 Development trend and the 2050 vision of Chinese agriculture

2.1 Development trend of Chinese agriculture

Productivity in agriculture and other industries (manufacturing and service) has converged. The total output of agriculture has been on the rise, while the proportion of agricultural employment and the share of agriculture in the GDP have declined since 1978. In 2019, there were around 177 million employees in agriculture, or 23.6% of the national total employment, down by 46 and 36 percentage points against 1978 and 1991, respectively (Fig. 1). The decline in the proportion of agricultural employees is largely attributable to the rapid development of the non-agricultural sector since the reform and opening-up of China, which raised the share of non-agricultural employment in rural areas from 9.2% in 1978 to 84.4% in 2018 [6,7]. The continuous decline in the share of rural employment is critical to the transformation of the economic structure of China. However, the current share in China still lags behind that of developed countries by a large margin. Those in developed countries usually drop to 5%, or even lower, after transforming agriculture and the rural economic structure [6]. Meanwhile, the downward trend in the ratio of agricultural employment in developed countries is often accompanied by a decline in the agricultural output ratio. Furthermore, these two gradually converge with each other. In contrast, the share of agricultural employment in China is far higher than for agricultural output; for example, in 2020, they were 23.6% and 7.7%, respectively.

Based on changes in the share of agricultural employment in the last 40 years and the future prediction for employment, the proportion of agricultural employment in China is estimated to decline to 10% by 2030 [8], while the ratio of agricultural GDP will be down to 4.5%; these two figures might be almost equal by 2050, at 4% and 3.6%, respectively. At this point, the difference in productivity for agriculture and non-agriculture sectors is nearly wiped out (1:1.1), and the revenue for agriculture and industry converges. The labor force in agriculture will decrease from 177 million in 2020 to less than 30 million in 2050 (including over 24 million for plantation and more than 5 million for breeding) (Fig. 2). The decline in the labor force in agriculture will be compensated by better labor quality. The improvement of labor quality and higher agricultural labor productivity will cause productivity for agriculture

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and non-agricultural sectors to converge. This guarantees the achievement of common prosperity.

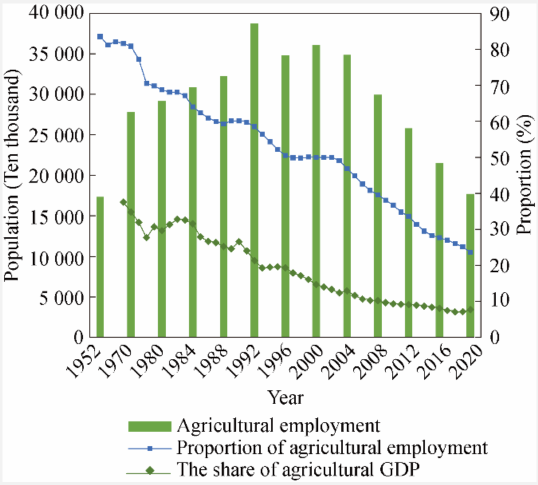

Fig. 1. Changes in Chinese agricultural labor force and the share of agricultural GDP (1952–2020).
Source: *China Statistical Yearbook 2020*.

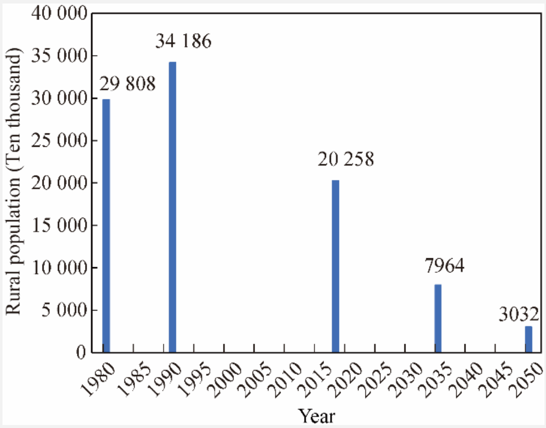

Fig. 2. Changes in Chinese labor force for agriculture (1980–2050).
Source: China Statistical Yearbook covering various years and the project group's predictions.

2.2 Crop production moving toward the 20%-80% pattern

Over the years, China's total grain output has been on the rise, despite fluctuations, along with market reform and technological advancement. Particularly, the record of surpassing 6.5^{8}×108 t for twelve consecutive years since 2009 has ensured national grain security. Simultaneously, agricultural products of high quality and high value registered more rapid growth, embodied by the average annual growth rate of 5.6%–8.6% for pork, beef, and mutton from 1978 to 2018, 7% for aquatic products, and an even faster growth rate for poultry. Driven by the increase in demand, the output of fruits within the plantation sector grows remarkably faster than that of grains and crops, reaching an average annual growth rate of 11% from 1978 to 2018 (Fig. 3). The seeded area for vegetables records an average annual growth rate of 5.1% (and could be even higher if the synchronized increase in per unit yield and quality is accounted for).

The rapid growth of agricultural output is driven by the remarkable increase in agricultural productivity, thanks to the advancement of key technologies and higher utilization of resources. In recent years, farmlands contracted by rural households have expanded as agricultural operation models change during economic and social development. In 2018, the available areas contracted by households nationwide exceeded 539 million *mu* (1 *mu* ≈ 666.7 m^2). However, most plantation farmers remain on a small scale. For example, according to the statistics released by the Ministry of Agriculture and Rural Affairs, the number of rural farmer households with an area of no more than ten *mu*, accounted for over 85% of the total productive rural households (Fig. 4). This reveals the existence of conflicts between small-scale farms and the large market for a long period to come.

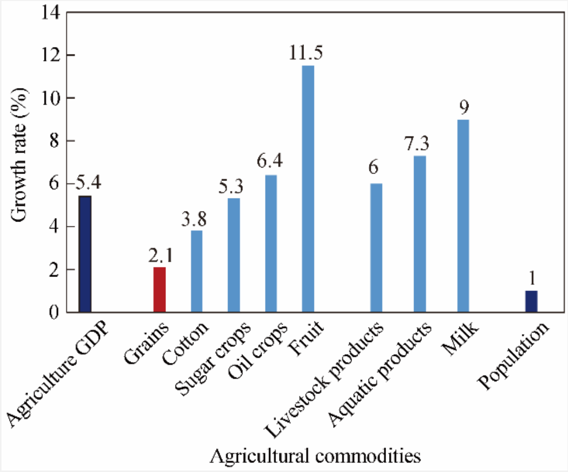

Fig. 3. Chinese agriculture, grains and major agricultural products, along with average annual population growth for the past 40 years.

Source: *China Statistical Yearbook 2020*.

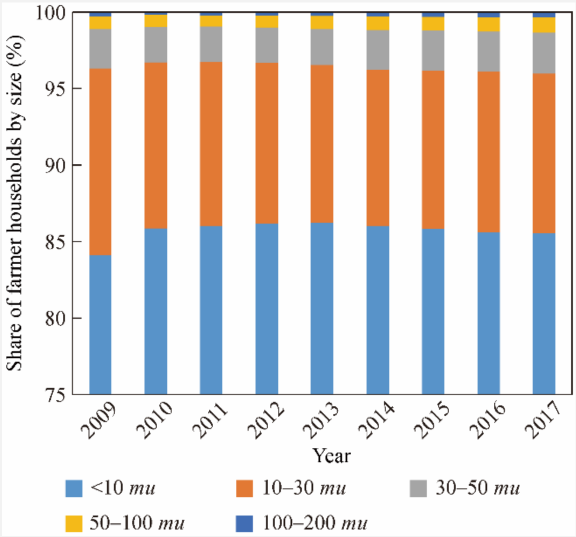

Fig. 4. Changes for the share of farmer households of different operational scales (2009–2017).

Source: Statistics of the Ministry of Agriculture and Rural Affairs.

Breeding will be the first area to be modernized on a large scale in the next three decades. Additionally, the agricultural acreage per labor force in crop farming, despite the continued increase, will remain below 75 *mu* by 2050 (1.8 billion *mu* /over 24 million people). The vision for crop farming development is: (1) family farms (with an average of two persons in the labor force) will be the main player; (2) large farms whose agricultural acreage is over 100 *mu* will take around 20%, while those with less than 100 *mu* will take 80%; (3) 20% of large farmers will produce 80% of crops or 20% of added value, while 80% of small farmers will produce 20% of crops or 80% of added value. This vision objectively captures the features of the 20%-80% pattern for Chinese plantations. Large-scale farms mainly produce bulk agricultural products, including grain, to ensure food security, while small-scale farms develop high-value agriculture to ensure income growth. Eventually, the labor productivity of large-scale and small-scale farms will converge to achieve common prosperity.

2.3 Agricultural technologies moving toward modern biotech, intelligent, and eco-friendly technologies

Scientific and technological advancement serves as the fundamental guarantee for the growth of agricultural productivity and national food security and remains the primary driving force for future agricultural production development and output growth [9–11]. The annual scientific and technological development rate for Chinese agriculture from 1978 to 2016 was close to 3% (far higher than the international average level); agricultural total factor productivity contributed over 56% to the total agricultural output value.

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In retrospect of agricultural development in China, the changes in the agricultural production factors propelled the development and upgrading of technologies. In the early days, agricultural production was an extensive operation, supported by techniques ranging from extensive cultivation to reclaiming wasteland. The crops planted then were mainly traditional local varieties. Based on farmers' experience, outstanding production techniques were summarized for field management [12], with technologies featuring the utilization of land and conservation of capital [9]. The approach of extensive cultivation could not meet the increased demand for grain output, as the reclamation potential of land faced a bottleneck, owing to the growth of the population and the expanded economic scale. Therefore, the locals began to seek higher per unit yield. However, when fertilizer was used in larger amounts, the output from the original varieties stored by farmer households was restricted by the lack of lodging resistance. As a result, highly lodging-resistant varieties received the major demand in grain production. China was among the first in the world to produce short-stalked varieties, and they rapidly became dominant in Chinese agricultural production [13]. At this stage, technologies were featured by land conservation technologies and land replacement with capital [9]. It is worth noting that the green revolution of technologies that focused on short-stalked varieties realized the substitution of manual harvesting with large-scale machinery (integrating harvesting, threshing, plowing, and fertilization). However, farmers were inclined to increase the amount of applied fertilizer for short-stalked varieties, as they had better lodging resistance and higher yield potential. Thicker plant canopy induced more damage from insects, which in turn further drove higher input of fertilizer, thereby triggering changes in the whole technological system.

Unlike the green revolution of technologies, biological breeding technology reduces the production input while boosting the yield. For example, the industrialized planting of insect-resistant, genetically-modified crops has significantly reduced the amount of pesticides required, thus reducing the labor input of pesticides; the adoption of new herbicide-resistant, genetically-modified varieties has partially substituted artificial weeding techniques with chemical pesticides [14]. Although these new technologies could partially replace the labor force, they can only impact individual input factors without altering the whole technological system or triggering changes in the production methods.

The development and application of sensors, remote sensing, information technology (IT), and Internet of Things in agriculture will work with biological breeding technologies to engender another round of agricultural technological revolution in the next three decades. For example, the application of sensors and remote sensing, among other technologies in agricultural production, could realize precise perception, while IT and Internet technologies can realize more precise control. Decisions with better precision can be made with the help of available information about production and the market for smarter and more intelligent agriculture [15].

Intelligent agricultural technologies will fundamentally change production and operation in agriculture by replacing labor input with highly efficient machines, looking ahead. (1) It could perceive the production process and replace the partial labor force with machines while avoiding perception differences caused by various production experiences. (2) It could control the production process (for example, mastering information about the moisture content and nutrients of the soil) and automatically decide which measures to take (for instance, how much fertilizer and irrigation should be given). This is to address issues in conventional agriculture of relying too much on people's experiences without a well-founded scientific basis by introducing automatic control into the production process. (3) It could free most of the labor force from the demand for observing fields and expand production scale of individual farmers. (4) It could achieve the industrialization of agricultural production, bringing the whole production process under standardized conditions and making the production environment of agriculture more adaptable [16].

In the next three decades, green and healthy technologies will become the inevitable and natural option for market competition, with agricultural production pursuing high yield and intelligence. When production becomes smarter, customers' demand shall be better satisfied with greener and healthier agricultural products. Furthermore, it will demonstrate the harmonious coexistence of the beautiful countryside for agricultural production, with modernized villages and towns in a better ecosystem for agriculture.

3 Major challenges for agricultural development in China

3.1 Aging and low education level of agricultural labor force

In the past thirty years, the ratio of labor force productivity for agriculture and other industries went down from 1:4.8 to 1:3.7 and will further decline to 1:1.1 in the next thirty years, which is attributable to the remarkable improvement in farmers' overall quality. On one hand, nearly half of Chinese farmers are over 50 years old, as the new generations of the rural population are unwilling and unskilled to engage in agricultural production and thus leave the rural areas and land [17,18]. In some places, agriculture falls into the hands of the elderly [19,20]. On the other hand, agricultural practitioners are generally less well-educated. The development of Chinese education achieved marked progress with the full accessibility of high school education in 2020. However, the drainage of human capital from rural areas leads to a lack of knowledge among agricultural practitioners. According to statistics in the *China Labor Statistical Yearbook*, the primary force among agricultural practitioners in China still includes those who have never taken any form of education, or merely graduated from primary and lower secondary schools. These three types accounted for 7.4%, 38.8%, and 45.9%, respectively, in 2019, registering some improvement against 2002 (Fig. 5). Agricultural practitioners with at least a college degree only account for 1%, or 1/10, compared to accommodation and catering (10.1%) and 1/100 of that in education (74.5%). Those with upper secondary education backgrounds amounted to 6.8%, far below the average 18.7% in other sectors.

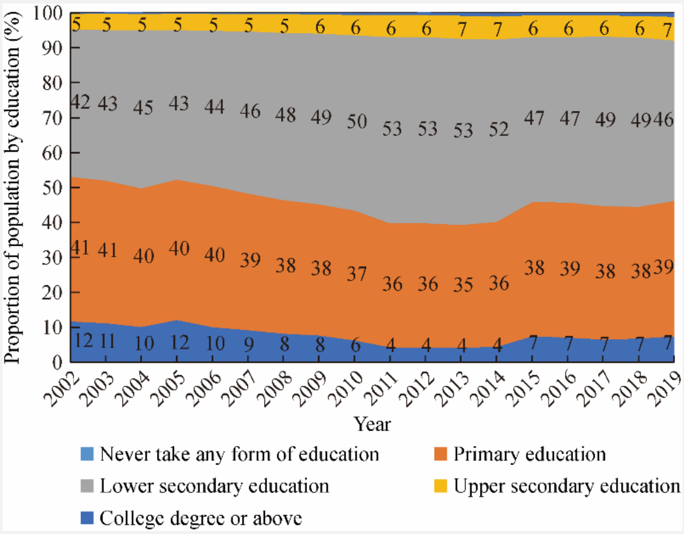

Fig. 5. Changes in the structure for educational background for Chinese agricultural practitioners (2002–2019).
Source: *China Labor Statistical Yearbook 2020*.

There is still much potential for Chinese agricultural practitioners to be better educated when compared with developed countries whose labor force in agriculture mostly has a high school education background. For example, in 2016, 53.1% of farmers in the United States had a high school diploma [21]; this figure was 74.8% in Japan [22], 63.5% in Germany, and over 40% in the United Kingdom [23]. In China, however, farmers with a high school education background only take 7.1% of the labor force, among which more than 90% have no more than a junior high school education. The proportion of Chinese farmers with no less than a junior college education is even smaller, with only about 3.5% in the United States, 4.7% in the United Kingdom, 5.1% in Germany, and 7.0% in France.

3.2 Absence of appropriate training system

When the agricultural educational system is mainly composed of general higher education institutions, advanced vocational schools, and junior vocational schools, which are all relatively marginalized, its attractiveness weans a lot. According to our research, there were 1245 general higher colleges/academies in 2018, among which 47 were related to agriculture and forestry. This figure rose to 51 when comprehensive colleges were considered. Compared with the year 2004, the enrollment in agriculture-related colleges and universities remained lower than the overall growth rate for general colleges and universities, regardless of the increase of 48 percentage points. In 2015, higher vocational colleges in China only recruited 59 000 students for junior college education in agriculture, forestry, husbandry, and fishing (1.7% of the total 3.484 million enrollment), much lower than the expected level required for relevant industrial development. A survey targeting 5150 out of 9132 secondary vocational schools across the nation found that only 1145 set majors related to agriculture, which created a huge gap in the scale and quantity required for rural revitalization.

There is inadequate integration of agriculture science considering the knowledge structure. The knowledge structure for people trained in the current system remains simplified and insufficient to support modernized agriculture and rural development. The conventional setup of majors in secondary and higher vocational schools is

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concentrated in areas closely related to agricultural production, such as animal husbandry, veterinary medicine, modern agronomic technology, garden technology, and the use and maintenance of agricultural machinery. Only a few of them provide training for rural environmental monitoring, fire protection for forests, and the production and management of circular agriculture. The production and operation of family farms and the inspection and management of agricultural product quality have not yet been provided. Contents related to smart agriculture and digital technology for a new era are rarely available in training and teaching. Therefore, it is difficult for the current structure of professions and majors, together with the flawed training structure, to support modern industrial development in rural areas.

The training system also needs to be improved. Key content in promoting modernized agriculture is for farmers to actively gain educational training and build up quality. However, the current training system for the agricultural labor force does not have a clear target or rational content, which results in the waste of resources. It is necessary to establish an evaluation system as a result. In recent years, theoretical research has been built as the government formulated and introduced related policies and regulations and earmarked more financial support to this area [24]; nevertheless, new requirements are needed for vocational education and training for farmers, given the disadvantages of the original setup as a result of the deepened institutional reform of the market economic system and accelerated agricultural modernization [13].

3.3 Challenges for balancing grain security and common prosperity

The fundamental reality in China is that arable land has to outperform itself by supporting an out-sized population. This determines that China cannot follow the model of full-scale development as in South America and North America. Instead, large- and small-scale farms will coexist for a long time. However, the current production pattern of crop farming can neither sustain grain security, nor realize the common prosperity of both large- and small-scale farms. In 2017, farmer households with less than 10 *mu* of arable land accounted for 85.4% of the rural population, whereas grain production of small-scale farms could not support their families. Farmer households, stock cooperatives, industrial and commercial enterprises, land trusts, and other operators with more than 100 *mu* of arable land (less than 2%) were also engaged in sectors and businesses other than agriculture and grain production owing to fluctuations in crop price and unstable grain yield.

The target of common prosperity for large- and small-scale farms requires small-scale farms to develop agricultural products of high value to raise income. With the increase in income and upgrading of consumption structure, residences' demand for food is structured with an inclination toward green and organic agricultural products with high quality and high value. This can be particularly satisfied by small-scale farms. We also have to notice that small-scale farms lack professional skills, social services, and stable and supportive policies when developing agriculture of high efficiency and high quality. Recently, they are also bounded by policies preventing them from engaging in sectors other than grain production.

It is a huge challenge for increasing incomes for farmers and the whole population after poverty alleviation is completed. On one hand, the labor productivity ratio for agriculture and non-agriculture industries dropped from 1:48 to 1:3.7 and shall further drop to 1:1.1 in the next three decades. Furthermore, 147 million members of the labor force will migrate from the agricultural sector to the non-agricultural sector to secure a job. With a low level and slow growth for the baseline labor productivity in agriculture, it only accounted for 32.6% of labor productivity in non-agricultural industries in 2020. When every sector is promoting the overall growth in labor productivity, non-agricultural employment growth of labor force in rural area is beginning to lower its pace. This makes it more difficult to drive the scale production of agriculture and raise labor productivity by encouraging the labor force in rural areas to be employed in non-agricultural sectors. On the other hand, high-quality farmers constitute a foundation for developing modern, smart, and ecological agriculture. However, aging and under-educated farmers are deprived of the human resources capable of supporting agricultural development for the future.

4 Agricultural development strategies and countermeasures for 2050 in China

4.1 Strategic planning for agricultural development

Based on the development vision and major challenges for agriculture, by the year 2050, the breeding industry will be the first in Chinese agriculture to realize modernization on a large scale, which will lay a foundation for the cropping industry to complete the transformation to the pattern of 20%-80%. The 14th Five Year Plan is a critical stage to realizing this strategic target.

4.1.1 The strategic target of common prosperity for farmers and citizens will be realized by significantly improving labor productivity for agriculture.

In the 14th Five Year Plan, agricultural GDP and employment need to reduce from 7.7% and 23.6% in 2020 to 6.7% and 19% in 2025. Were this target not achieved in the 14th Five Year Plan, the vision for the medium and long term (5.2% and 10% in 2035 and 3.6% and 4.0% in 2050) would not be realized. Correspondingly, farmers' quality needs to match the current level in Japan, Europe, and the United States in 2035 and 2050.

4.1.2 Breeding will take the lead in being modernized on a large scale.

A fundamental characteristic and a necessary option for the Chinese breeding industry is transforming from a conventional production model to a more modernized large scale. As China is comparable to the United States and Japan in scaled livestock breeding technology, China will first modernize breeding for scale development. The advancement of industrial technologies and expansion of scales create conditions for breeding to widely apply frontier production technologies and equipment, such as automatic feeding, automatic environmental control, automatic weighing and measuring facilities and equipment with impressive performance, portable facilities for animal estrus, artificial insemination and pregnancy testing, as well as equipment for water drinking, manure cleaning, automatic disinfection, and intelligent technologies. In addition, Internet of Things can be applied to prevent and control major risks of diseases, make early diagnoses of disease infections, evaluate the effect of animal herd immunity, perform differentiated diagnoses of infected and immunized animals, monitor disease risks, and issue early warnings.

4.1.3 Transforming crop farming to the pattern of 20%-80% to guarantee grain security and realize common prosperity for large- and small-scale farms.

In the 14th Five Year Plan, a pattern will take shape where large-scale farms mainly produce bulk agricultural products, including grain, to ensure food security, with small-scale farms developing high-value agriculture to ensure income growth. Moreover, a landscape of labor division will be formed to benefit rural revitalization. With family farms being the mainstay of production, the proportion of large-scale farms with over 100 *mu* of arable land will increase from 2% to 5% in 2025 (averaged at 140 *mu*), 15% in 2035 (averaged at 150 *mu*), and 20% in 2050 (averaged at 500 *mu*); the averaged areas run by small-scale farms will grow from over 10 *mu* currently to 20 *mu* in 2025, 30 *mu* in 2035, and 60 *mu* in 2050. At that time, the pattern of 20%-80% will finally be implemented. Additionally, common prosperity will be realized when large-scale farms produce grains on a large scale, with measures taken to secure incomes for grain; meanwhile, small-scale farms will have higher incomes by developing high value agriculture.

4.2 Countermeasures

4.2.1 Establishing separate policy support systems for large- and small-scale farms before 2025

The policy system in support of large-scale farms is mainly about family farms at a moderate operation scale, long-term circulation of the land-management right, construction of agricultural infrastructures, maintenance and increase in subsidies to agricultural machinery, special funding channels for agricultural credits, the building of granaries, and risk-coping strategies, such as insurance for production and income. As for the small-scale farms, the support system is mainly about establishing production and marketing cooperatives, development of e-commerce and micro-credit, social services for the entire industrial chain, brand building based on local characteristics, and insurances covering production and market risks.

4.2.2 Integrating rural–urban integration and facilitating land transfer

It is necessary to accelerate a fairer process of urbanization. This creates many non-agricultural employment opportunities for rural laborers and promotes the equalization and fairness of public services for the permanent urban population, including migrant workers. Non-agricultural employment in villages and towns will be promoted, and farmers will have more opportunities to do part-time, non-agricultural jobs in slack seasons. Special funds will be set up to encourage young villagers to take agricultural education and training, either on-the-job or off-the-job. Family farms' establishment will be supported. Additionally, the land will be transferred in an orderly manner, with a mechanism to form prices for land transfer and platforms for the transaction of land property right in rural areas. This will be based on blockchain, together with management and services organizations, for land transfer.

4.2.3 Establishing an innovative scientific and technological system to support large- and small-scale farms

A system for scientific and technological innovation compatible with the development of modern, smart, and

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ecological agriculture and a mechanism for technological innovation in integrating multiple disciplines and sectors will be built. Research and development investment in key links to develop core technologies and break bottlenecks during the development course of modern, smart, and ecological agriculture will be enhanced. Biological breeding and key gene discovery will be improved. Intelligent agricultural machinery and equipment, creation of green inputs, improvement in food nutrition and health, supply chain of intelligent agricultural products, enhancement of agricultural ecological functions and environmental protection, and so on, will be further built up. China will be better positioned to take initiatives in international competition and promote the overall indigenous innovation of modern agricultural technologies. Attention will be given to applying disruptive agricultural technologies, biological and digital technologies, and equipment in large-scale agriculture. Besides, quality will be enhanced, and digital technologies will be adopted in the production and marketing process for small-scale farms.

4.2.4 Improving education and training system to cultivate talents for modern agriculture

Urgent development needs will be met in the medium to long term by reforming the educational models for agriculture and the corresponding modes of fiscal support in the secondary and higher vocational education system. Given the target of improving farmers' quality, the curriculum will be optimized, and training courses related to field production and marketing will be set up to pass on knowledge to farmers in different production stages. Emerging talents suitable for the transformation to the pattern of 20%-80% will be trained in batches to directly engage in agricultural production. Additionally, mechanisms to appraise talent training performance and quality and provide fiscal support will be established.

4.2.5 Reorganizing institutions and adjusting their roles within government's administration

It is recommended that the Ministry of Agriculture and Rural Affairs set up a special coordinating institution to develop modern and smart agriculture. It will be responsible for coordinating the development of modern, intelligent, and ecological agriculture alongside policymaking across all departments, unifying policy formulation, and improving development direction. Proposals will be made for administrative departments such as the Department of Science, Technology, and Education, the Bureau of Animal Husbandry, and the Department of Seed Industry, to fully support large- and small-scale farms in their respective development based on labor division and to play their own roles. Additionally, the Department of Science, Technology, and Education, which is under the Ministry of Agriculture and Rural Affairs, will be in charge of and back up the production and marketing of large-scale farms, whereas the Department of Economic Management and the Bureau for Rural Revitalization will support the development of high-value agriculture by small-scale farms. Furthermore, smarter crop farming and breeding will be supported, and agricultural production will become greener and healthier to construct new villages focused on creating a beautiful countryside and a more inhabitable homeland.

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