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Program Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 17-May-2024 | Report No: PIDPA00095

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BASIC INFORMATION

A. Basic Program Data

Project Beneficiary(ies)	Region	Operation ID	Operation Name
China	EAST ASIA AND PACIFIC	P181021	Sustainable Fodder Production and Low Methane Livestock Development Program-for-Results
Financing Instrument	**Estimated Appraisal Date**	**Estimated Approval Date**	**Practice Area (Lead)**
Program-for-Results Financing (PforR)	13-May-2024	27-Jun-2024	Agriculture and Food
Borrower(s)	**Implementing Agency**		
People's Republic of China	Gansu Provincial Department of Agriculture and Rural Affairs		

Proposed Program Development Objective(s)

The Program Development Objective is to improve productivity and lower methane emissions in selected livestock sub-sectors, and enhance the governance system for greening the livestock sector in the participating counties of Gansu province.

COST & FINANCING (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)?	Yes
Is this project Private Capital Enabling (PCE)?	No

SUMMARY

Government program Cost	**824.80**
Total Operation Cost	**824.80**
Total Program Cost	824.30
Other Costs (Front-end fee,IBRD)	0.50
Total Financing	**824.80**

Financing Gap	**0.00**

FINANCING

Total World Bank Group Financing	**200.00**
World Bank Lending	200.00
Total Government Contribution	**624.80**

Decision

Other

B. Introduction and Context

Country Context

1. **China's economic development and climate change are closely interrelated, yet its quest for growth and prosperity is increasingly constrained by the impacts of climate change**. Since 2020, China has seen a moderation in economic growth rates, resulting from structural shifts of its drivers from public investments in infrastructure to private consumption. At the same time, as highlighted in the China Climate Development Report (CCDR, 2022), climate change is increasingly becoming a constraint on economic growth and could threaten to reverse its development gains[1]. Losses from adverse climate events could reduce GDP by between 0.5 and 2.3 percent as early as 2030, and income losses will disproportionately hurt the 40 percent of households with lowest incomes. Today China accounts for a third of global emissions, playing an essential role in slowing global emission trends. The country is also the world's largest emitter of methane (CH_4), which has 84–87 times the global warming potential of carbon dioxide over a 20-year timescale,[2] as well as of nitrous oxide (N_2O), another highly potent GHG.[3]

2. **After 40 years of unprecedented economic growth[4], China eradicated absolute rural poverty in 2020, ten years ahead of the United Nations' Sustainable Development Goal target of 2030.** According to the last accessible household survey data from 2020, the share of rural people living below the extreme international poverty line of US$2.15 per day (2017 PPP) had fallen to below 1 percent. Despite this remarkable achievement, about 348 million Chinese remain below the poverty line of US$6.85 per day which is used in upper-middle-income countries, of which two-thirds reside in rural areas. Approximately 40 percent of China's population (or 570 million people) still live in rural areas, and many are vulnerable to falling back into poverty in face of an economic shock or natural disasters, such as floods and droughts. Rural revitalization, as per the National Rural Revitalization Program (RRP, 2018–2035) adopted in 2017, is seen as a way to consolidate earlier rural poverty reduction gains going forward.

[1] World Bank, China: Country Climate and Development Report (CCDR), 2022.
[2] *Methane Tracker 2020 - Analysis - International Energy Agency*
[3] Nitrous oxide is 300 times **more potent** than CO_2 and takes 114 years to break down.
[4] China's nominal gross domestic product (GDP) per capita grew from US$229 in 1978 to US$12,720 in 2022 (World Bank).

3. **China's agriculture sector is the largest global emitter of GHG emissions, accounting for 13 percent of the global emissions from agriculture.** Agriculture is the fourth largest source of GHG emissions in China after the energy sector, manufacturing and construction, and industry, accounting for 6 percent of the total GHG emissions, equivalent to 792 $MtCO_2e$ a year.[5] Progress toward reducing GHG emissions from agriculture is being made, although the agriculture sector remains far from carbon neutrality.

4. **The livestock subsector, while an important contributor to ensuring the country's food security, is the largest source of agriculture GHG emissions in China** (at 39.2 percent), followed by inefficient fertilizer use (21.8 percent) and paddy rice cultivation (16 percent). Of the livestock sector GHG emissions, gastroenteric fermentation from ruminant animals (28.7 percent) and poor livestock waste management (10.5 percent) are the main sources. Beef has the highest GHG intensity (19.6 kg CO_2e/kg), followed by mutton (10.0 kg CO_2e/kg), chicken (4.4 kg CO_2e/kg), and pork (3.8 kg CO_2e/kg). Livestock is the main source of both methane, accounting for nearly one-quarter of the country's annual anthropogenic methane emissions, and nitrous oxide emissions. sector is gradually transitioning towards more consolidated, intensive commercial livestock production systems. While this is expected to reduce the GHG intensity per unit of livestock products compared to extensive production systems, it could increase point and nonpoint sources of air and water pollution.

5. **The demand for livestock products is expected to continue increasing, with growing disposable incomes driven by urbanization.**[6] It has been estimated that by 2030, the demand for beef in China will grow by 82 percent, 87 percent for mutton, 97 percent for yoghurt, and 10 percent for milk (Food and Agriculture Organization [FAO]). The livestock sector plays an important role in ensuring the country's food and nutrition security goals, and also as a source of jobs and incomes to producers and processors along its value chains.

6. **The Government of China has embarked on greening its agriculture sector development.** A series of strategies and plans have been adopted to ensure a more *sustainable* and greener economic development pathway going forward. First, the *Sustainable Agriculture Development Plan (2015–2030)*, which underpins this Program-for-Results (PforR), was adopted in 2015. The *Green Agriculture Development Strategy* launched in 2021 promotes green growth and decarbonization in the agricultural (including livestock) sector and addresses the issues of GHG emissions and pollution, low resource use efficiency, and sustainability of food production systems. *The National 14th Five-Year Plan (FYP) for Green Agriculture Development (2021–2025)* aims to increase land and water resource use efficiency, reduce agricultural GHG emissions, improve agricultural ecosystems and environmental quality, and reduce chemical fertilizer and pesticide application. China's response to the challenges created by climate change is also articulated through its 'dual carbon' goals (2020), which aim to peak the carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060. These ambitious goals, however, will require structural transformation of food systems to achieve the triple wins of increased productivity, reduced GHG emissions and enhanced climate resilience. This requires changes in production scale and structure towards more professionally managed commercial entities which have ability to adopt modern technologies and practices.[7]

[5] China CCDR, World Bank 2022.

[6] During 2013–2021, the 65 percent increase in real personal disposable income showed concomitant increases in p.c. consumption of livestock products of 67 percent for beef, 56 percent for sheep meat, 94 percent for poultry meat, and 27 percent for pork. China Statistical Yearbook, 2022.

[7] World Bank and Global Environment Facility-financed projects have piloted and scaled up sustainable livestock management practices, in particular the Climate Smart Management of Grassland Ecosystems (P166853) project and the China Guangdong Agricultural Pollution Control (P127775/P127815) project.

Manure management,[8] modern livestock rearing practices which reduce carbon intensity, and technology adoption forage production are some of theexamples that have been successful in achieving the above mentioned triple wins.

Sectoral and Institutional Context

7. **Gansu Province is one of the poorest provinces in China with lingering relative poverty.** With a population of about 25 million (2022), Gansu ranks last out of 31 provinces and administrative regions in China in terms of GDP per capita. Rural population accounts for 46 percent of the province's population. Agriculture represents 13.3 percent of the province's GDP - one of the highest among China's provinces - compared to 7.3 percent of China's average (World Bank, 2022). Agriculture's share of employment is 25 percent compared to 23 percent of national average (World Bank, 2022).[9] In Average personal disposable income per capita was CNY 23,273 in 2022 (approx. US$ 3,502), equivalent to 63.1 percent of national personal disposable income of CNY 36,886 per capita.[10] Around 13.3 percent of people in rural areas in Gansu are beneficiaries of social assistance programs for low-income families (*Dibao* and *Tekun*), with per capita incomes below RMB 415.2/month (US$ 3.84/day in 2017 PPP terms).[11]

8. **The livestock sector is a key engine for economic and income growth in Gansu province.** The sector accounted for 44 percent of the value of agriculture sector value added in 2021 (Gansu Department of Agriculture and Rural Affairs [DARA]). The number of animals is expected to continue growing over the next 5–7 years, at an estimated rate of 4 percent per year[12]. However, a significant livestock productivity gap exists between the Gansu and the rest of China. The average milk yield per cow in the province is 65 percent lower than the average in China (2,088 kg in Gansu vs. 5,940 kg in China), and beef productivity is 26 percent lower than in China (109 k/cattle vs 140 kg/cattle). Only mutton productivity slightly exceeds the China-average (15.9 kg/animal vs. 15.6 kg/animal).[13]

9. **The livestock-driven economic growth over the past decades has resulted in rapidly rising sectoral GHG emissions.** The sector emissions increased from 5.4 million tons in 2000 to 8.3 million tons in 2017, with an average annual growth rate of 2.5 percent.[14] Carbon emissions caused by livestock farming account for 71 percent of the total emissions, including 43 percent coming from livestock manure and 28 percent from enteric fermentation[15]. Enteric fermentation accounts for between 60 and 86 percent of the total emissions per animal and ruminants account for 78 percent of GHG emissions from meat production in Gansu, over two-thirds of which comes from cattle. The GHG emission intensity in Gansu's livestock system is a third higher than the national average.[16] Therefore, introduction and scale-up of modern low-emission livestock production technologies and practices are needed for to reduce net livestock GHG emissions.

10. **Livestock sector in Gansu is characterized by low levels of modernization coupled with high resource use intensity.** The livestock sector overall is characterized by low animal productivity, high GHG emission intensity,

[8] The Government has supported an effective program to improve manure management on 279,000 large-scale livestock farms, which has increased manure utilization rates to 75 percent and modernized and mechanized 95 percent of manure management systems on these farms.
[9] HKTDC Research.
[10] China Statistical Yearbook, 2023.
[11] *Source:* Ministry of Civil Affairs. Additionally, the PPP factor for rural China is 3.5.
[12] It should be noted that this estimated increase in the livestock numbers is subject to several potentially restricting factors, such as the availability of feed and other resources, and – ultimately – the market demand for the products.
[13] National Statistics Bureau, MARA, Gansu DARA. 2021.
[14] Ying, Lv. 2020. "Comprehensive Calculation and Driving Force Analysis of Agricultural Carbon Emissions in Gansu Province." *Journal of Cooperative Economy and Technology* 20.
[15] The inverse ratio between the emissions from enteric fermentation and manure is likely due to the manure left in the grazing lands.
[16] Wei, Ying, Xue Zhang, Mejia Xu, and Yuan Chang. 2023. "Greenhouse Gas Emissions of Meat Products in China: A Provincial-level Quantification." *Resources, Conservation and Recycling* 190 (2023): 106843.

fragmented and underdeveloped value chains, and low awareness and adoption rates of low-emission technologies and practices. The veterinary services in Gansu, similar to the rest of China, are struggling to address issues related to food safety, antimicrobial resistance (AMR), and control of zoonotic and animal diseases, resulting in limited outreach to livestock farms. Vaccination programs are reaching around 80 percent of large more commercial farms but, on average, only around 40 percent of medium-sized and smallholder livestock farms in the province. At the same time, good animal health practices are essential for improving productivity and reducing animal mortality from diseases, thus lowering the emission intensity per unit of output.

11. **Sustainable fodder production will be a critical factor in enhancing livestock sector's productivity in Gansu while reducing its environmental and climate footprints.** Large forage gap exists in China's mid-western provinces, including Gansu[17]. Sustainable and climate-resilient production of fodder crops is therefore critical to support the intensive livestock sector development in Gansu province, while reducing the sector's environmental footprint.

12. **Gansu is highly vulnerable to climate change, as the region experiences significant climate risks and hazards, particularly droughts and increasing temperatures, and has scarce environmental systems.** The province's environmental systems are characterized by water-scarcity and highly erodible and low-quality soils which contribute high degrees of sedimentation. The natural resource base for agriculture is limited by a harsh, arid climate with average rainfall of 300 mm and cold winters due to its high altitude (> 1000 m); a limited area of good quality arable land and limited water for irrigation. Gansu is one of China's provinces hardest hit by desertification. The province, which includes parts of the Gobi, Badain Jaran, and Tengger Deserts, is suffering from significant moisture drawdown. Annual precipitation is low, varying from 35-40 mm in the north to 735 mm in the south. Climate events, such as droughts, can lead to a further reduction in vegetation growth, resulting in reduced carrying capacities and soil degradation. Addressing climate risks and hazards is, therefore, crucial to ensure the sustainability and resilience of the livestock sector.

13. **The Program aims to reduce GHG emissions and increase productivity and climate resilience of the medium and large livestock production entities (hereinafter Target Livestock Production Entities[18] (TLPEs)), which will serve as demonstration for other farms, cooperatives and enterprises.** This is because such medium and large TLPEs, which are more commercially oriented, have higher capacities, willingness and potential economic gain in adopting new technologies and practices[19]. The novel contribution of the proposed Program is enhancing the governance system for the uptake of new technologies and practices beyond the immediate Program counties. This includes the development of a Measuring, Reporting and Verification (MRV) system for emission reductions from livestock-related activities, which will be the first in China's livestock sector. This will also allow the province to connect more easily to monetize carbon credits once the carbon market for agriculture reopens in China (see footnote), with farmers able to benefit from the additional income streams from the sale of emission reductions to voluntary markets.

14. **The low emission technologies and practices demonstrated by the Program will contribute to closing the productivity gap in the livestock sector.** The proposed PforR is one of the first low emission livestock sector interventions supported by the World Bank, providing an opportunity to replicate the lessons learned to support similar sustainable, productivity-increasing and GHG emissions-reducing livestock projects in other middle income client countries**.** TLPE-level economic analysis indicates that, compared to the BAU scenario, the targeted technological and practice packages (i.e., improving forage quality, feed substitutes, feed supplements, precision feeding, methane inhibitors) would increase

[17] A large forage gap in forage availability in traditional pastoral regions in China. T. Yang, J.Dong, L.Huang, Y.Li, H.Yan, J.Zhai, J.Wang, Z.Jin, G.Zhang. Fundamental Research 3 (2023).

[18] TLPEs include medium and large commercially oriented farms, cooperatives and enterprises.

[19] It should be noted that a consolidation process is ongoing in China's livestock sector and the number of smallholder farms is expected to fall during the next few years. Therefore, it is expected that medium and large farms will be taking up the new technologies and practices first.

livestock productivity on average by 10-20 percent, which is consistent with international evidence. To encourage the uptake of the new technologies and practices by the TLPEs, one-time catalytic subsidy in the amount of 5 percent of the investment[20] will be provided to the 700 TLPEs under DLI#2. Such one-time subsidy for adoption of novel technologies is justified on the grounds that they enable first movers (ie. 700 TLPEs) to test and pilot these technologies, which have not been previously used in China. Such one-off subsidy is justified on the grounds of: (a) mitigating risks related to adoption of these technologies, such as uncertainties about their performance in local contexts in Gansu; and (b) encourage private TLPEs to generate public benefits, such as reducing carbon emissions. There are no recurrent subsidies envisioned for these novel technologies under current or future government programs. The analysis carried out during the preparation showed that such technologies are expected to be profitable, based on international experiences, and this will be assessed and confirmed further during the PforR implementation through the mechanisms devised under DLI6, which is also supporting the ongoing processes of rebalancing public expenditure programs in China, including Gansu, from provision of private good towards provision of public goods and services.

15. **The increased productivity is expected to result in increased profitability at the TLPE level**. Table 1 below provides the results of the profitability estimate calculations based on the sub-sector and TLPE size. The profitability estimates are averages, based on results of three combined technology and practice packages. The analyzed packages include the following technologies and practices: improved forage, feed substitutes, feed supplements, precision feeding, methane inhibitors, and manure collection and storage. The new technologies and practices are estimated to increase TLPE incomes by 19-30 percent (depending on the farm size) with the subsidy (i.e., the one-time catalytic grants), mainly through improved productivity growth. Without the one-time subsidy, TLPE incomes are still higher by 10 -20 percent compared to traditional animal husbandry practices.[21] The PforR dos not recurrent subsidies in any form. Profitability growth is estimated highest for cooperatives under beef production model; enterprises under dairy model and medium sized farms under mutton production model. A Low Emission Technology and Practice in Livestock Sector Manual will be prepared (a PAP action) before the Effectiveness with the detailed costing and resource requirements for the new technologies and practices. This will serve as the basis for the design of the context-specific packages of the technologies/practices tailored for the beneficiaries, to ensure profitability of these technologies to the TLPEs and maximize the GHG emission reductions.

Table 1: Estimated Profitability Improvements by Farm Size, with Program Interventions[22]

Livestock/ Operations	Farm Size	Animal Population	Annual Net Income		
			BAU (CNY)	% Increase with PforR interventions (with one-time subsidy)	% Increase with PforR interventions (without the one-time subsidy)
Beef Production	Medium household	30	24,000	25%	13%
	Large household	50	41,000	22%	12%
	Cooperative	200	196,000	27%	18%
	Enterprise	600	640,600	26%	19%

[20] The average investment is expected to be US$20,000 – 30,000 per TLPE, with a maximum of US$100,000 per TLPE for high-tech technologies (such as precision feeding equipment, biodigesters, etc.)

[21] A subsidy will be provided to PforR TLPEs for two reasons: (i) green technologies (equipment, animals, etc.) can be more costly than conventional technologies therefore the subsidy is expected to support early demonstration uptake; and (ii) by adopting the green technologies, the TLPEs will be delivering a GPG – GHG emission reductions.

[22] The Program interventions also include extension services and advice to the TLPEs. The sources of data for the technology packages are: data from TLPEs, international and national experts engaged by the Bank team during preparation, and research sources. Data on the current farm sizes, income levels, and potential technologies most likely to be adopted by the TLPEs were obtained from Program Counties Bureau of Agriculture, in consultation with the TLPEs.[23] The Program area is defined as the 700 TLPEs and 100,000 ha of fodder production area.

Dairy Production	Medium household	15	9,750	21%	15%
	Large household	30	21,000	19%	10%
	Cooperative	300	252,000	22%	15%
	Enterprise	800	728,000	23%	17%
Mutton Production	Medium household	100	5,000	30%	20%
	Large household	200	11,000	24%	15%
	Cooperative	500	35,800	22%	18%
	Enterprise	900	66,700	26%	19%

16. **The technologies and practices supported under the proposed PforR would result in lower GHG emissions in the Program area[23]. This is expected to come from: (i)** reduced herd expansion rate of 3.5 percent from a projected 4 percent growth rate, due to the herd management and productivity improvement activities; and (ii) **reduced emissions from the livestock-management activities by at least 26.7 percent.** The traditional technology contribution accounted for a 15 percent reduction in emissions from enteric fermentation, and from manure management: 5 percent at MTR stage, and 10 percent at completion stage. The new technologies (inhibitors/additives) supported by the PforR are estimated to reduce methane emission from enteric fermentation by some 20 percent over traditional practices. It is projected, therefore, that GHG emissions will be reduced by 67,858 tons of CO_2 equivalent annually at the mid-term of project implementation period, and by 78,310 tons annually at the completion stage. This calculation of 20 percent emission reduction from the new technologies is a conservative, lower bound estimate, if compared to 35 percent emission reductions from similar technology pilots in New Zealand and other countries.

Table 2: Expected GHG Emission Reduction in the Program area, with Program interventions[24]

Parameters	**Program-Supported Results of GHG Emission Reduction**		
	2023 (Baseline)	**2027 (MTR)**	**2030 (Implementation Completion)**
Number of animals, BAU (with a growth projection of 4.0% p.a. (provincial target))	269,748	315,567	354,970
Total Emissions, BAU, tCO_2e	216,730	254,258	286,176
Number of animals, with Program interventions in the livestock sector (growth projection of 3.5% p.a.)	n/a	309,542	343,195
Total Emissions, with Program interventions in the livestock sector (herd management+ new technologies and practices), tCO_2e	n/a	186,400	207,866
Emission reduction rate in livestock, “with” vs “without” the Program, %	n/a	26.7%	27.4%

C. Relationship to the CPS/CPF and Rationale for Use of Instrument

[23] The Program area is defined as the 700 TLPEs and 100,000 ha of fodder production area.

[24] The BAU in the Table 2 is calculated using GLEAM-i tool, which is FAO’s Global Livestock Environmental Assessment Model (GLEAM), used in project preparation **to calculate greenhouse gas emissions using IPCC Tier 2 methods**; team’s calculations of the GHG emission reduction scenarios. The approach described in paragraph 16 is used for the cacluation of the emission reduction estimates as GLEAM-I tool cannot be used to account for the advanced technologies (such as inhibitors), although they are expected to contribute a significant portion of GHG emisisons under the Program.

17. **The proposed Program is aligned with the World Bank's Country Partnership Framework (CPF, FY 2020–2025) for China (Report No. 11785-CN)**,[25] which was discussed by the World Bank Board of Directors on December 5, 2019. The CPF identifies two broad areas of support: closing the remaining institutional gaps in China's development and the generation of global public goods (GPGs), and three associated areas of engagement: (a) advance market and fiscal reforms, (b) promote greener growth, and (c) share the benefits of growth. The planned Program activities directly contribute to closing the remaining institutional gaps and promote greener growth. To contribute to closing the institutional gaps, the Program focuses on the establishment of governance systems for the uptake of low-emission technologies and practices in the Gansu livestock sector. Under the Engagement Area 2, the World Bank Group (WBG) aims to support the Government's efforts to (a) reduce air, soil, and water pollution; (b) demonstrate sustainable agricultural practices and improve animal health and control of trans-boundary disease management; and (c) strengthen institutional capacity for greening the livestock sector. The proposed Program supports greener growth by facilitating the implementation of results which would lead the transition to a lower-carbon pathway in livestock sector development; reducing air, soil, and water pollution; demonstrating sustainable livestock and agricultural practices; improving animal health and disease risks of the selected livestock value chains, resulting in safer and higher-quality products for consumers; and strengthening institutional capacity for green livestock sector development.

18. **The Program's contribution to GPGs.** Given China's global contribution to GHG emissions from agriculture, the planned Program's results will generate significant global and regional public goods, as shown in Box 1.

Box 1. Contribution of the Gansu Province's PforR to GPGs

The proposed Program will contribute to GPGs through the following actions:

(a) **Reduced GHG emissions.** The PforR is expected to generate substantial climate benefits by centering on the implementation of mitigation and adaptation measures. The Program will result in reduced GHG emissions, in particular, methane, from improved livestock feeding regimes (high-protein/legumes fodder production, emission-reducing additives, and other advanced technological measures), better animal health practices, improved animal breeds and manure management practices, etc., and an enabling environment for the uptake of low-emission and resilience-improving technologies and practices and facilitating development of tradeable emission reductions from the livestock sector. The GHG mitigation measures would also reduce soil and water pollution, contributing to regional benefits. The Program areas are located in the Yellow River basin, which is the second largest river in China. By supporting livestock manure treatment to remove pollutants such as chemical oxygen demand (COD) and biological oxygen demand (BOD), and nutrients like nitrogen and phosphorus, the PforR contributes to preventing pollutants and nutrients from entering water bodies, hence reducing point and non-point source water pollution.

(b) **Contributing to the global knowledge for development.** Low-emission technologies and practices successfully implemented in livestock value chains in Gansu can be scaled up in China, and globally. The establishment of the enabling environment and governance systems enables the scale-up of low-emission technologies and practices in Gansu's livestock sector in the future. They include development of the technical standards and measurement, reporting, and verification (MRV) system and realignment of subsidy systems, which generate knowledge for successful implementation of similar activities elsewhere. Lessons and knowledge generated by the Program would be relevant for other middle-income countries which aim to reduce GHG emissions in their livestock sectors.

19. **The proposed Program is anchored in the CCDR and fully aligned with the World Bank's global commitments, WBG's Green, Resilient and Inclusive Development Framework, the WBG's Climate Change Action Plan (2021–2025),**

[25] World Bank Group. 2021. China – Country Partnership Framework for the Period FY2020–2025. (Report No. 117875-CN). Washington, DC: World Bank Group. https://documents1.worldbank.org/curated/en/902781575573489712/pdf/China-Country-Partnership-Framework-for-the-Period-FY2020-2025.pdf.

and the World Bank's Gender Strategy. The Program supports implementation of climate mitigation and adaptation actions identified under the CCDR, which highlights the use of low-emission practices and technologies in agriculture sector as key for emission reduction. It also follows the CCDR recommendation on the realignment of subsidies in the agriculture sector, which is coordinated with the targeted investment in MRV systems, to allow for the gradual shift in payments toward environmental outcomes. It will support institutional strengthening and capacity building to create the enabling environment for scaling up sustainable low-emission livestock production. The proposed PforR is expected to contribute to the World Bank's new scorecard and climate commitments by promoting productivity and reducing GHG emissions from livestock sector. Responding to the World Bank's Gender Strategy, the proposed Program aims to address the issues of women's access to agricultural inputs and other productive resources, extension services, and trainings which would enable women to benefit from economic opportunities in livestock sector while increasing their representation in decision-making processes.. These are aligned with Pillar 2 (Removing Constraints for More and Better Jobs) and Pillar 3 (Enhancing Women's Voice & Agency and Engaging Men and Boys) of the World Bank's Gender Strategy (2017–2023). The Program remains relevant under the new draft Gender Strategy (2024–2030), which is expected to be launched shortly.

20. **The proposed Program also supports the implementation of China's Nationally Determined Contribution (NDC),** updated and submitted to the United Nations Framework Convention on Climate Change in October 2021.[26] In the updated NDC, China reaffirmed its commitment to tackle climate change under the terms of the Paris Agreement and reiterated its dual carbon goals. The Program specifically focuses on measures within the agriculture sector that contribute to both mitigation and adaptation efforts. These measures include reducing agricultural emissions, increasing carbon sinks in agricultural ecosystems, and enhancing the sector's resilience to climate change. The Program is well aligned with China's climate change commitments and in line with China's Long-Term Strategy and National Climate Change Adaptation Strategy 2035. The Program has considered the country's *Implementation Plan of Emission Reduction and Carbon Sequestration for Agriculture and Rural China* issued in 2022.

21. **A PforR financing instrument has been selected for the World Bank's support to Gansu's livestock sector**. The Government program is supported by strong political and financial commitments from the provincial and local-level governments. The design of the PforR is well aligned with the government's expenditure structure. This allows to leverage the significant public financing that is allocated for greening the agriculture sector under the government strategy and improve the efficiency, targeting and effectiveness of these expenditure programs for generating results at scale and enhance the borrower systems toward the achievement of more impactful results. Additionally, it will also allow for a scaling up of the low emission livestock technologies and practices based on the PforR results and strengthening of the institutional and country systems for the delivery of the results beyond the targeted Program areas after the demonstration phase supported by the PforR.

C. Proposed Program Development Objective(s)

22. **The PDO is to improve productivity and lower methane emissions in selected livestock sub-sectors[27] and enhance the governance system for greening the livestock sector in the participating counties of Gansu province.** The Program aims to achieve results through the triple win of improved productivity, reduced emissions, and enhanced resilience in the livestock sector.

23. **The following PDO-level indicators will measure the achievement of the PDO:** (i) Increased productivity in selected livestock sub-sectors (beef, milk and mutton) defined as increase in volume of production among the TLPEs

[26] The 2021 United Nations Climate Change Conference is more commonly referred to as COP26.
[27] The livestock sub-sectors included under the PforR are: beef cattle, dairy cattle, sheep and goats.

(percentage) (RA1); (ii) Net Green-House Gas (GHG) Emissions (methane, nitrous oxide and carbon dioxide) per year among the TLPEs (Metric tons/year) (RA1); and (iii) Enhanced governance system (technical standards, MRV system, subsidy system and green product certification) achieved (RA2).

D. Environmental and Social Effects

24. **An ESSA has been conducted to evaluate the soundness of applicable environmental and social (E&S) systems**. A combination of approaches were applied during the assessment, and relevant stakeholders were consulted in all Program counties. Overall, a robust engagement was carried out with over 380 relevant stakeholders during the ESSA process, of which over 30 percent were female. The following has been carried out: (a) thorough screening and assessment of the potential E&S risks and impacts from the activities to be supported under the PforR; (b) review on the E&S laws, regulations, and procedures related to managing the E&S risks and impacts associated with the PforR activities at the provincial, and local levels; (c) field visits to sites of PforR activities in the selected counties; (d) extensive meetings and interviews with key stakeholders, including government officials at provincial, county, township, and village levels, representatives of local communities and livestock enterprises; (e) focus group discussions in 8 ethnic minority concentrated villages with 167 villager representatives; and (f) a sample survey of 43 of the 700 TLPEs was conducted in all seven Program counties to: (i) create their socio-economic profile and verify the key operational characteristics of the Program beneficiaries; (ii) carry out analysis regarding the social risks related to vulnerable groups including ethnic minorities relevant to the proposed livestock operation, and (iii) explore how the Program would affect and engage with different stakeholder groups, and assess the ability of the government to engage with the target beneficiaries. The observations made and the detailed discussions during these visits and surveys provided a good understanding of the potential E&S risks associated with the PforR and the procedures and systems required to mitigate and monitor such risks and impacts.

25. **Overall, the Program is expected to bring broad and significant E&S benefits.** It will significantly improve the regional eco-environment and the well-being of community residents through reducing pollutants and GHG emissions, and promoting animal health, improving livestock husbandry resilience against climate shocks, and enhancing livelihood sustainability for farmers, including ethnic minorities. A thorough E&S screening was conducted to exclude activities with a potential to cause significant adverse impacts that are sensitive, diverse, or unprecedented on the environment and people. The ESSA confirmed that no high-risk E&S activities would take place under the PforR. Excluded activities are: artificial forage cultivation with high water consumption; acquisition or occupation of permanent farmland; and activities which may have adverse impacts on ethnic minorities, such as relocation, major changes in production and lifestyle.

26. **The overall E&S risks and impacts associated with these PforR activities are deemed to be Substantial.** During operation, new facilities or existing facilities on which the technologies and practices will be adopted may pose some environmental problems, including solid waste, wastewater, hazardous materials, endanger farmland ecology, spread of pathogenic microorganisms, and bring risks to workers and public health; fodder production may use excessive water, depleting ground water, and application of pesticides and fertilizers could lead to the agricultural NPS pollution and soil compaction. There are potential health and safety risks in excavation, and driving machinery and vehicles, etc. during construction, and occupational health and safety (OHS) hazards in the day-to-day operations of livestock breeding and farming, use of pesticides, zoonotic infectious diseases during operation. The use of prohibited antibiotics, "clenbuterol" or other drugs in feed, or the excessive use of trace elements could cause the residue of harmful substances remain in animal products, which will affect animal health, lead to high incidence of animal disease, reduce breeding efficiency, and affect the quality of agro-food products, which in turn will affect public health and safety of agro-food consumers. Labor impact: there are potential labor disputes and occupational health and safety risks to workers and to a lesser extent, communities during the project construction process. There were no issues related to forced labor or child labor, or

SEA/SH cases identified during the site surveys. During the construction of related facilities, the entry of external construction workers into the community may pose a risk of spreading infectious diseases. The wastewater, waste gas, solid waste generated during construction and operation, as well as the movement of machinery and vehicles, may impact the daily life and road safety of surrounding communities. Land use: facility agricultural land use (FALU), Land use right transfer (LURT), upgrading and renovation of existing facilities and temporary land use (TLU) are expected to be involved. Livelihood impacts: land use like FALU and LURT will have limited impacts on farmers and herders' livelihoods, as land leasing fees are negotiated and paid annually to the owner of land contract rights by land users based on market price. Overall, livelihood impacts can be expected to improve for the workers, contractors and owners of the TLPEs in the Program as a result of improved livestock productivity. Ethnic minorities, vulnerable groups and employees of the TLPEs will be proactively involved in the Program to ensure their needs are prioritized.

27. **Overall, these adverse E&S impacts are neither significant nor irreversible and can be easily identified, avoided, minimized, and mitigated** through known and demonstrated technologies and good management practices. However, given the varieties of activities to be supported in the Program counties, the likely adverse E&S effects risk is considered Substantial. Sunan county has a high share of ethnic minorities and some ethnic minority concentrated townships and villages involved in the PforR geographic boundary. There will be no activities within the scope of the Ecological Conservation Red Lines, although there are natural reserves in the Program counties. Compared to enterprises, cooperatives and family farms may face more challenges and vulnerabilities in livestock farming development. There is a potential risk of uneven benefit distribution; and with existing information disclosure channels and GRMs, there is still a need for improving and diversifying information delivery channels to farmers, such as written manuals, electronic information dissemination through online platforms, specific promotion and awareness raising to different target groups like women, ethnic minorities and older people.

28. **Following a thorough E&S system assessment, it was identified that** there is a need to prepare and implement environmental and safety code of procedures (ESCOP). The environmental and sanitary conditions in some livestock production entities can be generally poor due to inadequate manure treatment and animal disease control facilities, and some facility operators could exhibit a lower adoption rate of health and safety practices, environmental protection management measures due to inadequate operational procedures and internal management systems could be supervised and inspected inadequately by health authorities. Pollution control and animal diseases and zoonotic disease control facilities should be upgraded, improving their internal management systems and strengthening the health and safety (including animal welfare) awareness-raising and environmental protection training as well as the daily supervision.

29. **The Program will strengthen engagement and grievance management system for beneficiaries and workers with focus on ethnic minority people and women and E&S risks management**. Although existing information disclosure channels and GRMs are functioning, there is scope for improving and diversifying information delivery channels to farmers, such as written manuals, electronic information dissemination through online platforms, specific promotion and awareness raising to different target groups like women, ethnic minorities, older people, etc. Further, there is a need for the identification and management of E&S risks and impacts as well as public consultation and information disclosure in relation to construction and operation of some facilities. The potential risk of uneven benefit distribution will be further identified and managed via stakeholder engagement actions, GRM implementation, and regular supervision and monitoring. Compared to enterprises, cooperatives and family farms may face more challenges and vulnerabilities in livestock farming development. There is a potential risk that social benefits and beneficiary composition (gender, ethnic minority etc.) do not improve over time. To ensure that all TLPEs, regardless of farm size and structure, gender, and ethnicity, equally benefit from the Program, there is a need to establish a monitoring system to monitor benefits across the Program in order to take corrective measures if required.

30. **Agreed risk management actions** include the following: i) Document cases of the good practices and experiences of controlling pollution from livestock production, preventing and controlling animal and zoonotic diseases and animal welfare, sharing with TLPEs guidance to prepare appropriate Environmental & Safety Code of Procedures (ESCOP); ii) Strengthen the publicity, education, supervision and management of the prevention and control of animal and zoonotic diseases, health and safety, animal welfare and environmental protection training and management of the operators of cooperatives and large family farms; iii) Strengthen engagement and grievance management system for beneficiaries and workers with focus on ethnic minority people and women, and E&S risks management in general; and iv) Develop Social Benefit Monitoring system to monitor beneficiary composition and distribution of benefits.

31. **Grievance redress.** Communities and individuals who believe that they are adversely affected as a result of a Bank supported PforR operation, as defined by the applicable policy and procedures, may submit complaints to the existing program grievance mechanism or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address pertinent concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted at any time after concerns have been brought directly to the Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), visit https://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, visit https://accountability.worldbank.org.

E. Financing

32. **The total Program financing is estimated at US$824.8 million,** of which US$624.8 million (CNY 4.44 billion) will be financed by the provincial and county governments and US$200 million will be financed by the IBRD loan.

Table 3. Program Financing Summary (2024–2030)

Source	Amount (US$, millions)	% of Total
Government	624.8	75.7
IBRD	200	24.3
Total	**824.8**	**100.0**

Note: The exchange rate is US$1 for CNY 7.1 (as of February 1, 2024)

33. **The Gansu government expenditure framework provides a credible boundary for the Program.** Government budgets for the PforR Program's expected outcomes are sufficient, and there are no significant concerns about their fiscal sustainability. The transfers that the Program Counties received from the central and provincial governments are stable and predictable. The Expenditure Framework Assessment (EFA) showed that, during 2020–2022, a total of US$412.4 million was spent under budget lines relevant for the PforR. The expenditures relevant to RA1 and RA2 accounts for 88.5 and 11.5 percent, respectively. The majority of public funds are directed toward activities under RA1 where results are achieved at the county level. The RA2 places a greater emphasis on system enhancement and institutional strengthening at the provincial level, which does not require significant budget resources. Consequently, the EFA primarily centers on the budgets and expenditures related to the Program activities under the RA1, focusing on increasing sustainability and reducing emissions from the livestock sector.

34. **Expenditure performance and financial sustainability.** The quality of Program expenditure management will be critical to achieving the PforR objectives. While the county governments are responsible for delivering the results, the provincial level government is responsible for providing funds as well as subsidies to the Program counties through: (a) earmarked transfers that mandate program counties to use the funds for activities which are critical to the achievement of expected results; (b) expenditure performance evaluation and rewards; and (c) technical guidance and close supervision. Co-financing for the program is expected to be stable, and the Program poses relatively limited risk to fiscal sustainability. Gansu's budget relies significantly on central government transfers, which accounted for 78 percent of revenues in the provincial general public budget (GPB) in 2022 (the latest available data). Central government transfers are a stable source of funding and have been somewhat countercyclical in recent years, growing faster in years with slower provincial GDP growth. Furthermore, funding for the program will be allocated from earmarked transfers (as opposed to general transfers), which will ensure that funding is stable and reliable. Finally, the total annual expenditures relevant to the Gansu PforR Program have been small, equivalent to 0.8 percent of Gansu's annual GPB revenue during 2020 – 2022. Given that the provincial budget is expected to remain flat during the next three years, it is expected that the PforR-related annual financing will remain less than one percent of the annual GPB revenue.

35. **The PforR will support repurposing traditional subsidy programs towards green subsidies to support low emission livestock development.** The recent agriculture public expenditure analysis[28] shows that China has a historical track record of adjustments and optimization of fiscal support for agriculture. The Government of China and provincial governments have gradually moved their direct agriculture subsidy program towards green and ecologically oriented system of agricultural subsidies over the past 15 years, particularly for reducing agriculture-related point source environmental pollution and curbing the overuse of fertilizer. Gansu has been following the same trend. During 2020-2022, the general budget for agriculture, forestry and water was reduced by 11.1 percent, while the allocations for environmental programs increased by 22.9 percent. It is, therefore, expected that after the PforR closes, the subsidies for the scale-up of the new green and low emission livestock technologies, if warranted, would be budget-neutral as the provincial government would continue to repurpose some of its less efficient subsidy programs towards green and low emission livestock sector development programs, guided by the assessment of outcomes of the pilot under the DLI#6.

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