Carbon neutralization strategy for TNC in Dairy Industry

2023 Bain Case Competition | XiaoBaoBain

XIAOBAO BAIN

The Nature Conservancy

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Executive Summary: TNC should promote standard setting, providing fund, and overseeing trials to build up low carbon ecosystem for husbandry industry

Overview

Industry overview

- Husbandry industry has a **large share** in China's carbon emissions, and is **still growing**
- In husbandry industry, **dairy** is the **major source** of carbon emissions.

Pain points

- Weak or even **no incentives**
- Lack of **collaboration**
- The absence of **targeted policies**
- Herdsmen fall into the vicious circle of **overgrazing**

Strengths and Potentials

- TNC's rich experience and great influence
- High feasibility of carbon reduction
- High market concentration in dairy industry

Strategy

Standard & Ecosystem

- Set dairy industry carbon reduction **standards**
- Eventually build a dairy industry **green ecosystem**

Low-carbon ranches

- Grassland restoration
- Forage additive Asparagopsis
- Organic fertilizer usage
- Conduct trials

Green value chain

TNC's **function** in the value chain:

- Support
- Promote
- Interconnect

Implementation

Timeline

- Conduct **trials first**, then start with **countrywide expansion**

Risk

- Potential risks are predicted
- Corresponding mitigations are ready

Forecast

- Expect to see **significant** carbon reduction to achieve China's 2030 goal

Source: XiaoBaoBain analysis

AGENDA

Market Analysis

- Industry Overview
- Pain points
- Potential

Strategy Design

Implementation

Appendix

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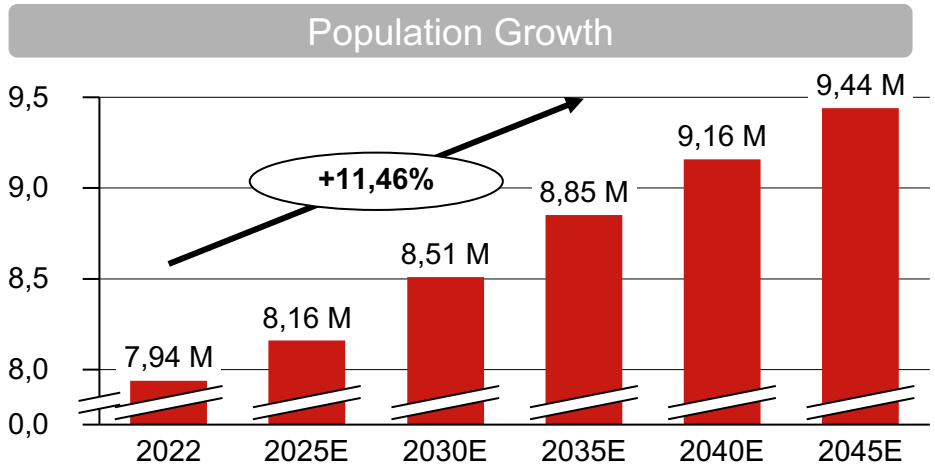
Husbandry industry emission is expected to grow 11.4% with the increase in demand: as one of the biggest emitters, China should put more efforts to tackle

World's Carbon emissions promises to keep growing driven by booming population

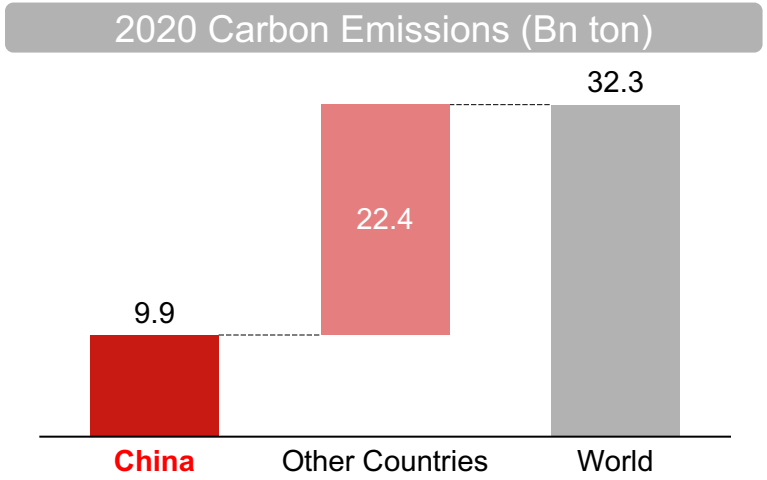


Growing Population → Increasing Consumer Demand → More Milk Production → Higher GHG Emissions

Milk Production **+30%** → GHG[1] emissions **+18%** (2005-2015)

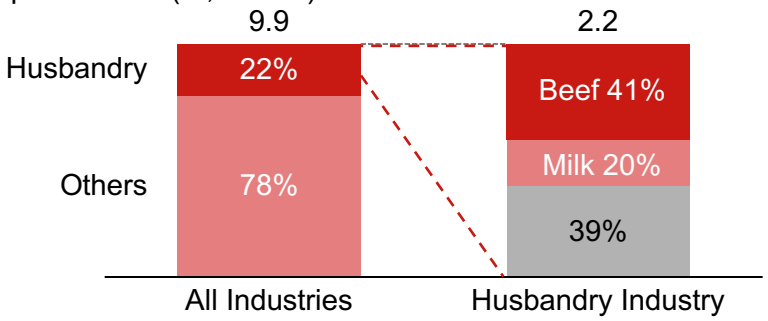
Growing Population +19%→Customer Demand +19% → Milk Production **+19%** → GHG emissions **+11.4%** (2022-2045E)

China is the world's largest carbon emitter, accounting for nearly 30% of the emissions



Husbandry industry accounts for 22% of total anthropogenic GHG emissions

2020 Carbon emissions in China, by industry and productions (%, Bn ton)



China has been striving to reduce carbon emission reduction

Action Plan for Carbon Dioxide Peaking Before 2030
2021.10

Science and Technology to Support Carbon Neutral Implementation Plan for Carbon Peaking (2022-2030)
2022.06

President Xi Jinping

"China's CO_2 emissions per unit of GDP will fall by more than 65% by 2030."

"China will reach carbon neutrality by 2060."

However, efforts being put in husbandry industry is not enough

- Husbandry industry still **not included in the carbon trading system**
- **Trivial subsidies** for companies striving for carbon reduction
- **No industry institutions or policies** pushing companies to form a carbon reduction ecosystem
- …(more)

Note: **GHG** refers to "Green House Gas"

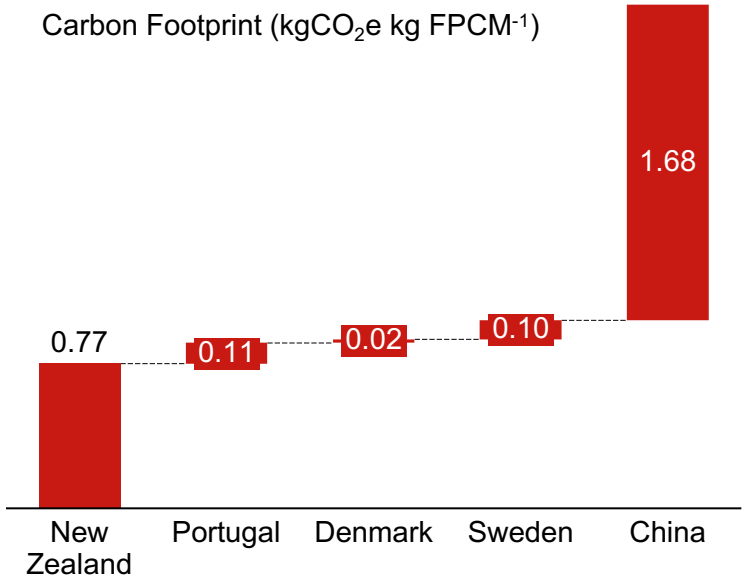
Source: Food and Agriculture Organization of the United Nations, Carbon Monitor, XiaoBaoBain analysis

Dairy industry has much room for carbon reduction, high feasibility and mature paths for practice

Much room for carbon reduction

Carbon intensity of dairy industry is relatively high in China

China's greenhouse gas emissions per kilogram of raw milk produced are about **two times the world's leading level**



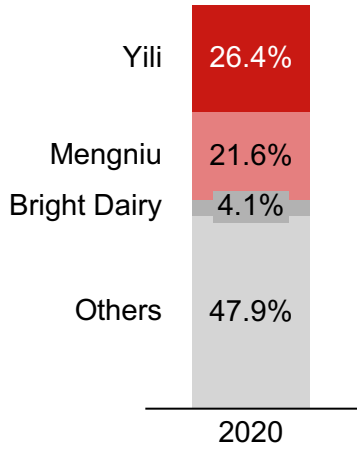
High feasibility

Significant results can be achieved by focusing on key aspects

90% of emissions come from pasture-related (e.g., dairy farming, feed growing), which means tackling the corresponding problems will contribute to huge overall improvement

Actions can be implemented and spread by leading companies in diary industry

The diary industry has a concentration of market share (CR3[1]>= 50%). Leading companies is highly impactive with wide recognition.



Mature path for carbon reduction

Developed countries have paved the way for latecomers

U.S

- Scale up to increase productivity
- Precise control of forage diet

Japan

- Fully utilize grassland resources

Europe

- Focus on tech improvement
- Advanced technology for carbon sequestration

The remaining problem:

- **Which** measure to adopt?
- **How** can these measures be adapted to China's dairy industry?
- **What**'s TNC's role in the process?

Note: 1. **CR3** refers to concentration rates of top 3 companies

Source: AgResearch, Euromonitor, Bain, XiaoBaoBain Analysis

Pain points: The absence of targeted regulation, public awareness, and collaboration make dairy industry being a large CO_2 emission source for China

Pain points	Reasons	Roots
1 **Only a few companies execute carbon reduction practices**	• Lack of incentives • Unaware of the importance of dairy industry carbon reduction	• The whole livestock industry does not belong to the scope of **carbon trading** • Lack of **industry standards**
2 **Without an industry ecosystem to promote widespread carbon reduction actions**	Lack of social environment and companies' joint effort	• Little **promotion** on the importance of carbon reduction in diary industry • Lack **leadership** of industry institutions and dominating companies
3 **Unclear carbon reduction pathways, lack of effective and locally adapted measures**	• Lack of specific and implemented policies targeting husbandry industry	• China is still fumbling in carbon reduction with few existing livestock models to learn from, hard to **adopt foreign practices feasibly**
4 **Grass deterioration rate increased in recent years**	Vicious circle of overgrazing	Overgrazing → Deteriorated grassland → Insufficient grass → High forage cost → Overgrazing **Vicious circle**

Source: XiaoBaoBain analysis

With TNC's influence and the huge potential to decrease emission in husbandry industry, China can achieve its 2030 carbon reduction goals

TNC's impact and influence

1 ✓Influence ✓Impact

- Invested in 12 deals with $2.4Bn in 2022
- Protected and improved management of 1,245,532 acres of land
- Protected 161,906 square miles of ocean

2 ✓Action ✓Accessibility

- Has been providing ESG consulting service for countries including China
- Has carried out concrete measures in environmental protection

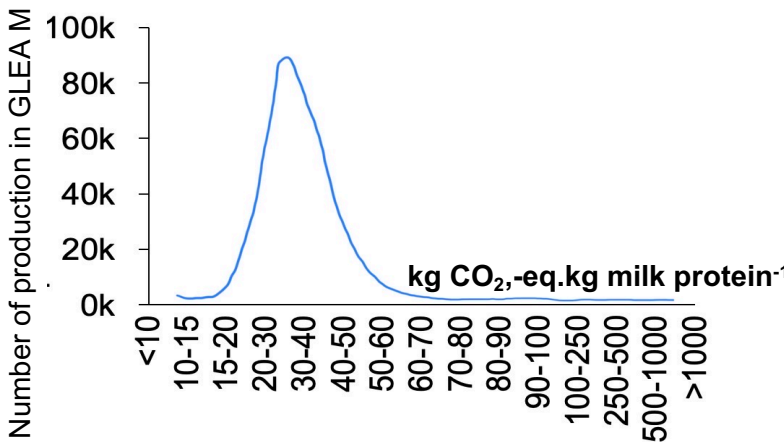
3 ✓Support ✓Advocate

- Has been providing fund (e.g. Sustainable Water Impact Fund), partnership, and supporting service as needed
- Has benefitted government and eco-friendly businesses

+

Emission reduction's potential

1 ✓Huge potential



Producing the same unit, firms' amount of CO_2 produced varies

2 ✓High feasibility

Two largest milk producers, Yili (26.4% and Mengniu (21.6%) have nearly half of market share

➡ Start with one company and influence the whole industry

=

Achieving benchmarks

1 ✓Real reduction in industry

12,875.813 x (1-65%) = **5,794.115**

Estimated emissions in base year 1990 | *China's goal of reducing >65% emission by 2030* | *The upper limit of emissions in 2030*

2 ✓Affect future business's approach

Sustainability is a KPC for 73% of Chinese household shoppers

0 1 2 3 4 (*Willingness to purchase*)

43% of ESG investments significantly outperform non-ESG's

- Strongly underperformed
- Underperformed
- Neither
- Outperformed
- Strongly outperformed

Sources: GLEAM, Euromonitor, UN DESA, Statista, TNC Impact Report, XiaoBaoBain analysis

AGENDA

Market Analysis

Strategy Design

- Standard & Ecosystem
- Financial instruments
- Low-carbon ranches
- Green value chain

Implementation

Appendix

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Strategy overview: TNC should follow the three-parts strategy to promote carbon emission reductions in China's dairy industry

TNC's carbon neutralization strategies in dairy industry

Standard & Ecosystem

- Set specific carbon emission metrics and standards for dairy industry
- Get the standard adopted by ESG index to gain publicity and enhance its influence
- Award certification to companies with high ratings to encourage carbon reduction
- Eventually construct a green dairy industry ecosystem

Low-carbon ranches

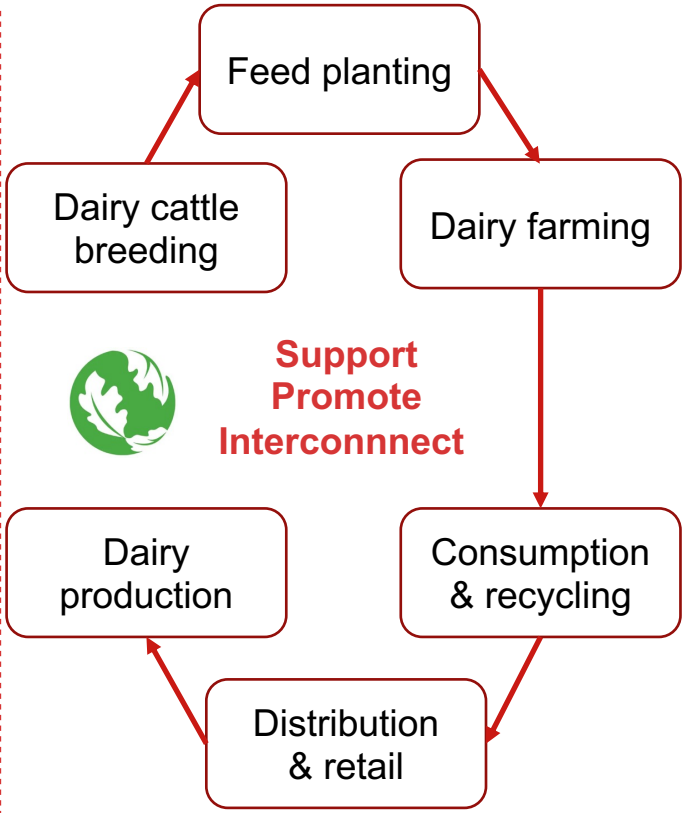
Grazing ranches:

- Focus on **deteriorated grassland**.
- Grassland evaluation and restoration
- Conduct **trials** in Organ Tal

Captive ranches:

- Reduce enteric fermentation methane emissions with **forage additive** Asparagopsis
- Promote and subsidize **organic fertilizer** usage to deal with manure waste emissions
- Conduct **trials** in Yinchuan in cooperation with Mengniu

Green value chain



TNC's role in the industry

1. **Sponsor** — Provide subsidy for emission reduction programs
2. **Actor** — Take concrete measures to reduce carbon emissions
3. **Educator** — Boost public environmental awareness
4. **Lobbyist** — Exert influence on government policy making
5. **Organizer** — Promote multi-lateral cooperation across industry
6. **Researcher** — Develop new tech to reduce carbon emissions

TNC should adopt financial tools by lobbying the government to admit dairy industry into carbon market and cooperating with index companies

Enter the carbon market

Lobby the government for incorporating animal husbandry industry into the carbon market

Benchmark **New Zealand**

- Dairy industry has been **incorporated into carbon market**
- Agricultural carbon emissions will be priced in 2025
- **Cut free allowances** gradually to encourage carbon emission reduction

Promote **grassland carbon sink trade**

Benchmark **California**

- Recognize the **potential** of grassland carbon sink
- Grassland carbon sink is **frequently traded**
- Encourage ranch owners to **restore grassland** with carbon trading profits

Cooperation with index company

Objective

Gain more influence for the newly-issued standard

TNC

CSIndex

Objective

Establish specific ESG standards for different industries

Cooperation opportunity

Incorporate TNC's standards into CSIndex ESG rating system

Benefits

Reputation	• Gain **publicity** for TNC's new standard, and make it recognized in the industry
Incentives	• Encourage companies in the dairy industry to **reduce carbon emissions**
Profits	• ESG investors are likely to yield a **higher return** with refined rating system

Source: TNC, CSIndex, California Air Resources Board, Lit research, XiaoBaoBain analysis

TNC should focus on grassland carbon sink and deteriorated grassland restoration for grazing production systems – profound impacts are expected

Grassland condition evaluation

TNC Resources	Evaluation process
Large number of volunteers	Visiting local herdsmen **door-by-door** for information
Experienced experts in environmental protection	Send **experts** to conduct on-site investigations
Abundant researches for reference	Take advantage of models and data in **previous researches**
Frequent cooperation with the government	Turn to local **government** for help and data

Fully utilize TNC's resources

Grassland restoration

Measures

Severe

- **Fencing**
- Plant grass with barren and drought resistance
- Fertilizing and irrigation
- Base detailed plan on expert's research

Medium

- **NbS**

(Nature based solutions)

- Rotational grazing

Slight

- **Assist government in enforcing overgrazing ban**
- Introduce low-emission feed to the grassland

Support emerging Green Ranches

Desert ranch

- ☑ Turn desert into carbon-negative oasis
- ☑ Improve biodiversity in nearby regions

Benchmark

China Shengmu
In Ulan Buh desert

Forest ranch

- ☑ Make use of grass resources in forests
- ☑ Nice environment raises productivity
- ☑ High quality grass reduces methane emissions

Benchmark

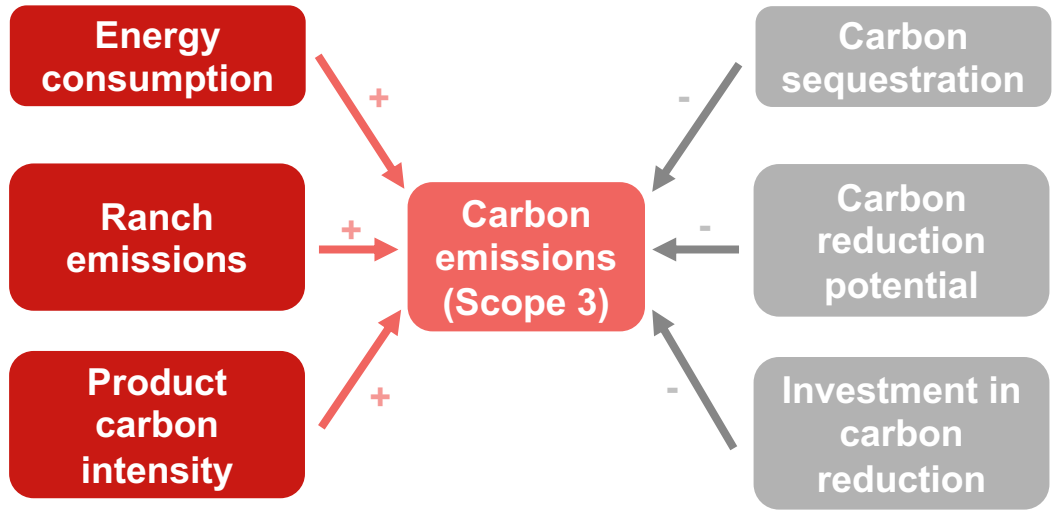
Shinrin no Bokujo
In Nasu, Japan

Source: TNC, China Shengmu, Lit research, XiaoBaoBain analysis

TNC should establish a set of metrics for dairy industry to evaluate companies' carbon reduction performance and eventually build up a green dairy ecosystem

TNC dairy industry carbon neutralization metrics

Fundamental rating framework



Rating criteria	• Bonus for carbon reduction efforts, penalty for carbon emissions
Aim	• Objectively assess the carbon reduction performance of a dairy company
For consumers	• Offers a **trustworthy certificate** of low-carbon product
For suppliers	• Provides a **reflection** of present carbon reduction progress and future improvement **direction**

Award

Companies with high ratings can print TNC's logo as certification for green product

Green Ecosystem

Suppliers

Mengniu

Yili

To get high ratings, industry leaders will encourage their suppliers to invest in carbon reduction

中国圣牧 CHINA SHENGMU

MODERN FARMING 现代牧业

Profits

- Attract large number of green consumers
- Charge premiums for green products

Suppliers

Eventually affect the entire value chain

Source: CSIndex, XiaoBaoBain analysis

Trials at overgrazing ranch with enough support, proper control, and raising awareness make the place into a role model for other ranches to emulate

Pilot Ranch Selection

1 Selection Criteria

Priority: *High* → *Low*

- ★★★ Local government is willing to support
- ★★★ Severe grass deterioration due to overgrazing
- ★★ Local herdsmen lack environmental awareness
- ★ High cost of forage due to insufficient grass

2 Preliminary Area Selection

Criteria Satisfied

- ☑ Government emphasizes environment protection
- ☑ Local desert steppe has severely deteriorated
- ☑ Uneducated herdsmen lack environmental awareness
- ☑ Herdsmen can hardly afford high forage cost

Trial strategies

1 Government Cooperation

- Set up a local TNC subsidiary
- Cooperate with the government to build an Ecological Civilization Construction Demonstration Zone

2 Stop Overgrazing

- Enforce the ban on overgrazing with joint effort of TNC, local volunteers, and the government
- Offer subsidy to local herdsmen on condition of downsizing

3 Grass Deterioration Control

- Grass planting
- Turn to feeding temporarily
- Send experts to make a detailed grass restoration plan

4 Boost Environmental Awareness

- Conduct lectures on grassland protection
- Offer free training on sustainable ranching

Expected results

- Ecological Demonstration Zone is established
- Overgrazing is eliminated
- Grass gradually restores
- Local herdsmen voluntarily protect the grassland

Target

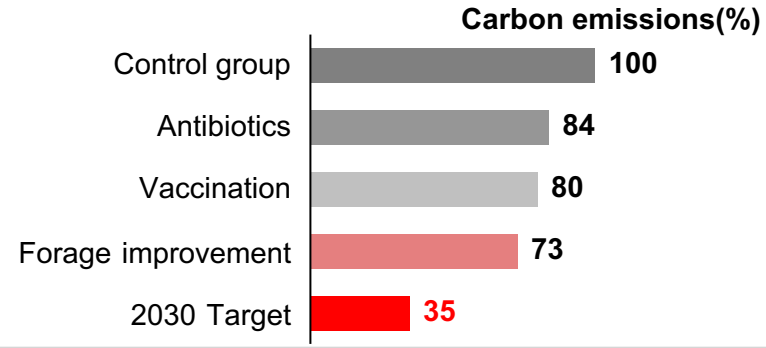
Countrywide Expansion

Source: Lit research, XiaoBaoBain analysis

Enteric fermentation and manure management problems are top priorities for captive production systems - TNC cab tackle them with subsidies and guidance

Enteric Fermentation

Traditional measures are far from enough



Manure Management

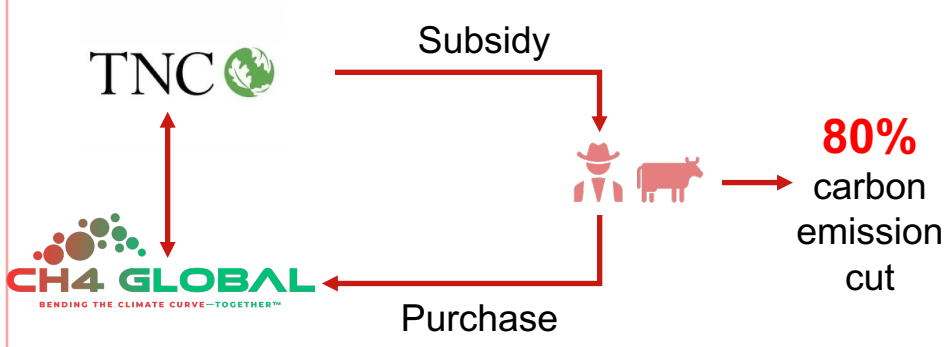
Low manure utilization willingness

- High **transportation** cost
- Lack **technology** to deal with pollutants
- Farmers are **unwilling** to purchase manure-based fertilizers

Manure → **Wasted**

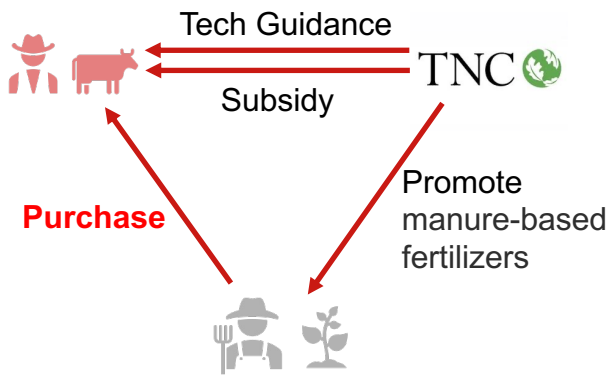
Cooperation with CH4 Global

Asparagopsis: Forage additive made by CH4 Global



Promote Manure Utilization

TNC's Full Involvement



Trial Ranch Selection

1 Selection Criteria — Priority

- ★★★ Enough fund for experiment
- ★★ Interested in carbon neutralization
- ★★ Influential in the dairy industry
- ★ With agricultural regions nearby

High → Low

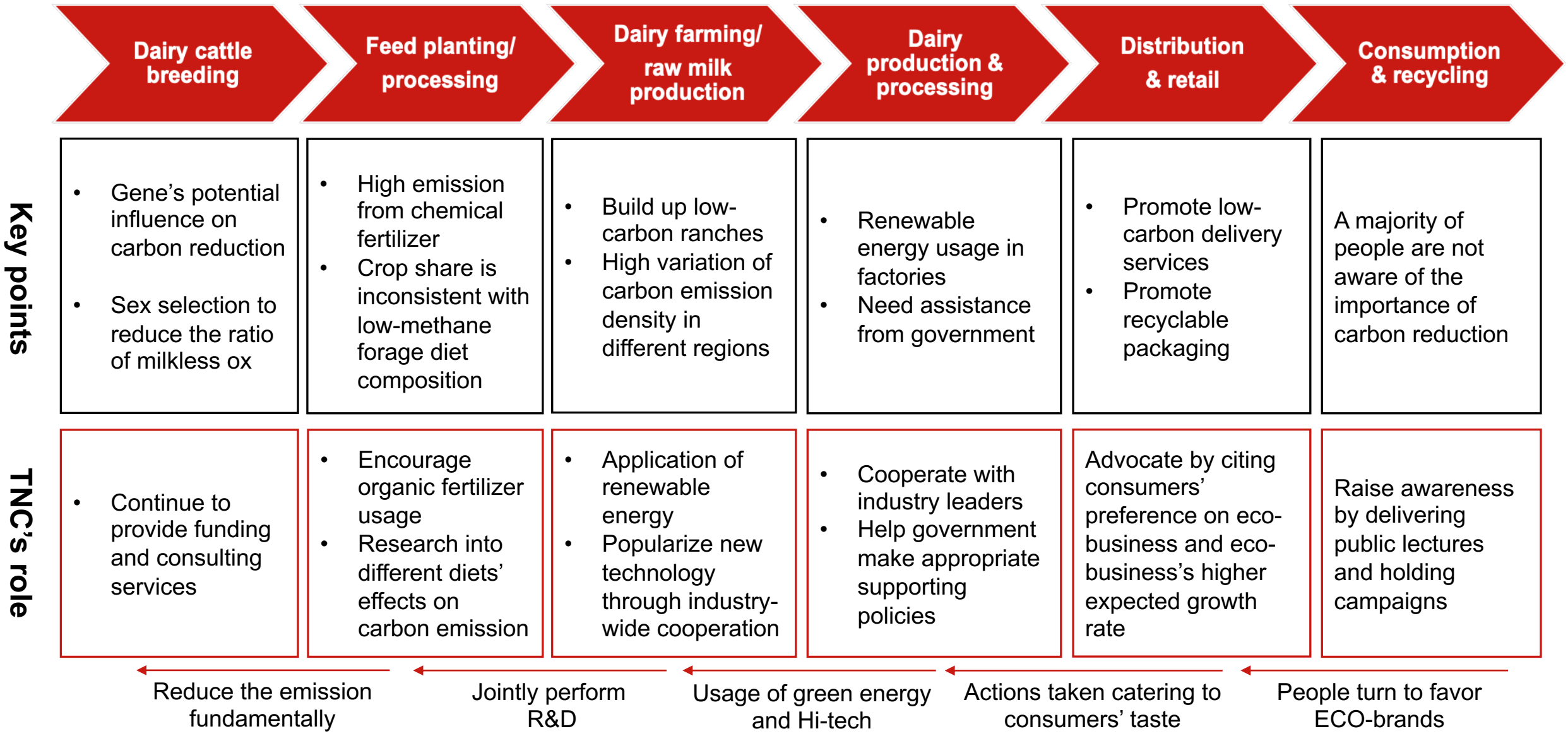
2 Preliminary Area Selection

Cooperation with **dairy industry leaders** in **Yinchuan, Ningxia**

蒙牛

Source: TNC, Mengniu, CH4 Global, Lit research, XiaoBaoBain analysis

Consumer's awareness can drive the building up of low carbon value chain – where TNC plays a crucial role to promote, support, and interconnect



Source: Boadi (2004), FAO, XiaoBaoBain Analysis

AGENDA

Market Analysis

Strategy Design

Implementation

- Forecast
- Risk and mitigation
- Timeline

Appendix

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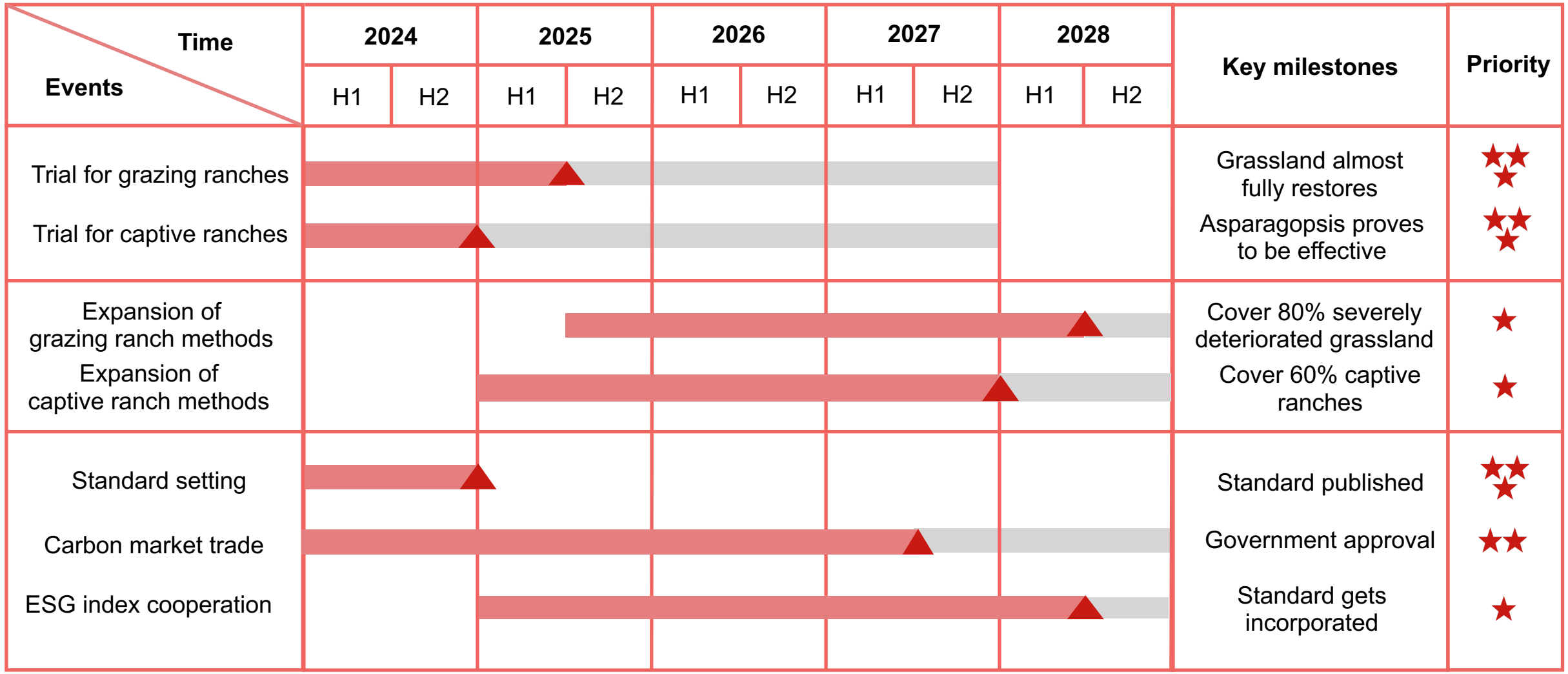
Implementation timeline: We recommend TNC implement strategies according to this 5-year roadmap

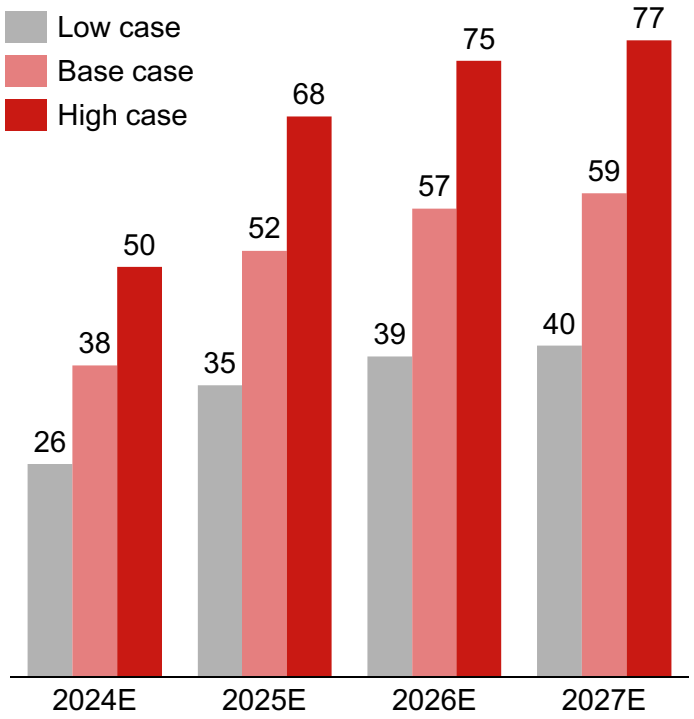


Source: XiaoBaoBain analysis

Carbon reduction forecast: We expect to see significant carbon reduction to achieve China's 2030 goal

1 Grassland restoration forecast

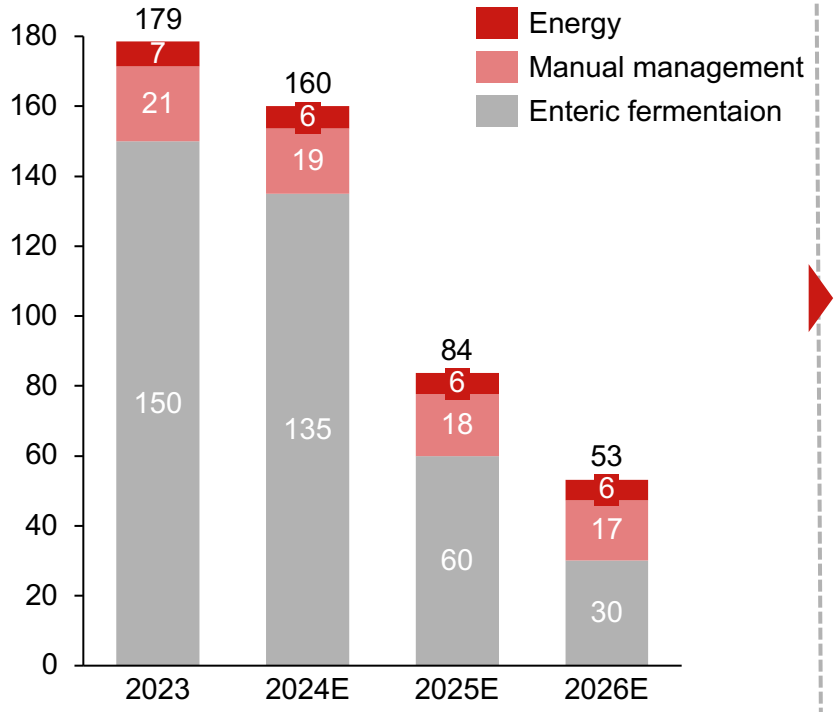
Carbon sink rate (gC/m²·y)



High **carbon sink potential** with rapid restoration of deteriorated grassland

2 Captive ranch forecast

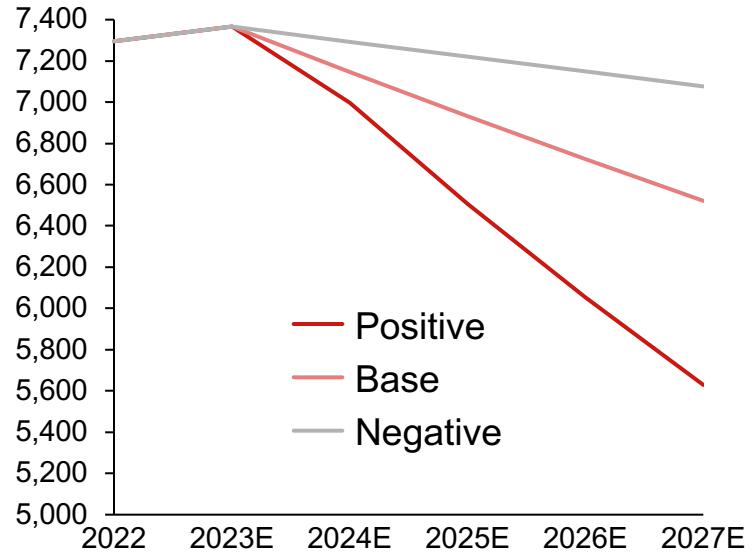
Carbon emission per cow (kgC/y)



Significant **carbon emission cut** driven by reduction in enteric fermentation emissions

3 Overall carbon emission forecast

Total dairy industry carbon emission (t)



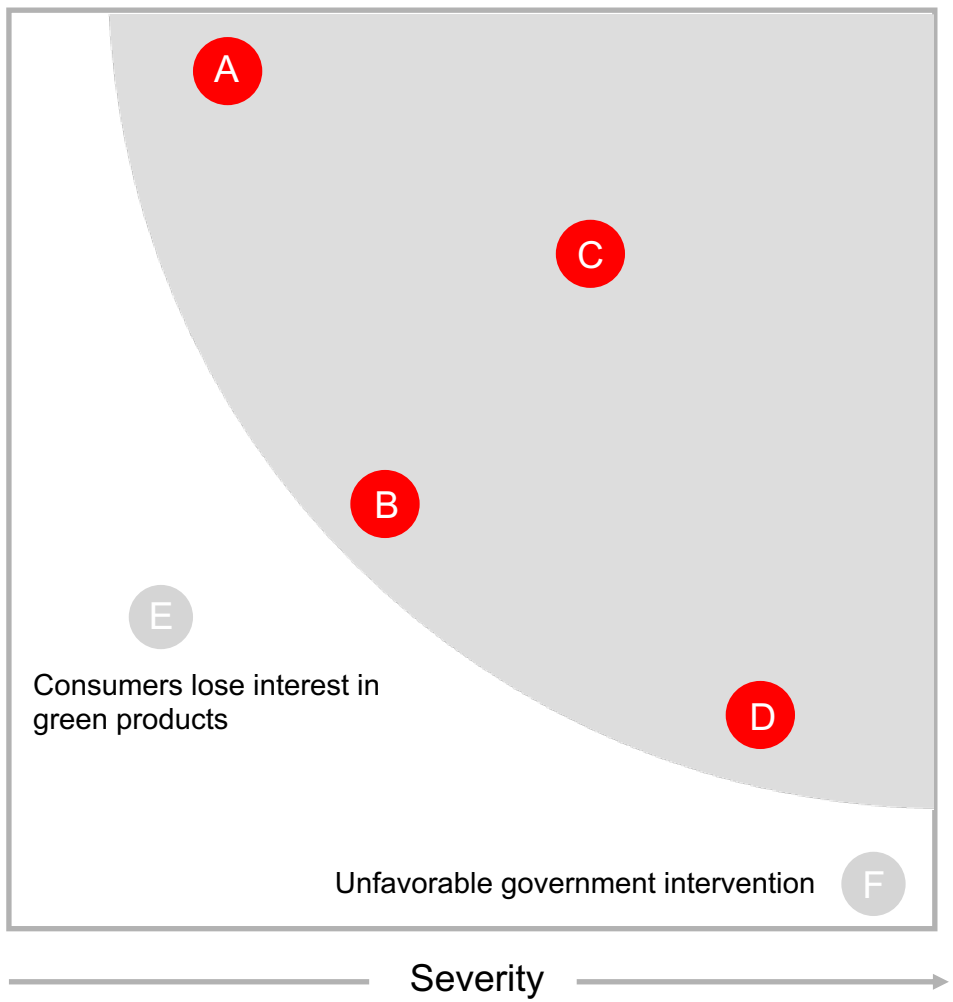
Significant **carbon emission cut** in the positve and base case

Cancel out the increasing trend driven by demand growth in the negative case

Source: TNC, Lit research, XiaoBaoBain analysis

Risk and mitigation: TNC should be prepared to identify and mitigate major risks when implementing the strategies to ensure the trial's success

Potential risks



Risks

A Insufficient manpower
- May not be able to fully implement rapid expansion plan due to limited manpower

B Fund shortage
- Fund is insufficient for implementing rapid expansion plan or offering subsidies

C Companies not cooperating
- Companies may be unwilling to cooperate from cost-and-benefit perspective

D Negative trial results
- Asparagopsis is less effective than expected
- Grassland restores slowly

Mitigation strategies

Seek local support
- Cooperation with local companies or NPOs
- Recruit local members and volunteers

Raise fund
- Hold fund raising campaign
- Seek help from the International TNC headquarters

More incentives
- Offer more subsidy to encourage cooperation
- Offer free publicity for their products

Multiple trials
- Conduct trials on other forage additives. E.g. 3-NOP
- Conduct several trials concurrently

Source: XiaoBaoBain analysis

AGENDA

Market Analysis

Strategy Design

Implementation

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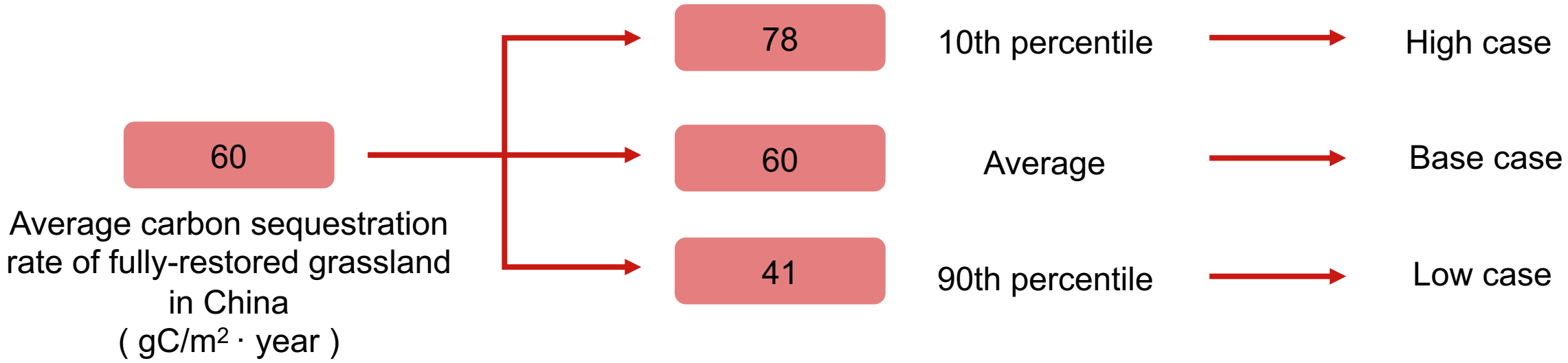
Appendix: Model for grassland restoration forecast

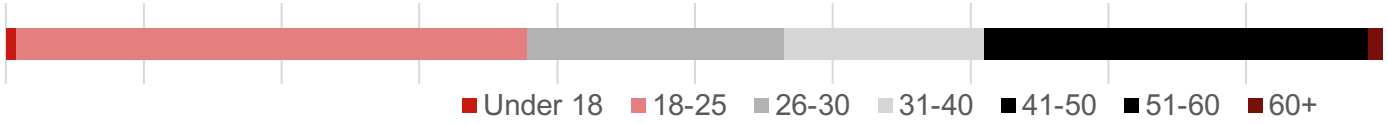


	2023	2024E	2025E	2026E	2027E	Full restoration
High	0	50	69	75	77	78
Base	0	38	52	57	59	60
Low	0	26	35	39	40	41

Source: Lit research, XiaoBaoBain analysis

Appendix: Questions and results of our questionnaire survey (1/2)

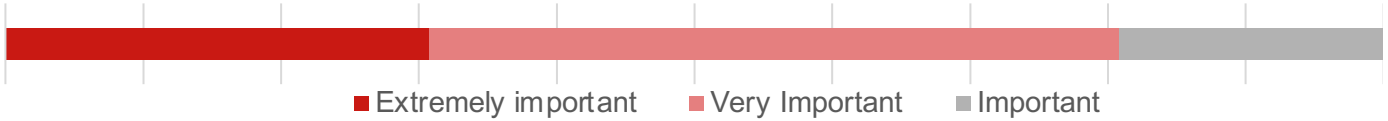
1 How old are you?



2 Have you done any ESG-related work?

3 Do you agree that it is necessary for the government to give reimbursement for ESG corporations?

4 How important do you think husbandry is for carbon emission reduction?

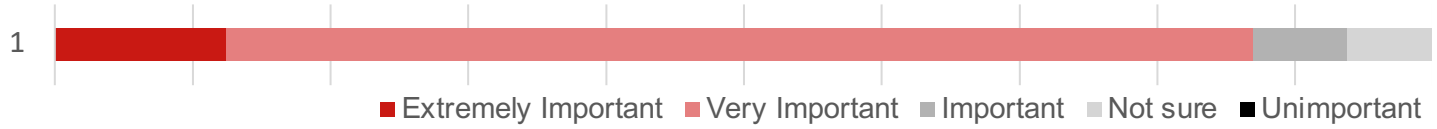


5 Are you familiar with the related key carbon reduction measures for husbandry corporations?

Source: XiaoBaoBain survey and analysis

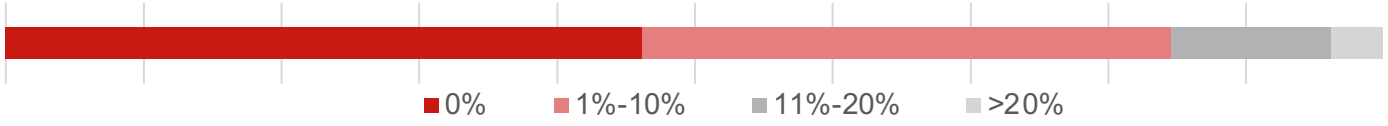
Appendix: Questions and results of our questionnaire survey (2/2)

6 How important do you think it is for husbandry companies to implement related measures?

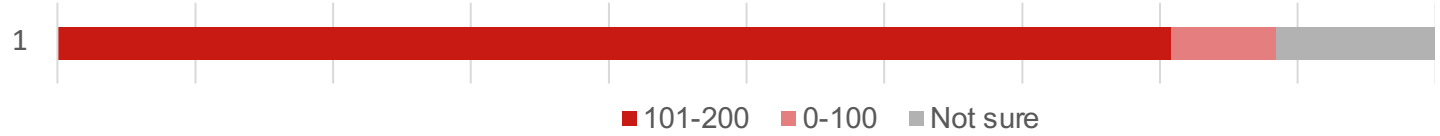


7 Do you think it is important for husbandry companies to invest capital in ESG?

8 How much premium you would like to pay for carbon emission validated products?



9 According to your understanding, what is China's current carbon transaction price?



10 Do you think we should increase the price for carbon transactions?

11 Do you think it is necessary to include husbandry into the carbon transaction system?

Source: XiaoBaoBain survey and analysis