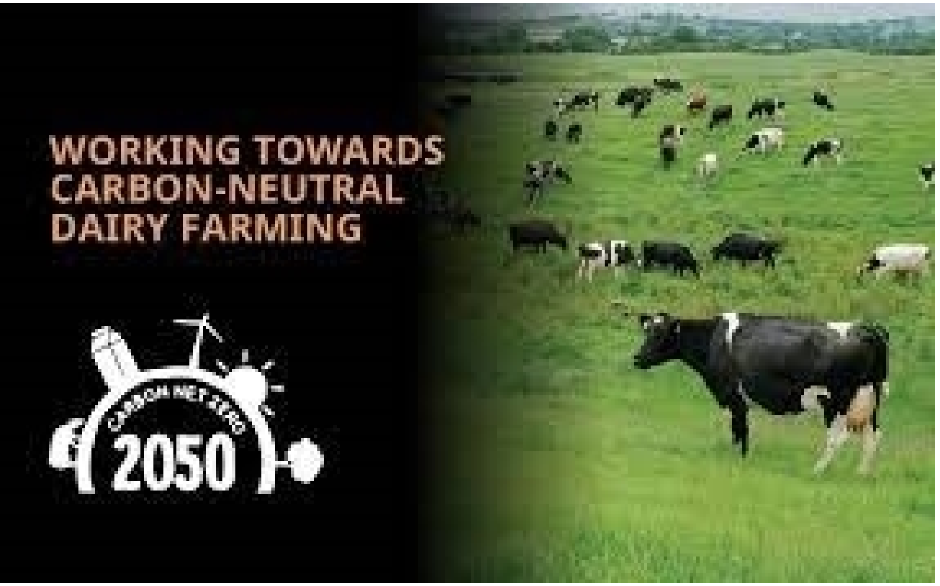


Climate care dairy farming aspects in China

A. prof. dr. Wei Wang
wei.wang@cau.edu.cn

28th August 2023 Lyon France

CONTENTS

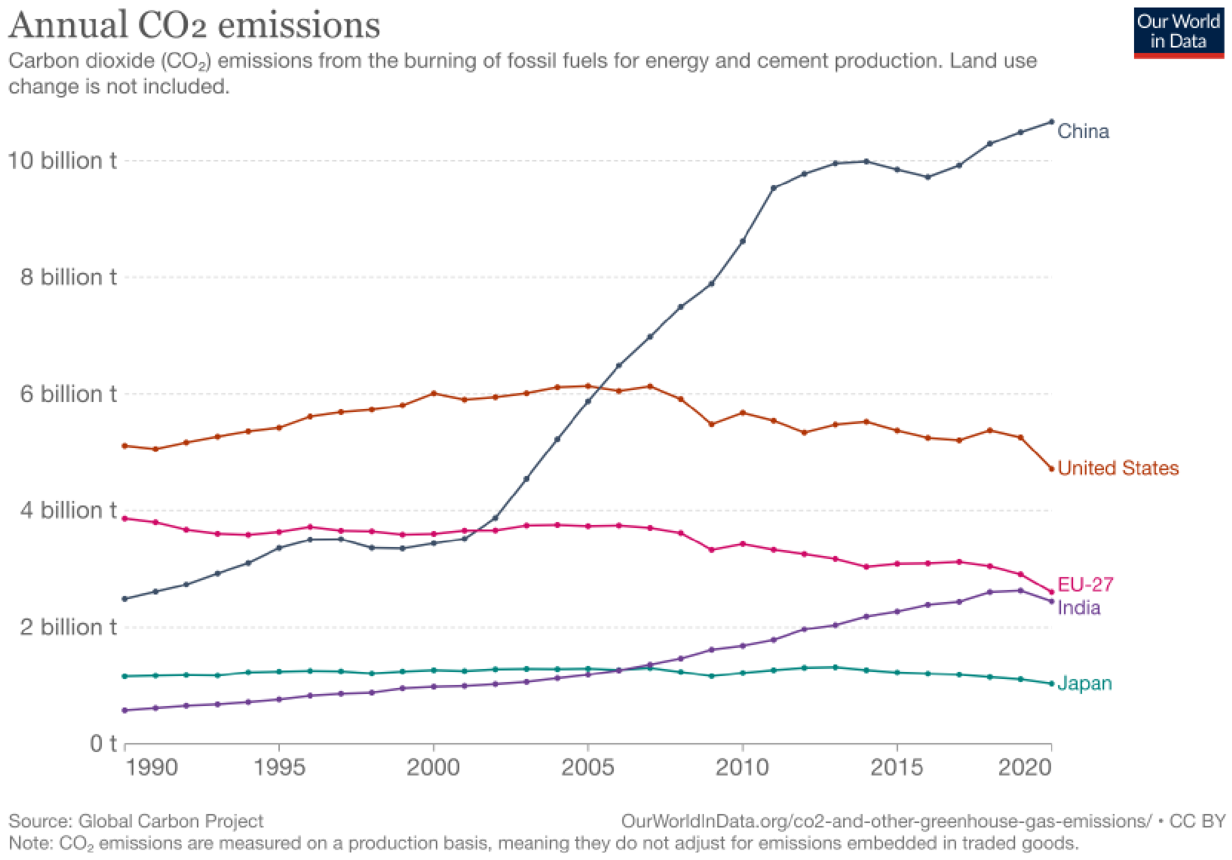
China Agriculture University

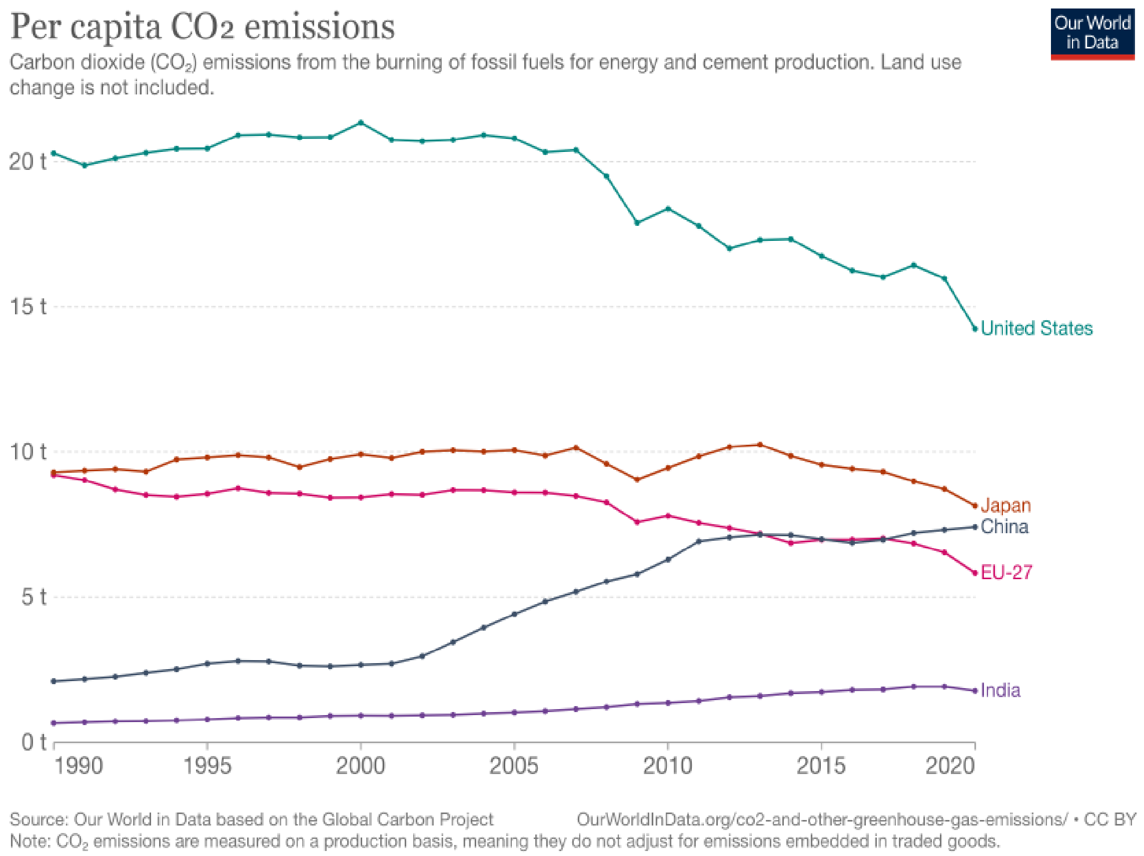
/01

China’s commitments and dairy sector

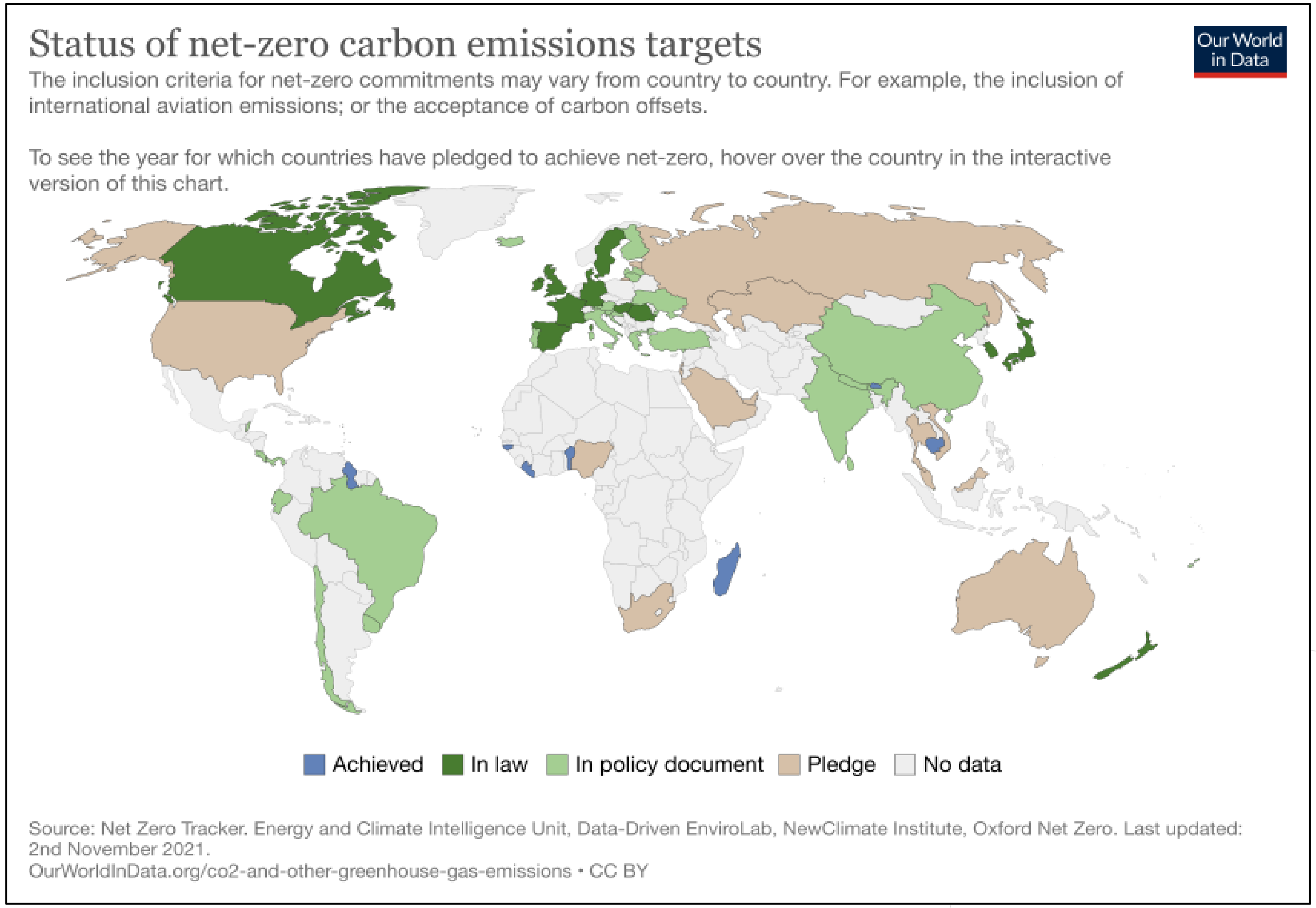
中國農業大學
China Agriculture University

CURRENT EMISSION SITUATION IN CHINA





"Dual Carbon" Goals – Carbon Peaking and Carbon Neutrality



Peak Carbon emission —

2030

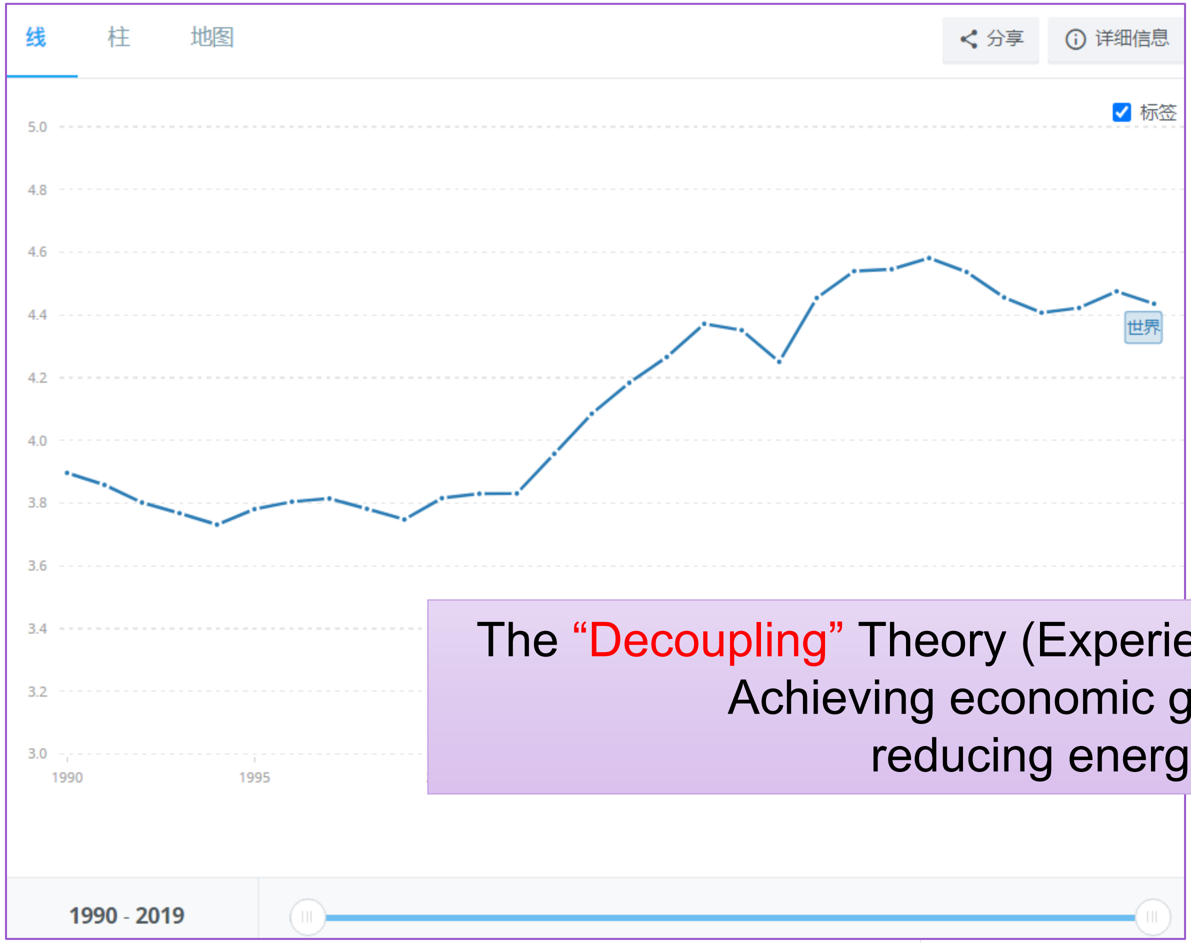
Reach Carbon Neutrality —

Before 2060

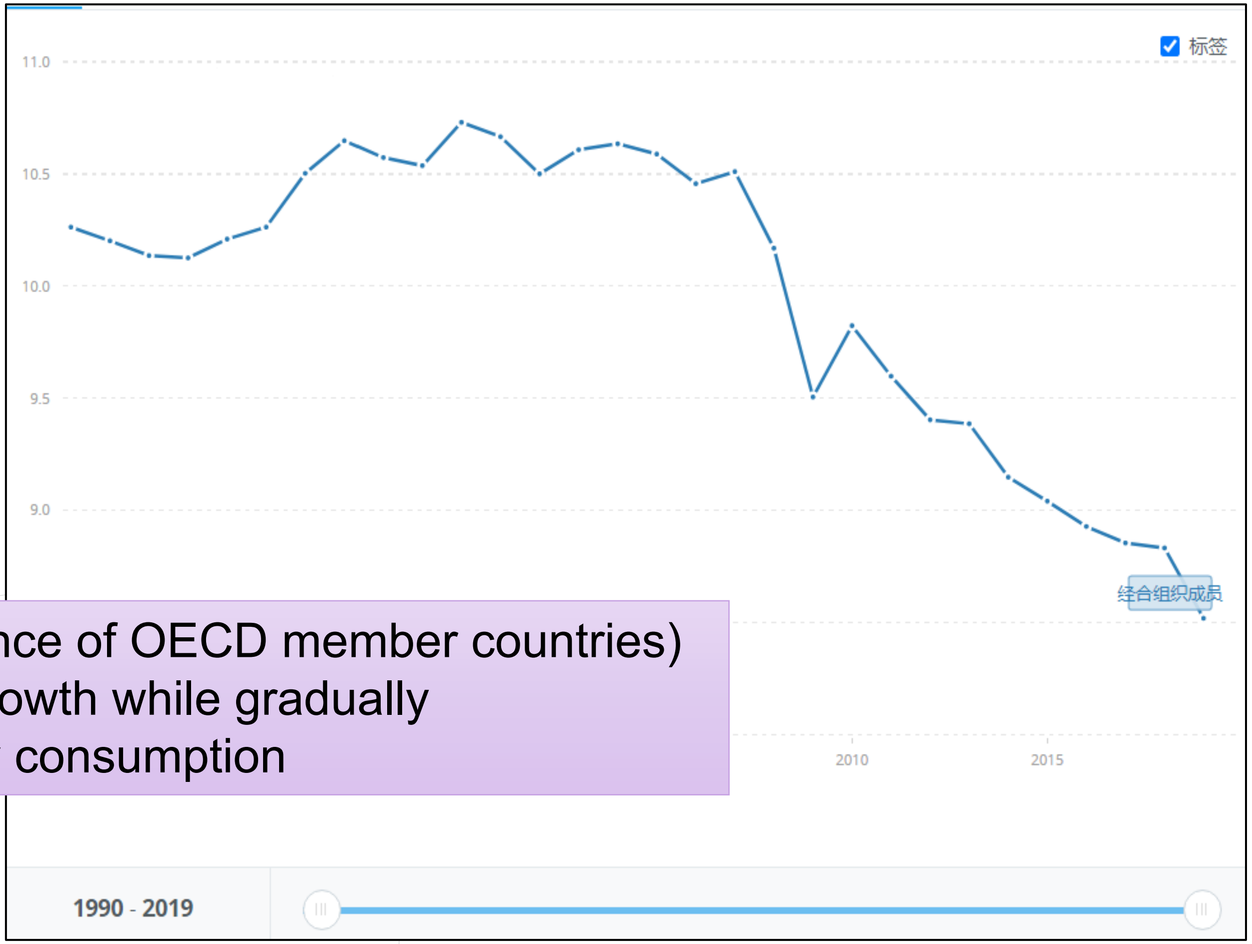
The total amount of carbon emissions in the US, the EU and other regions is stable, with the peak ending in the 2000s and 2010s, and it is expected to achieve "carbon neutrality" around 2050

Economic Foundation for the Implementation of the "Dual Carbon" Strategy

CO_2 emissions (tonnes per capita) - **World**



CO_2 emissions (tonnes per capita) **-- OECD members**



The "Decoupling" Theory (Experience of OECD member countries)
Achieving economic growth while gradually reducing energy consumption

The Key to Implement the “Dual Carbon” Strategy

中国農業大学
China Agriculture University

The underlying reasons for the evolution of carbon emission patterns lie in the changes in **energy consumption, energy consumption structure, and industrial structure**

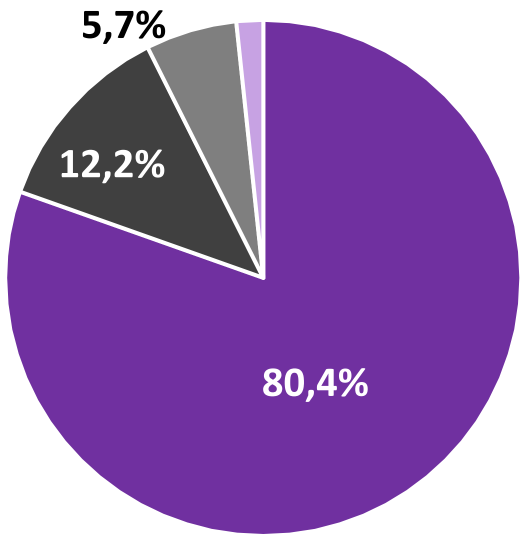
Implementing the 'Dual Carbon' strategy will trigger widespread and profound systemic changes, achieving a comprehensive balance and coordination of all elements between the two critical points of **maximizing development and minimizing emissions.**

Analysis of the 'Dual Carbon' practical path tailored to local conditions and coordinated with the industrial structure →

Mode of economic growth

- Sustainable
- Inclusive
- Resilient

Sources of greenhouse gas emissions in China



China’s GHG emissions in 2010

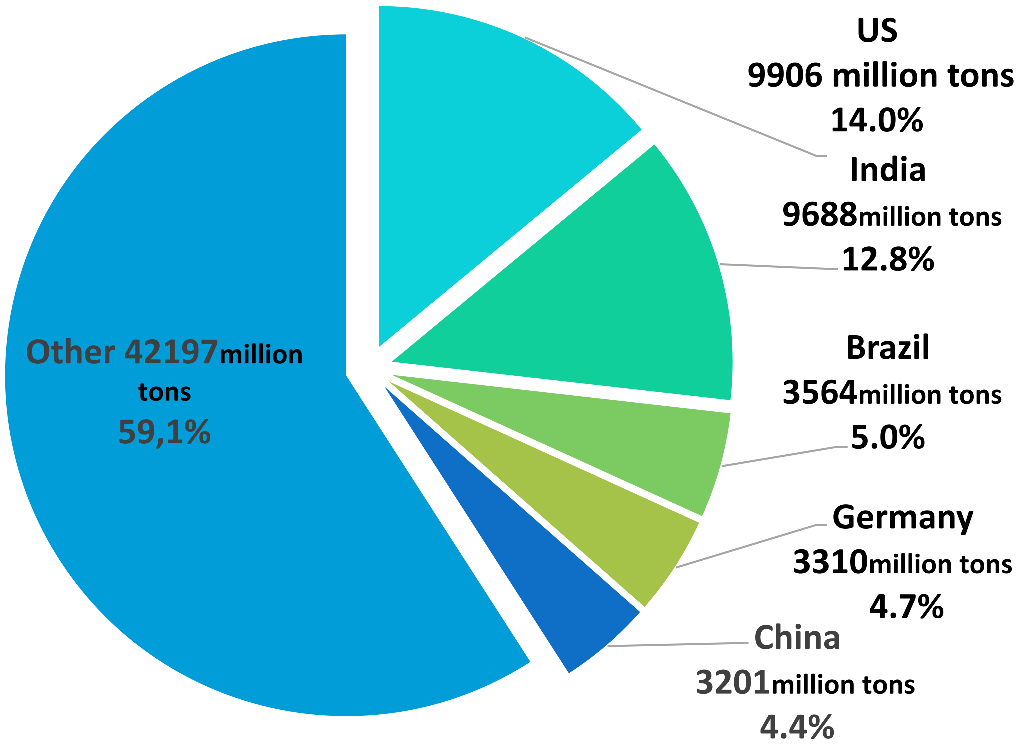
In 2010, China’s GHG emissions amounted to 9.551 billion tons of CO_2 equivalent, of which CO_2 accounted for 80.4%, and methane accounted for 12.2%.

CH_4 emissions from China's agricultural activities amounted to 471 million tons of CO_2 equivalent, approximately 66% of which came from the cultivation of ruminant animals.

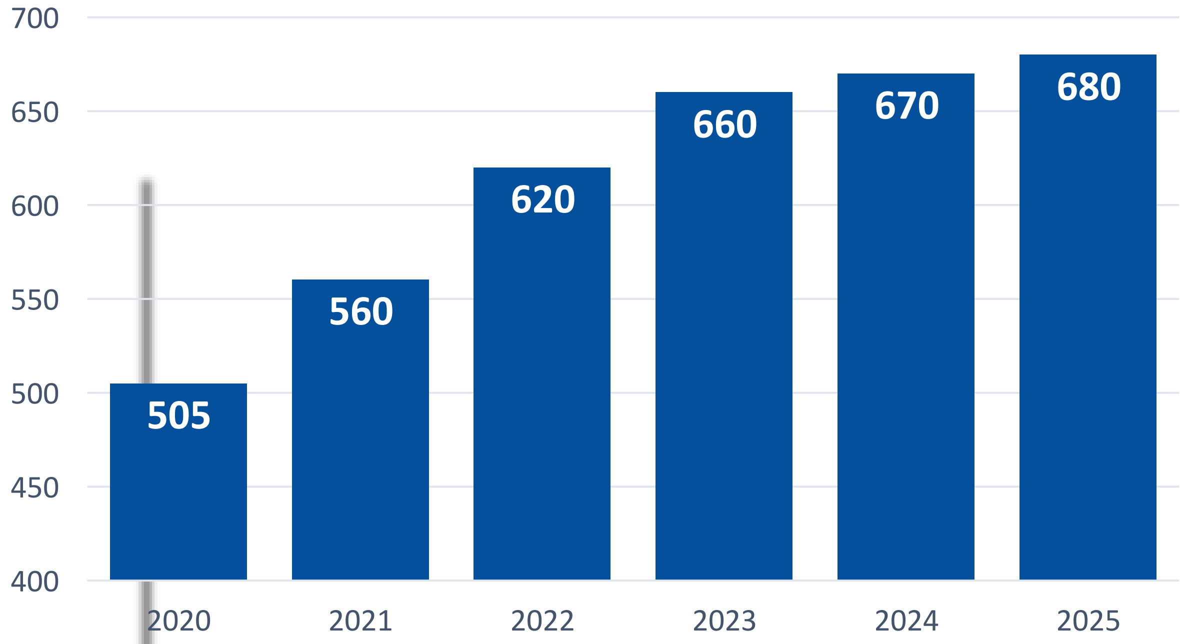
- China's ruminant animal breeding ranks among the top in the world, with 12.5 million dairy cows (ranked fourth globally), a stock of 66.18 million beef cattle, and a combined stock of 300 million sheep and goats, ranking first in the world.
- At the same time, with the continuous development of China's economy and the upgrading and adjustment of meat consumption structure, the demand for high-quality livestock products (such as beef, mutton, and milk) and the breeding quantity of ruminant animals will also continue to increase

China's milk production and dairy cattle inventory situation

The global milk production in 2019 was 71,399.4 million tons



The global milk production in 2019

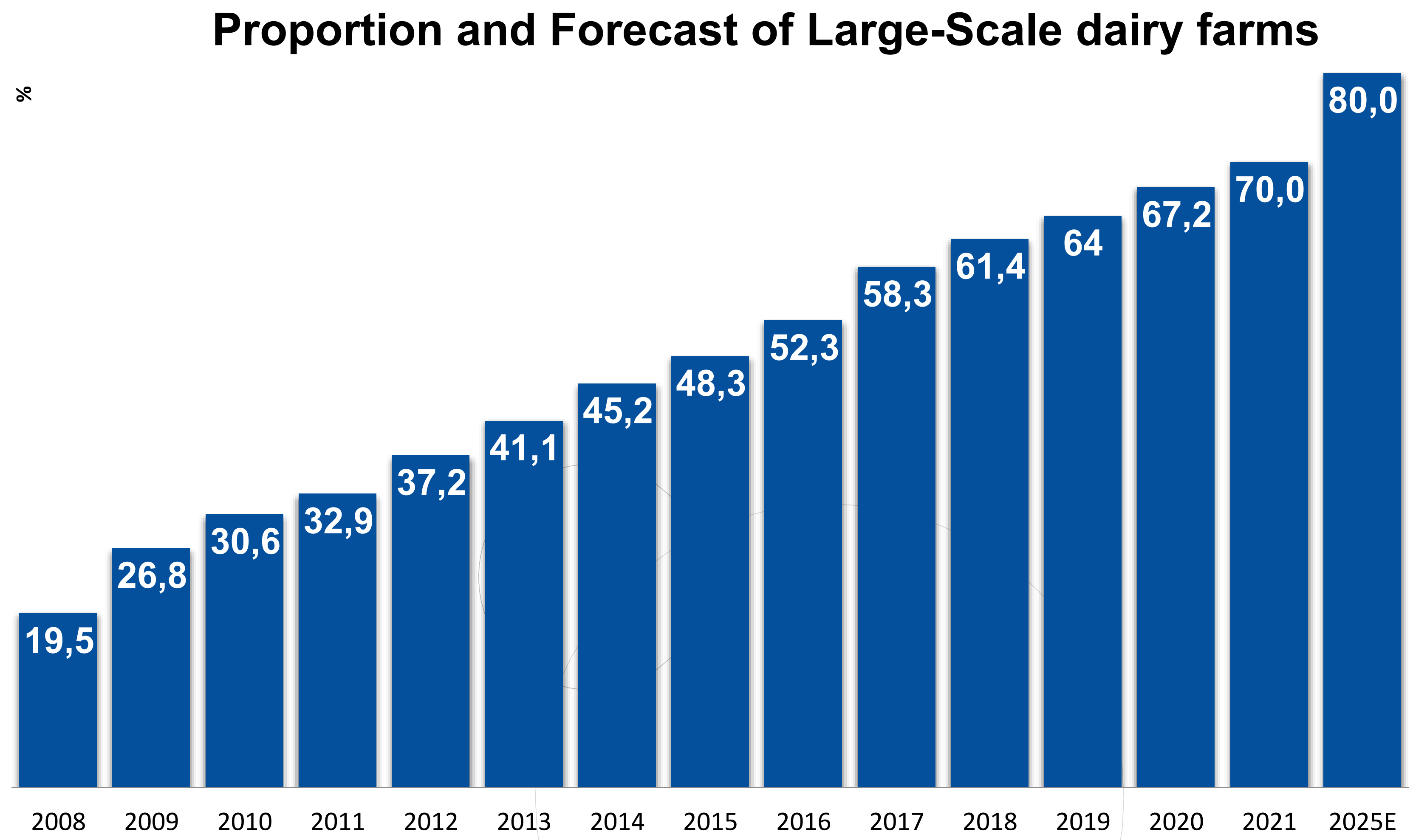


Estimated Dairy Cattle Inventory in Large-scale Farms during the 14th Five-Year Plan Period (in thousands)

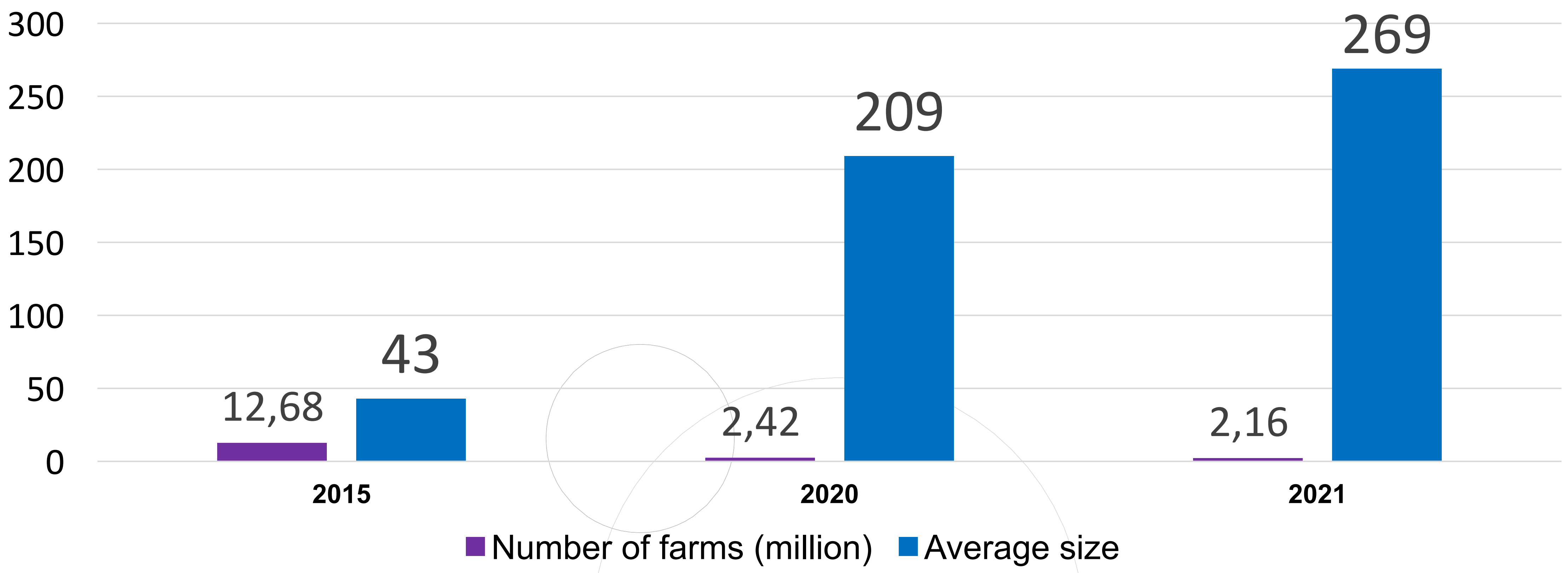
- ✓ Before 2023, the natural growth rate of dairy cows was at 5%, and it has since slowed down.
- ✓ During the 14th Five-Year Plan period(2021-2025), the import of dairy cows will range from 900,000 to 1,000,000 head.

Source : NDITS

The Proportion of Large-scale Dairy Farming (With stock of Over 100 cows) In China has increased By Nearly 50 Percentage Points



China's dairy farming is dominated by large-scale intensive farming system



The Cost of Feed for Dairy Cattle Farming Continues to Rise

China Agriculture University

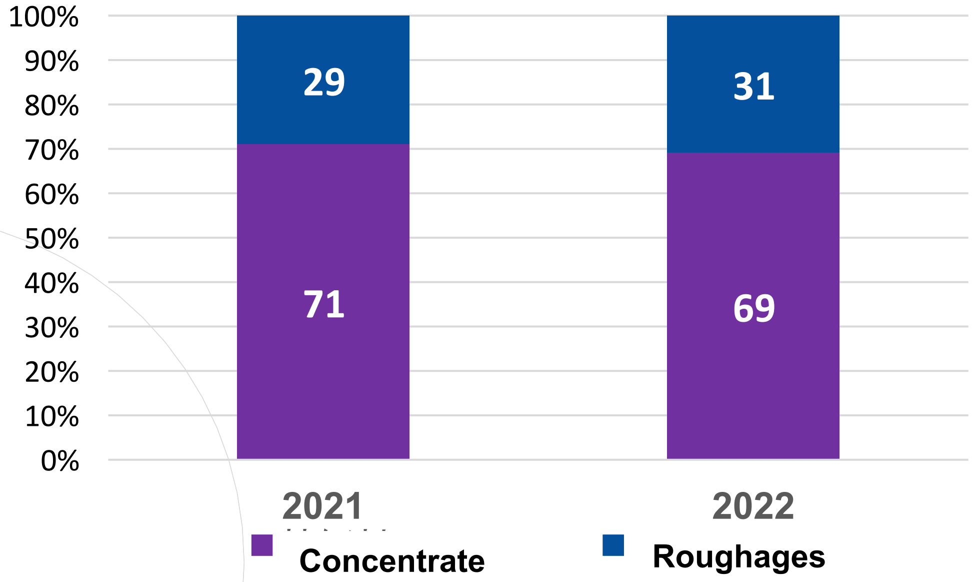
The increase in feed prices has led to a daily rise of 8 yuan per head in dairy feed costs, with the cost of feed per kilogram of milk increasing by 0.25 yuan.

Based on preliminary research findings, as of August 2023, **the cost per kilogram of milk is 3.81 yuan/kg.** Currently, the dairy farming industry is experiencing significant losses.

Calculation of the Impact of Feed Price Changes on Milk Production Costs

	2021.3	2022.3	Rate of increase
Cost of Ration (yuan/kg)	65.7	73.2	11%
Cost of Feed per Kilogram of Milk (yuan/kg)	2.19	2.44	11%
Total Cost per Kilogram of Milk (yuan/kg)	3.42	3.81	12%

Estimated Distribution of Feed Costs in the Year 2022 (%)



Source: NDITS; Roughages refers specifically to silage and hay.

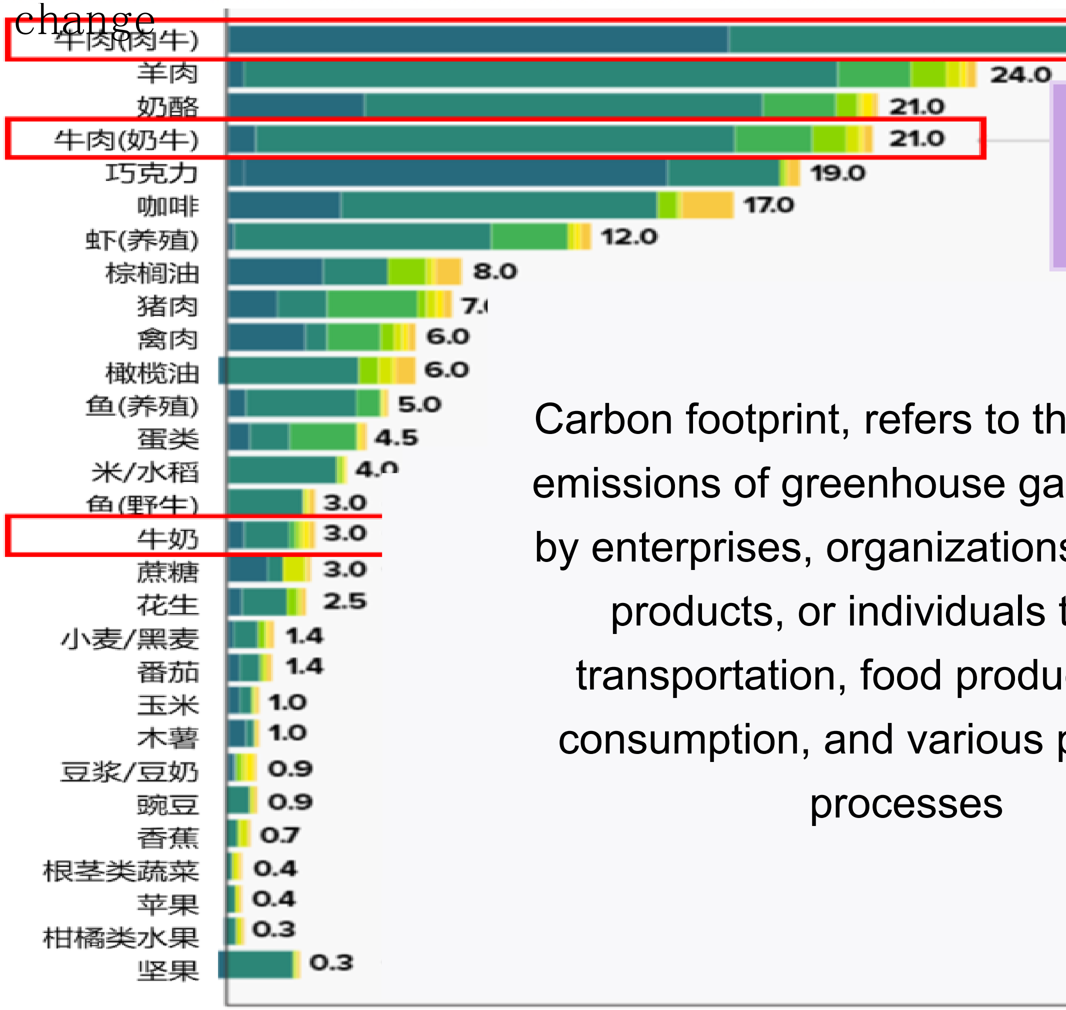
40,000 heads in stock– Modern Dairy BENGBU Farm

- How can we produce more milk with fewer cattle to meet the future market demand for high-quality dairy products?
- How can we fundamentally address the industry issues of 'three highs and one low' (high input, high energy consumption, high pollution, and low competitiveness) and revitalize the dairy industry through a low-carbon development path?

/02

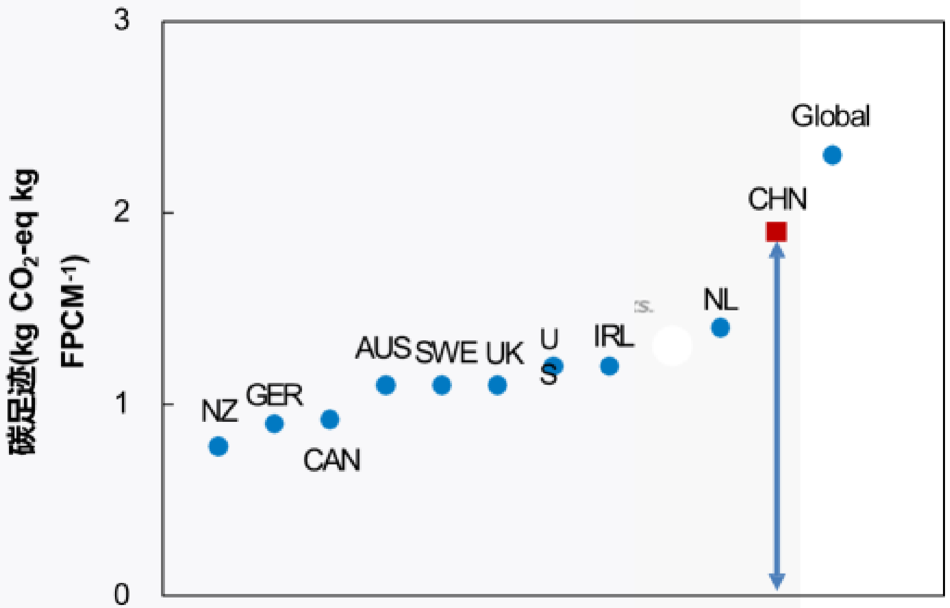
The carbon inventory of China dairy farming system

Carbon footprint & Food chain



Carbon footprint of producing different foods
(kg CO_2-eq/kg product)

Carbon footprint, refers to the collective emissions of greenhouse gases caused by enterprises, organizations, activities, products, or individuals through transportation, food production and consumption, and various production processes

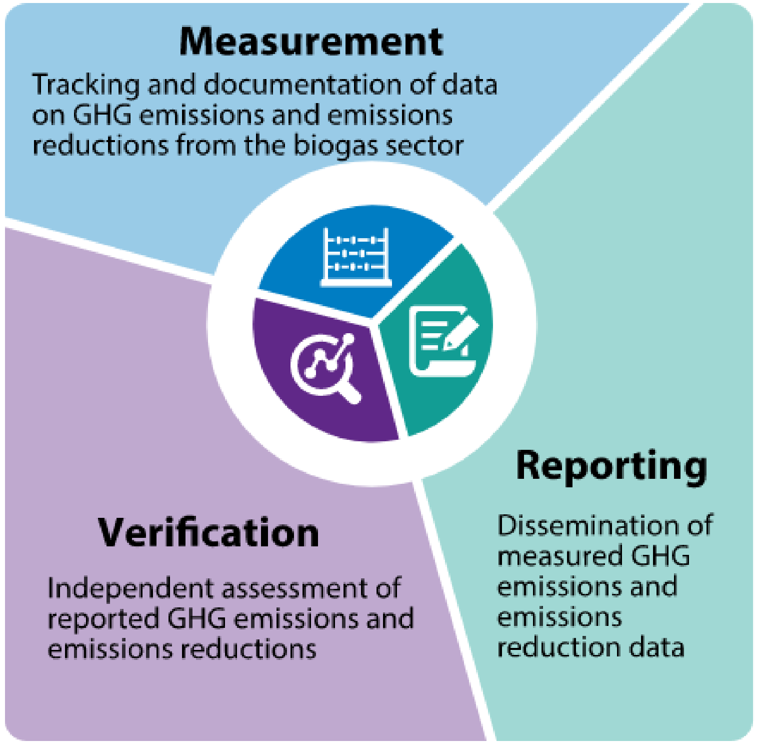


Comparison of the carbon footprint of the dairy industry in different countries

Greenhouse Gas Inventory and M.R.V. System

Compiling a GHG inventory is a fundamental task in addressing climate change.

Through the inventory, we can identify **the primary sources of GHG emissions**, **understand the emission status of various sectors**, **predict future mitigation potential**, and thereby assist in formulating response measures



- **M - Monitoring**

  Collect activity level data, compute emission factors, and emission amounts.

- **R - Reporting**

  Process of providing greenhouse gas emission results in accordance with inventory compilation guidelines.

- **V - Verification**

  Independent assessment of reported greenhouse gas emissions and emission reductions.

国家应对气候变化战略研究和国际合作中心
National Center for Climate Change Strategy and International Cooperation (NCSC)

5.国家发展改革委办公厅关于印发首批10个行业企业温室气体排放核算方法与报告指南（试行）的通知

来源：国家气候战略中心　时间：2020-03-19

国家发展改革委办公厅关于印发首批10个行业企业温室气体排放核算方法与报告指南（试行）的通知

发改办气候[2013]2526号

各省、自治区、直辖市及计划单列市、副省级省会城市、新疆生产建设兵团发展改革委：

为有效落实《国民经济和社会发展第十二个五年规划纲要》提出的建立完善温室气体统计核算制度，逐步建立碳排放交易市场的目标，推动完成国务院《"十二五"控制温室气体排放工作方案》（国发[2011]41号）提出的加快构建国家、地方、企业三级温室气体排放核算工作体系，实行重点企业直接报送温室气体排放数据制度的工作任务，我委正组织制定重点行业企业温室气体排放核算方法与报告指南。首批10个行业企业温室气体排放核算方法与报告指南（试行）已制定完成，现予印发，供开展碳排放权交易、建立企业温室气体排放报告制度、完善温室气体排放统计核算体系等相关工作参考使用。使用过程中的问题和意见，请及时反馈我委。特此通知。

附件（略）　1.中国发电企业温室气体排放核算方法与报告指南（试行）
2.中国电网企业温室气体排放核算方法与报告指南（试行）
3.中国钢铁生产企业温室气体排放核算方法与报告指南（试行）
4.中国化工生产企业温室气体排放核算方法与报告指南（试行）
5.中国电解铝生产企业温室气体排放核算方法与报告指南（试行）
6.中国镁冶炼企业温室气体排放核算方法与报告指南（试行）
7.中国平板玻璃生产企业温室气体排放核算方法与报告指南（试行）
8.中国水泥生产企业温室气体排放核算方法与报告指南（试行）
9.中国陶瓷生产企业温室气体排放核算方法与报告指南（试行）
10.中国民航企业温室气体排放核算方法与报告格式指南（试行）

国家发展改革委办公厅
2013年10月15日

中国企业联合会可持续发展工商委员会
China Business Council for Sustainable Development
（中国可持续发展工商理事会）

省级温室气体清单编制指南

（试行）

温室气体计算方法标准

国际
- GHG Accounting Tool for Chinese Cities
- Global Protocol for Community-Scale Greenhouse Gas
- Mitigation Goal Standard

国内
- 《中国燃煤电厂温室气体排放计算工具》
- 《省级温室气体清单编制指南（试行）》
- 《中国民航企业温室气体排放核算方法与报告格式指南（试行

更多

国际能源署技术路线图
- 技术路线图：二氧化碳与封存技术在工业中的应用
- Technology Roadmap: Carbon Capture and Storage in
- 能源技术路线图：中国风电发展路线图2050
- Technology Roadmaps: China Wind Energy Development
- Technology Roadmap: Energy and GHG Reductions in the
- 技术路线图：核能
- Technology Roadmap: Hydropower
- Technology Roadmap: Energy Efficient Building
- 电动车及插电式混合动力汽车路线图
- 技术路线图?高效低排放燃煤发电
- 技术路线图--交通用生物燃料
- 水泥技术路线图2009：直至2050年的碳减排目标

二〇一一年五月

International Greenhouse Gas Emission Accounting System (Method)

中國農業大學
China Agriculture University

Name of the Accounting System	Developing Organization	Applicable Entities	Main Contents of the System
IPCC 2006 and 2019 revised edition	**IPCC**	**For national governments and organizations**	**Methodologies for greenhouse gas sources from various sectors "Greenhouse Gas Accounting Systems"**
GHG protocol	**WRI** **•WBCSD**	For corporations, organizations, or emission reduction projects	Corporate accounting and reporting standards **Corporate** accounting and reporting standards **Product** lifecycle accounting and reporting standards **Corporate value chain** accounting and reporting standard
ISO 14064 ISO 14067	**ISO**	For corporations, organizations, or emission reduction projects	These are non-mandatory standards, relevant to organizations or emission reduction projects The requirements of this standard constitute the minimum basic requirements for organizations or emission reduction projects
PAS 2050 Specification	**BSI**	For corporations, organizations, or emission reduction projects	The primary focus is on the emissions of various greenhouse gases produced throughout the lifecycle of a company's products

TWO OF THE WORLD BIGGEST DAIRY PROCESSORS ARE CHINESE

Table 1: Global Dairy Top 20, 2022

2022		2021	Company	Country of headquarters	Dairy turnover, 2021* USD billion	Dairy turnover, 2021* EUR billion
1		1	Lactalis	France	26.7†	22.6†
2		2	Nestlé	Switzerland	21.3†	18.0†
3	▲	4	Danone	France	20.9†	17.7†
4	▼	3	Dairy Farmers of America	US	19.3	16.3
5		5	Yili	China	18.2†	15.4†
6		6	Fonterra	New Zealand	14.8†	12.5
7	▲	9	Mengniu	China	13.7	11.6
8	▼	7	FrieslandCampina	Netherlands	13.6	11.5
9	▼	8	Arla Foods	Denmark/Sweden	13.3	11.2
10		10	Saputo	Canada	12.0	9.6
11		11	Unilever	Netherlands/UK	8.3†	7.0†
12	▲	14	Savencia	France	6.6	5.6
13	▲	18	Gujarat Cooperative Milk Marketing Federation Ltd	India	6.3	5.3
14	▲	17	Sodiaal	France	5.9†	5.0†
15	▼	13	Meiji	Japan	5.9†	5.0†
16		16	Agropur	Canada	5.8	4.9
17	▲	20	Müller	Germany	5.7†	4.9
18	▼	12	DMK	Germany	5.2†	4.4†
19		19	Schreiber Foods	US	5.1†	4.3
20		#	Froneri	UK	5.0	4.2

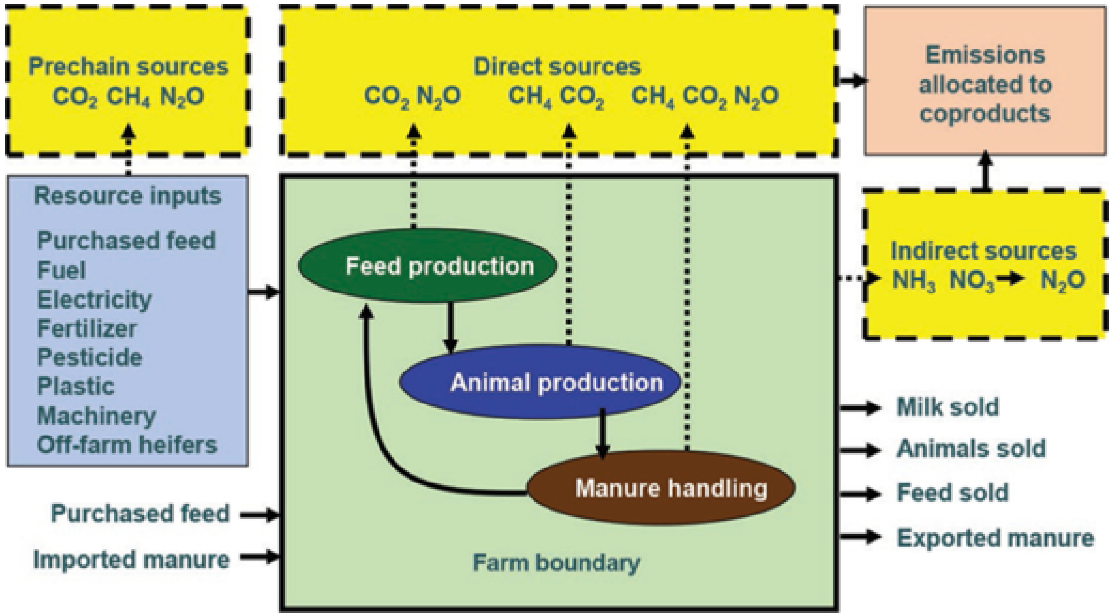
* Turnover data is predominately dairy sales, based on 2021 financials and M&A transactions completed between January 1 and June 30, 2022. Pending mergers/acquisitions not incorporated include: BMI's Fresh Division and production facility in Würzburg to Lactalis, Fonterra's sale of DPA Brazil, Soprole and changes to the Australian business, Müller's acquisitions of FrieslandCampina's German plants and (fresh) brands, FrieslandCampina's disposal of Campina LLC (Russia-based operations), Nutrifeed (animal nutrition) and the powder plant in Aalter, Belgium, and FrieslandCampina's acquisition of Nutricima.

† estimate.

Company	Disclosure Year	Scope	Intensity	Unit	Description	Reference
Nestlé	2018	Scope 1 Scope 2 Scope 3	**3.3** **2.5** **107.3**	**Million metric tons of CO2e**	1. Reduce carbon emissions originating from assets owned or directly controlled by the group, such as emissions from combustion. 2. Decrease carbon emissions associated with purchased external energy sources like electricity, by adopting green energy options. 3. Minimize indirect emissions within the production chain, such as emissions generated during the consumption process.	Nestlé's Net Zero Carbon Emissions Roadmap（2020年12月）
Lactalis	2021				1. By 2025, achieve a reduction of at least -25% in greenhouse gas emissions (Scope 1 and 2). 2. By 2033, achieve a reduction of at least -50% in greenhouse gas emissions (Scope 1 and 2). 3. Achieve carbon neutrality by 2050.	Lactalis annual report（2021）
Danone	2021				1. Absolute reduction in Scope 1 and Scope 2 CO2 emissions (%) since 2015: -38.1% (2020) -48.3% (2021); -30% (by 2030). 2. Global reduction in carbon dioxide (%) compared to the previous year: -4.6% (2020) -3% (2021); -3% (2021).	DANONE INTEGRATED ANNUAL REPORT (2021)
Arla	2021	Scope 3	**1.20** **1.15**	Milk and whey/kg CO2e Milk/kg CO2e		
Friesland Campina	2021	1. Transportation and production 2. Member companies	**691** **12063**	kt CO_2e	Scope 1 and Scope 2: The GRI 305 standard does not comprehensively describe Friesland and its members' current greenhouse gas emissions status. Friesland has chosen to develop its own system to gain a deeper understanding of greenhouse gas emissions in milk production (processing) and transportation processes, as well as emissions from member companies.	2021 Annual Report
Fonterra	2022	Scope 1 Scope 2 Scope 3	**1.366** **0.565** **22.549**	Million metric tons of CO_2e		

Company	Year	Scope	Intensity	Unit	Description	Source
Yili	2021	Total Emissions Product emissions	**1.88** **0.222**	Million tons CO_2e $kgCO_2e/kg$ of product	By 2025, aiming to reduce the GHG emissions per ton of dairy products to 183.47 $kgCO_2e$.	Sustainability Report 2021
Mengniu	2021	Total Emissions Product emissions	**1.36** **0.171**	Million tons CO_2e $kgCO_2e/kg$ of product	Mengniu Group aims to achieve carbon peak by 2030 and carbon neutrality by 2050.	Sustainability Report 2021
Shengmu	2021	Feed processing Feed cultivation Cattle farming	**1.3** **7.7** **57.0**	Ten thousand metric tons of CO_2e	Major emission unit emissions decreased during the same period: 2020: Feed processing: 1.4; Feed cultivation: 8.1; Cattle farming: 60.5 (Unit: ten thousand tons of CO_2e)	2022 Mid-Year Performance Report

Carbon Emissions in the Dairy Industry Span the Entire Supply Chain.



GHG Emissions in Various Farming Stages by LCA system

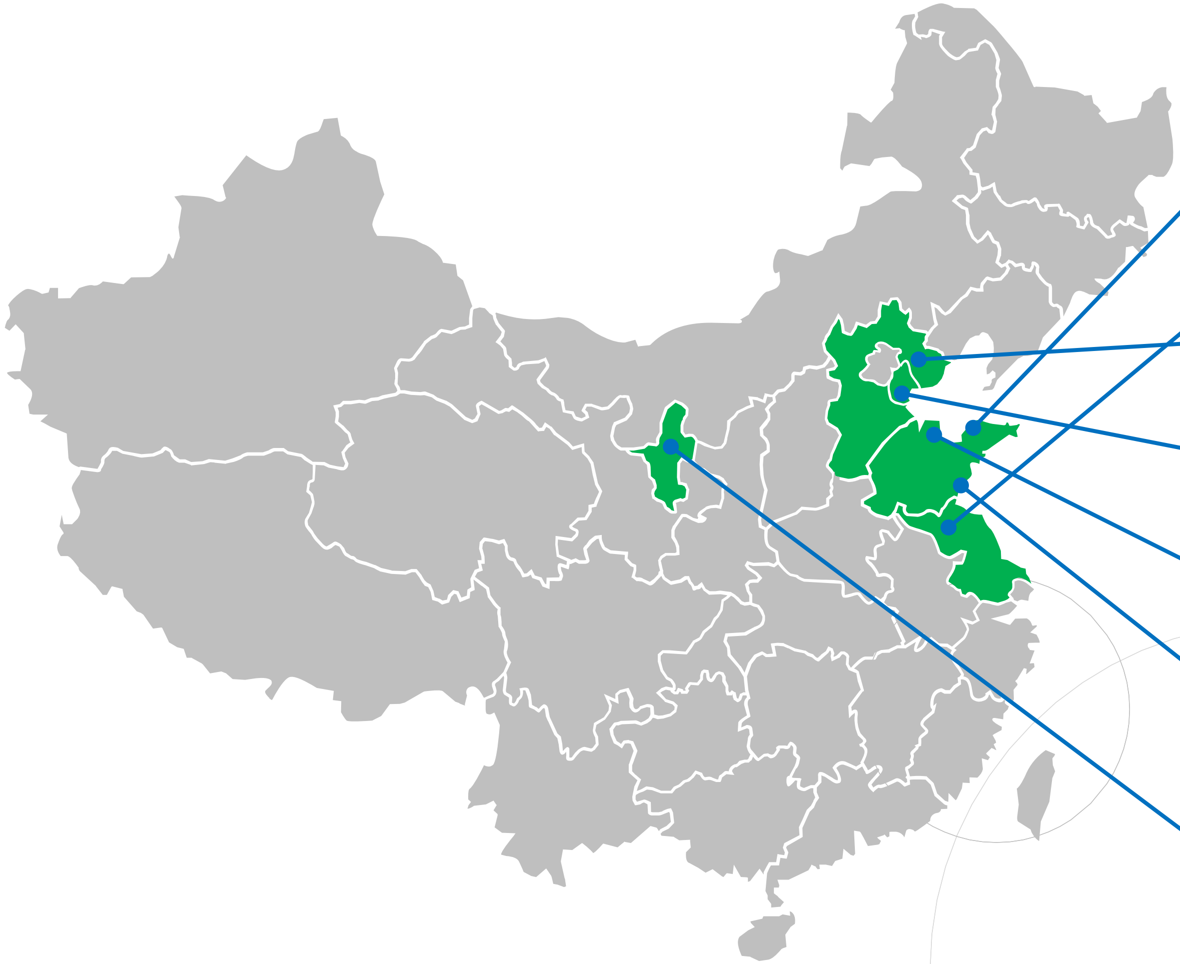
GHG Emissions in Various Farming Stages

GHG Emission Sources: Feed, Feeding, Housing, Manure Management, Fertilization, Soil

Types of GHG: Methane, Nitrous Oxide, Nitrogen Oxides

From a life cycle perspective, carbon emissions in the dairy industry traverse the entire supply chain, with greenhouse gas emissions being generated at every stage of dairy cattle farming.

Carbon footprint assessment of dairy farms at different sizes in China



Farm 1
Location: Shandong cows: 600 heads
Type: Family-run Farm

Farm 2
Location: Jiangsu cows: 3000 heads
Type: Large-scale Farm under a Certain Group

Farm 3
Location: Hebei cows: 9000 heads
Type: Large-scale Farm

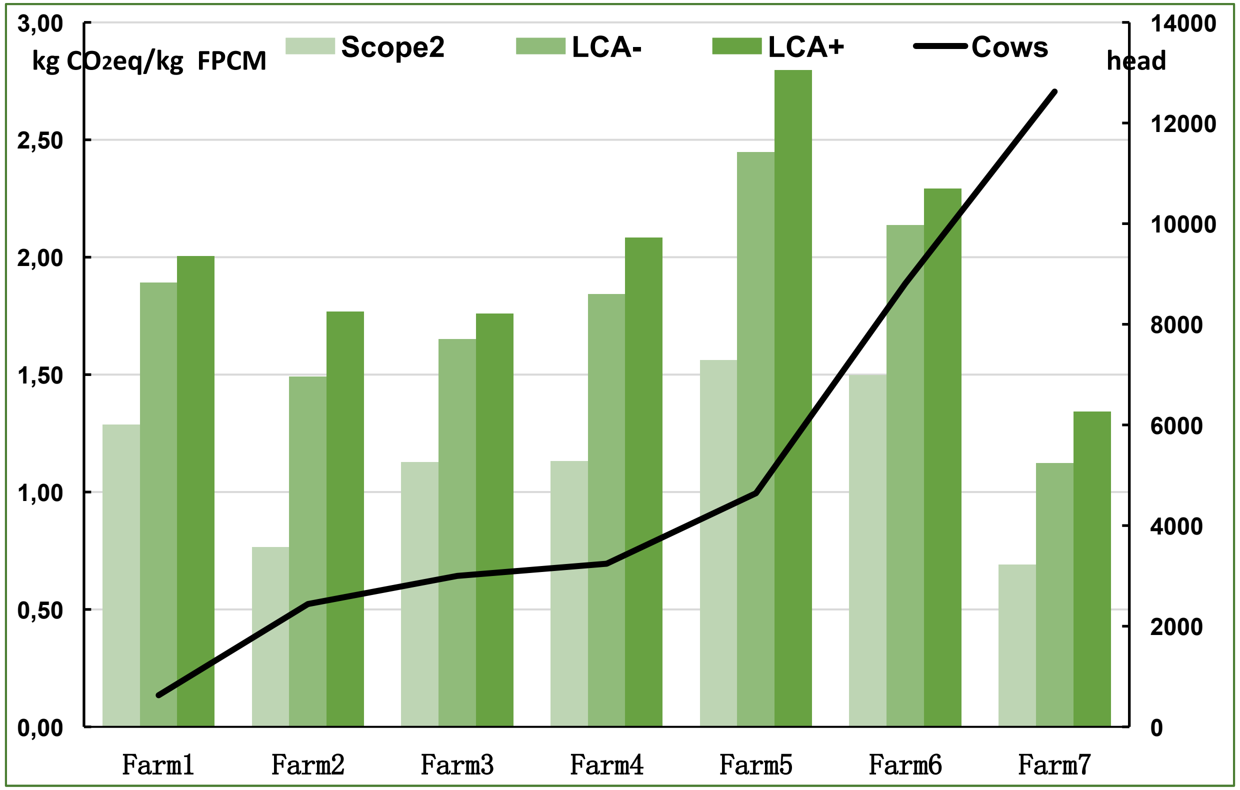
Farm 4
Location: Tianjin cows: 3000 heads
Type: Large-scale Farm under a Group

Farm 5
Location: Shandong cows: 10,000+ heads
Type: Large-scale Farm under a Group

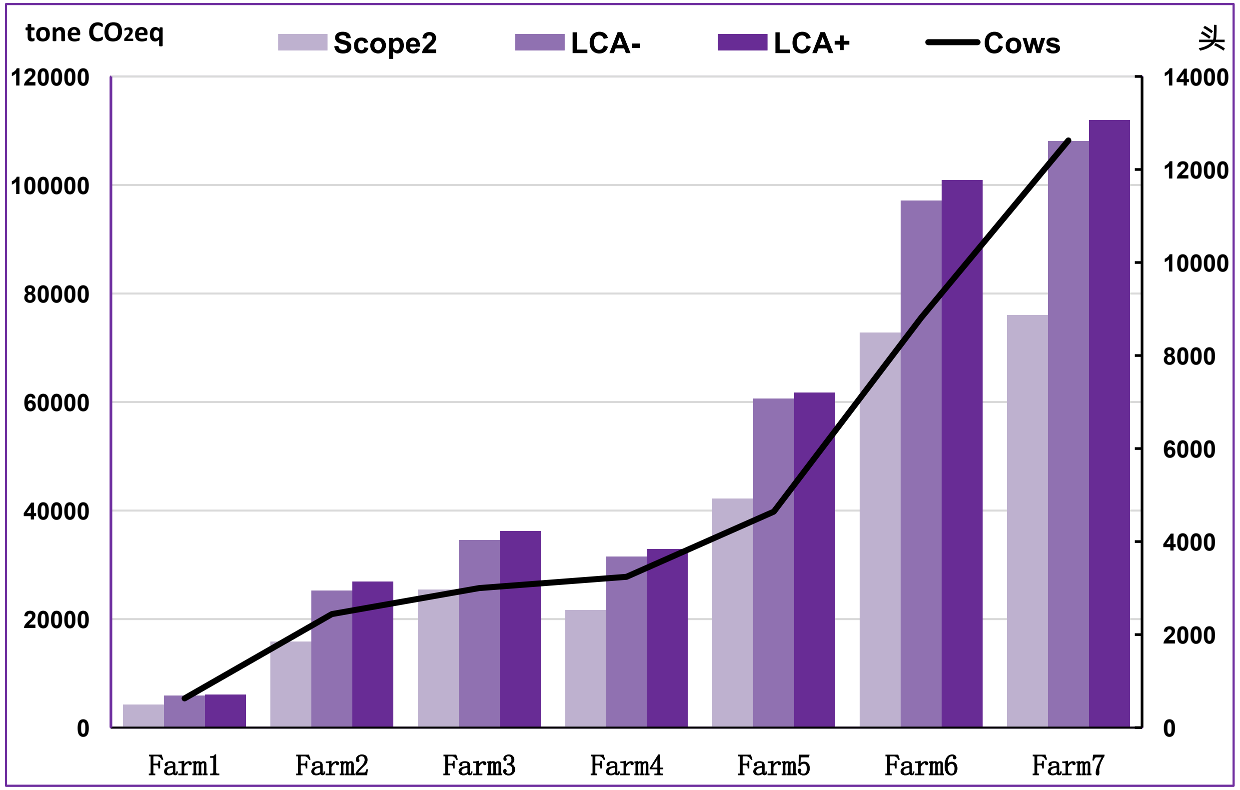
Farm 6
Location: Shandong cows: 2500 heads
Type: Large-scale Farm under a Group

Farm 7
Location: Ningxia cows: 4500 heads
Type: Large-scale Farm

Accounting for herd size and kilograms of milk GHG emissions from farms (2021)



Accounting for Range Herd Size and Total Annual GHG Emissions (2021)



Based on the overall comparison of carbon emission data from the 7 farms, it can be observed that as the size of cattle herds in a farm increases, the total GHG emissions produced also tend to be higher.
However, different regions and livestock farming methods do not exhibit a significant correlation with emissions per kilogram of milk.

Emission from the largest dairy farming group in China

China Agriculture University

5-8 tons CO_2e	*Emission per individual cow*
0.7-1.2 Kg CO_2e	*Emissions per kilogram of raw milk*
0.9-1.5 Kg CO_2e	*Emissions per kilogram of (FPCM)*

土地用途改变 ▸ 农场 ▸ 饲料 ▸ 加工 ▸ 运输 ▸ 零售 ▸ 包装

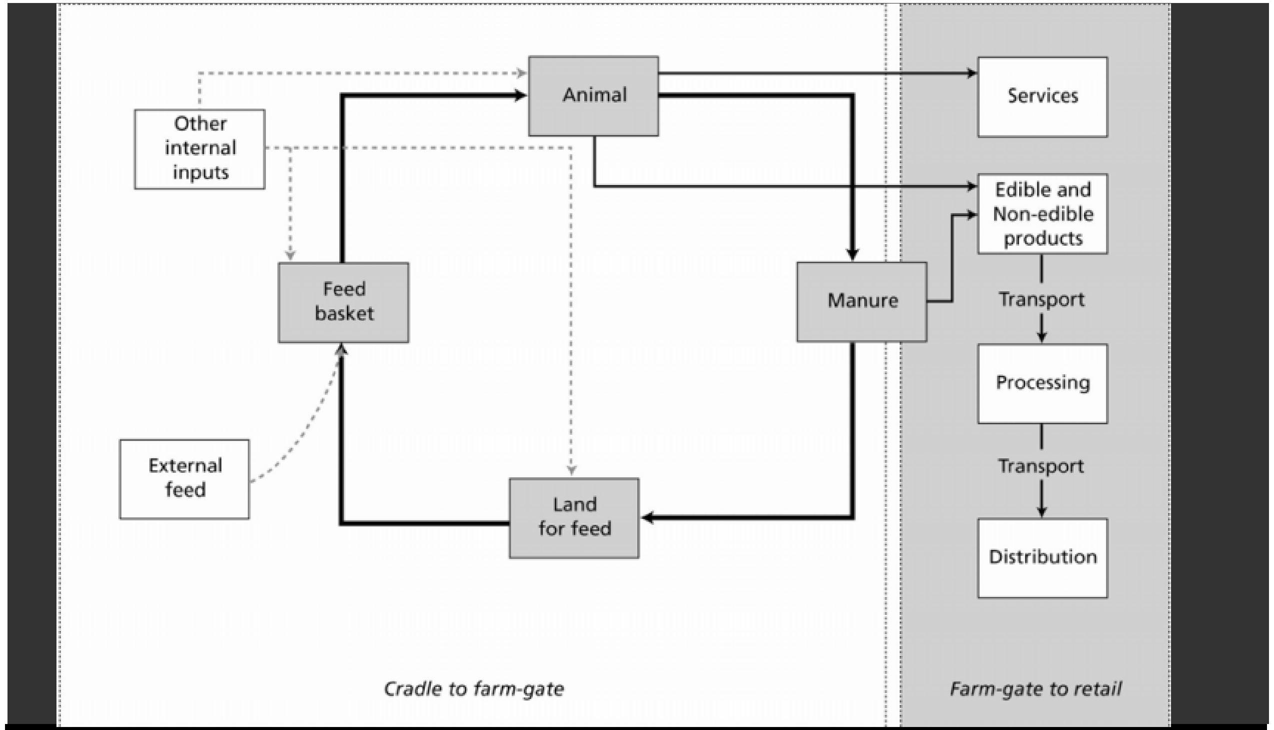
Cattle farming: 1 million tons of CO_2e

1. **Enteric fermentation**
   570,000 tons of CO_2e (57% of the total)

2. **Manure management**
   190,000 tons of CO_2e (19% of the total)

3. **Energy utilization**
   240,000 tons of CO_2e (24% of the total)

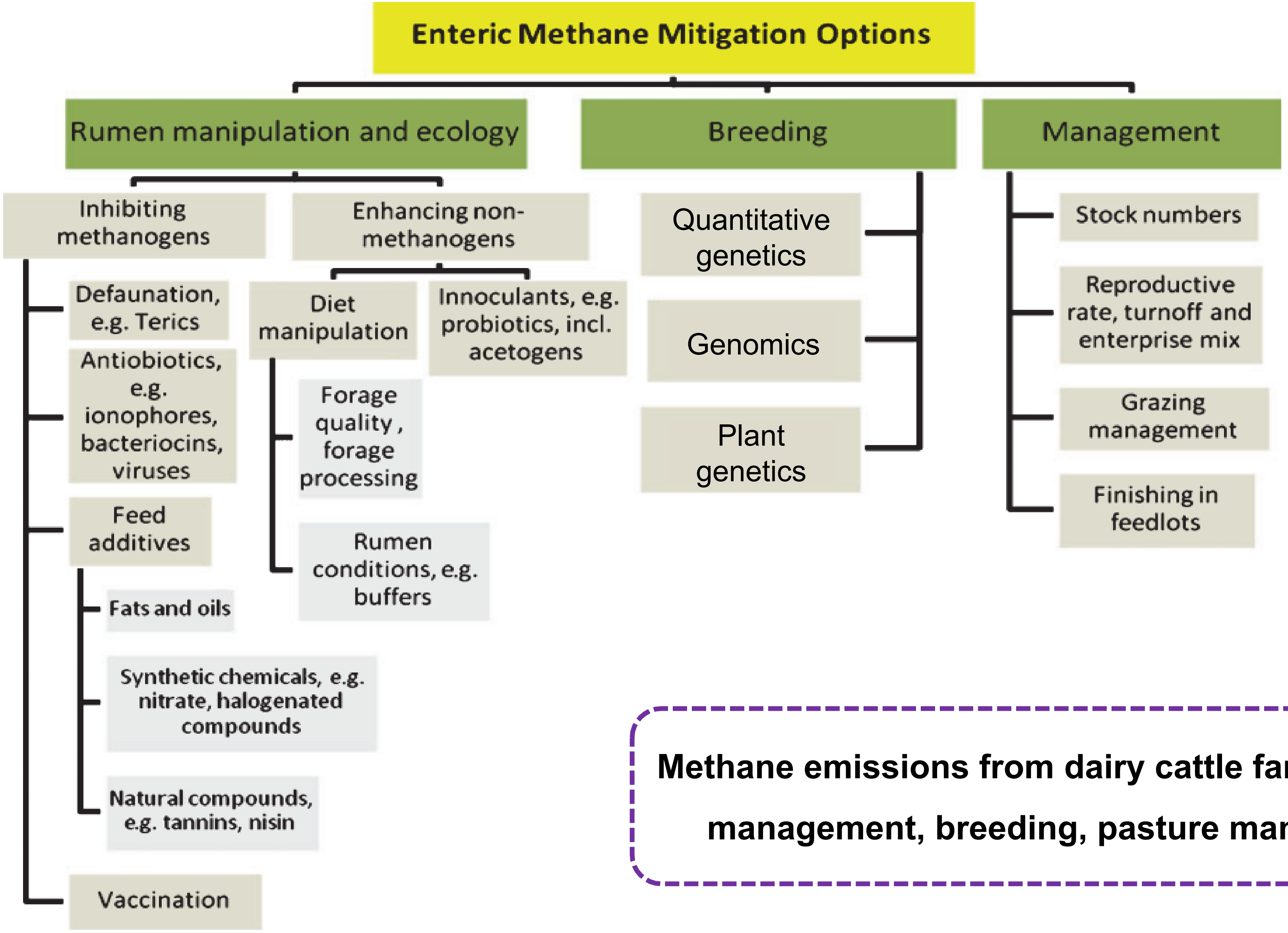
Source: Modern Animal Husbandry public information



/03

Our undergoing research on mitigation measures

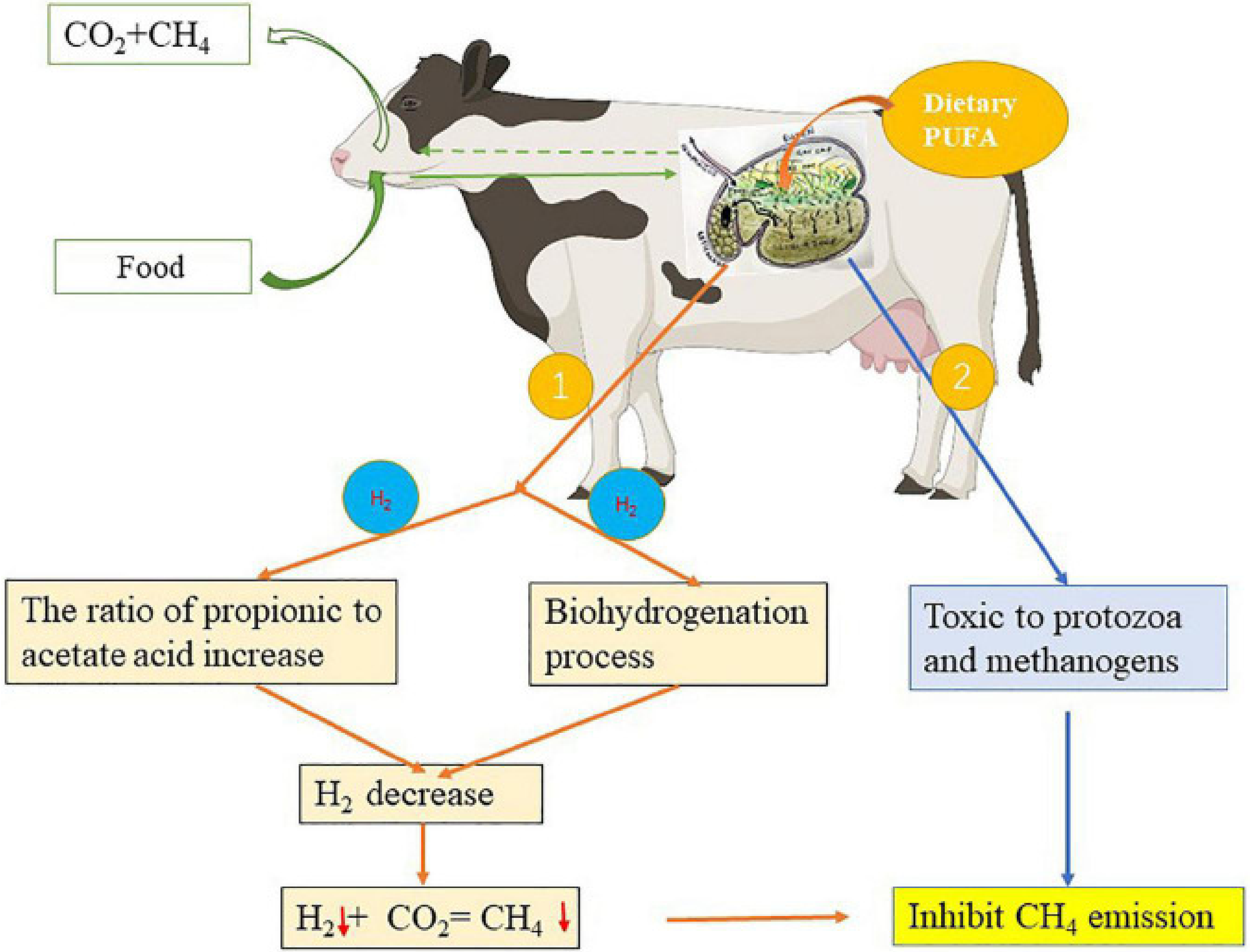
Intestinal Fermentation Emission Reduction Measures



- Dietary control technology can contribute to emission reduction by over 70%.
- Dietary control technology can be divided into various techniques, among which feed composition and nutrient optimization are the most effective and commonly used.

Methane emissions from dairy cattle farming can be regulated through feed management, breeding, pasture management, and manure treatment.

1- Proudcing low-carbon milk by regulating cow’ s dietary fatty acid profile



frontiers | Frontiers in Nutrition

TYPE Review
PUBLISHED 19 October 2022
DOI 10.3389/fnut.2022.955846

Check for updates

OPEN ACCESS

EDITED BY
Kai Wang,
Chinese Academy of Agricultural Sciences (CAAS), China

REVIEWED BY
Qian Jiang,
Hunan Agricultural University, China
Kang Zhan,
Yangzhou University, China

*CORRESPONDENCE
Wei Wang
wei.wang@cau.edu.cn

SPECIALTY SECTION
This article was submitted to Nutrition and Microbes, a section of the journal Frontiers in Nutrition

Producing natural functional and low-carbon milk by regulating the diet of the cattle—The fatty acid associated rumen fermentation, biohydrogenation, and microorganism response

Xiaoge Sun[1], Yue Wang[2], Xiaoyan Ma[1], Shengli Li[1] and Wei Wang[1]*

Experimental Design

China Agriculture University

Selecting cattle

- 10 Holstein dairy cows
- Lactation days (209.6±9.96 d)
- Same parity
- LUFA / HUFA

Ration

◆ Dietary fat content around **6%**

LUFA: Low Unsaturated Fatty Acids
HUFA: High Unsaturated Fatty Acids

Feeding management

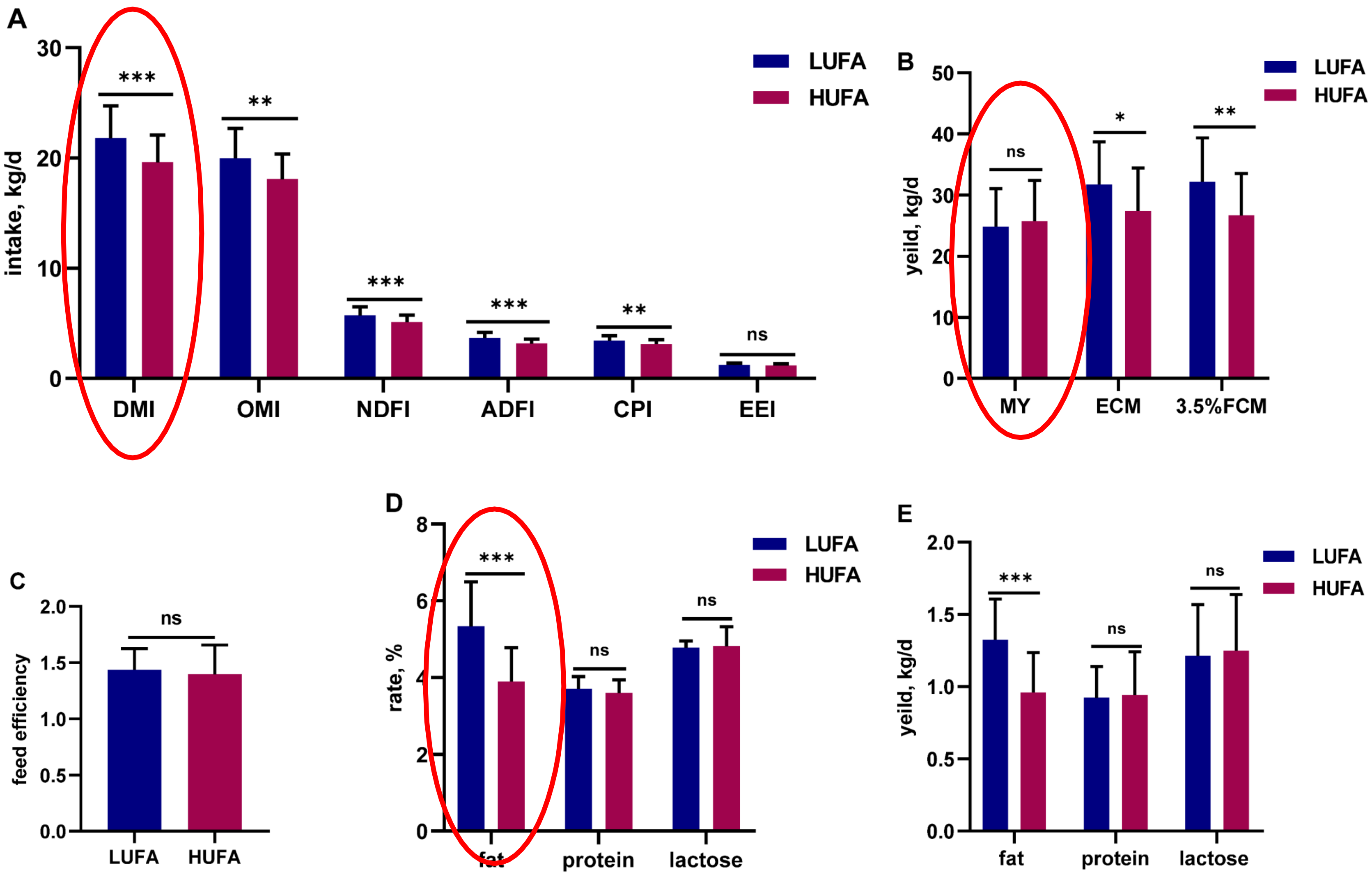
- 7-day adaptation period + 15-day pre-feeding period + 5-day respiration chamber sampling period
- Feeding TMR twice daily (7:00/14:00) with free access to water
- Milking three times daily (7:00, 14:00, 19:00)

Sample collection and data recording

- Feed samples collected twice a week, daily recording of dry matter intake (DMI) and milk yield
- Milk samples collected during the experimental period for milk composition analysis
- Methane production measured using respiration chambers

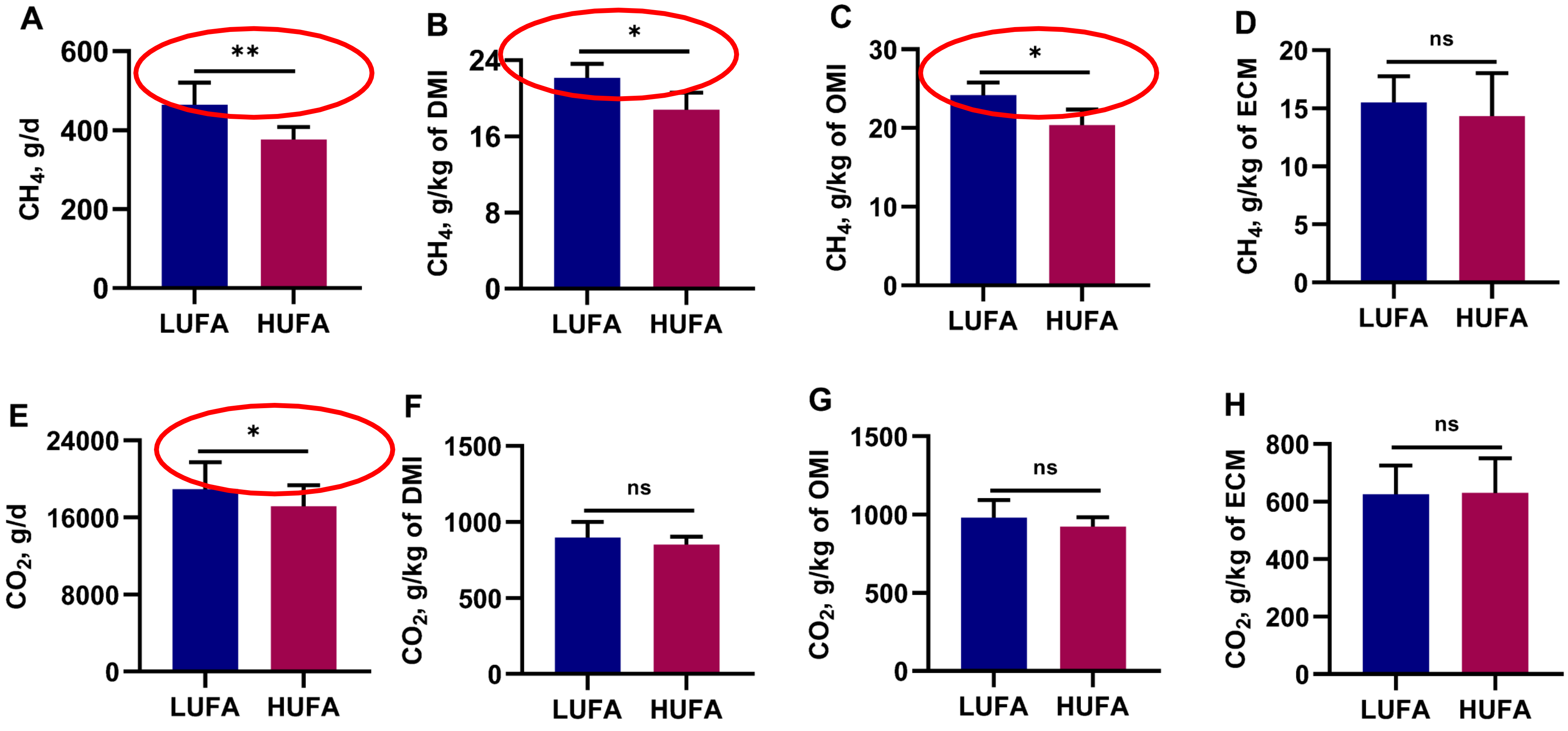
EXPERIMENTAL RESULTS - PRODUCTION PERFORMANCE

中国农业大学
China Agriculture University



Unpublished data

EXPERIMENTAL RESULTS - GAS PRODUCTION



Unpublished data

CONCLUSION OF THE UFA TRIAL

1. Increasing the content of unsaturated fatty acids (UFA) significantly reduced methane production in dairy cows without affecting milk yield, while maintaining consistent fat content. However, higher UFA content led to a decrease in milk fat percentage.

2. Under a dietary fat content of 6%, we tried to maximize the UFA ratio difference between the two treatment groups (LUFA and HUFA). Therefore, further research is needed to investigate whether a moderate reduction in UFA ratio in the HUFA group, without affecting milk fat and yield, can lead to reduced methane production.

2- Increasing the proportion of high-quality whole-plant corn silage

中国农业大学
China Agriculture University

Effect of feeding different proportions of corn silage in the diet on methane production in lactating dairy cows

Parameters	Proportion of corn silage replacement				SEM	*P* value
	0%	33%	67%	100%		
Methane production, g/d	399	414	411	387	12.8	0.028
Methane production/DMI, g/kg	24.6	25.0	24.5	22.0	0.38	0.010
Methane production/FPCM, g/kg	16.6	17.0	16.2	15.3	0.50	<0.001

Source：Van Gastelen et al. 2015.

- **Smoe studies** have explored the impact of replacing grass silage with corn silage in dairy cow diets on enteric methane production.
- The results indicate that replacing grass silage with corn silage leads to a reduction in methane production, particularly when measured per unit of FPCM.

Team research: When the inclusion level of whole-plant corn silage in the diet is 30 kg (wet basis), it reduces dairy cows' dry matter intake and consequently lowers milk yield. However, feed conversion efficiency, nitrogen utilization efficiency, and economic benefits are higher compared to the other two groups.

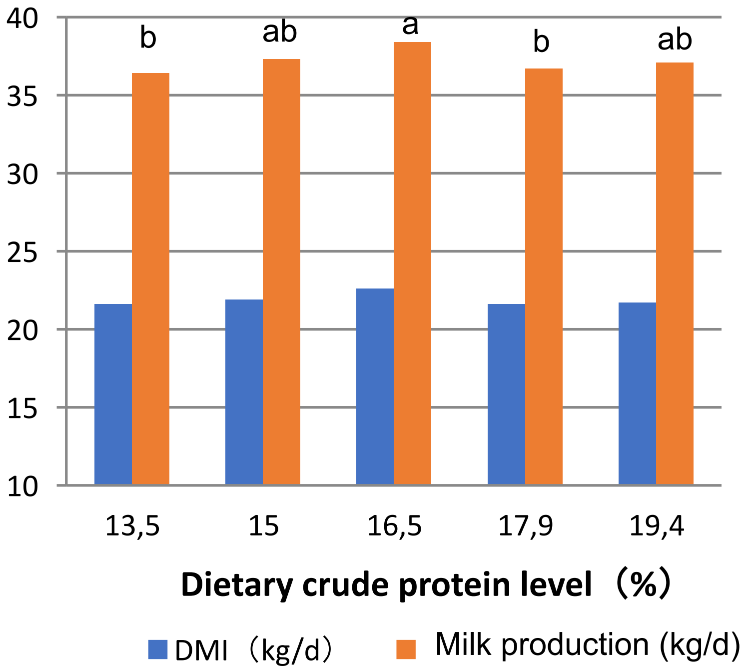
Data source: Liu Jianying. China Agricultural University, 2020.

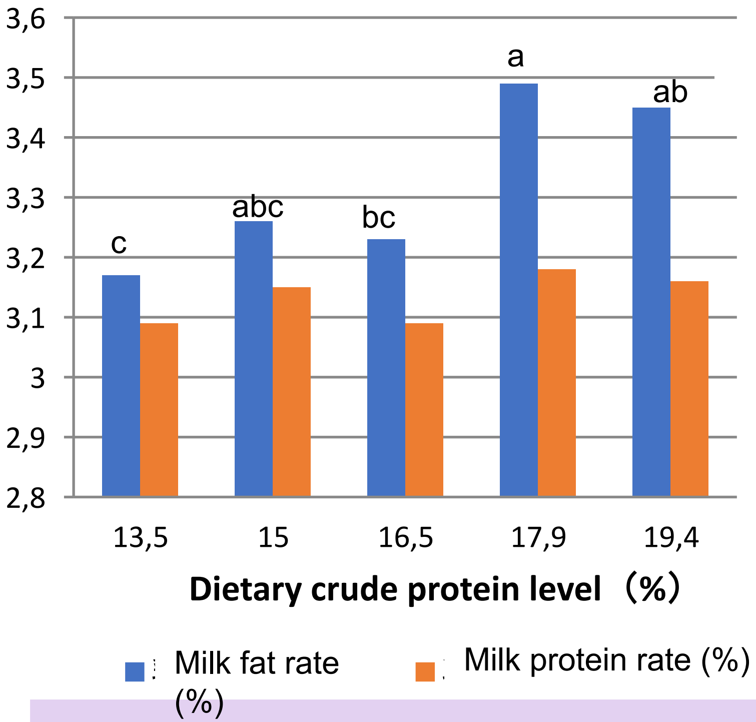
Effect of different silage levels in the diet on milk composition in dairy cows

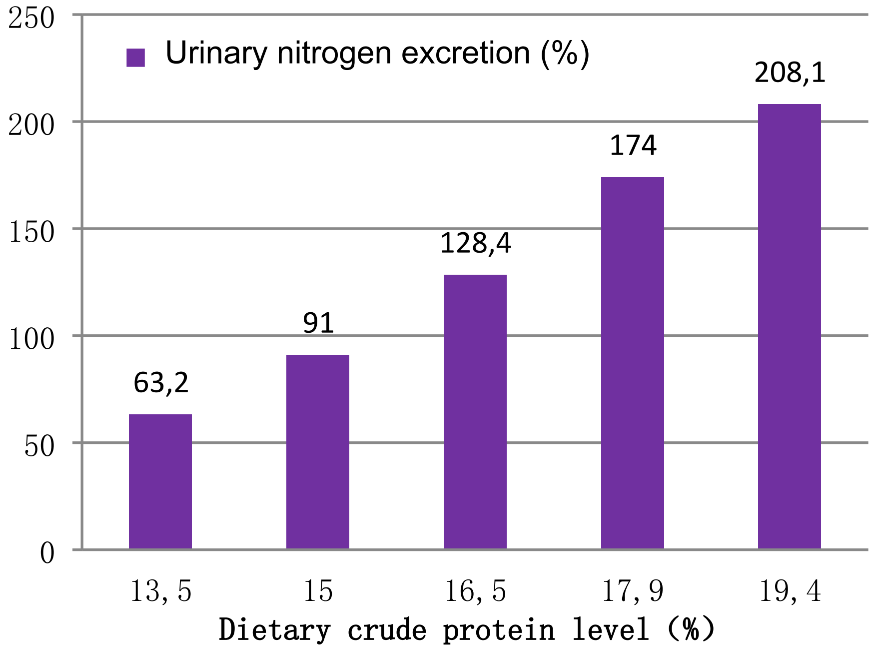
Parameters	The proportion of corn silage in the diet			SEM	*P* value
	18%	24%	30%		
DMI, kg/d	24.90	24.40	20.78	2.86	<0.01
Milk production, kg/d	24.09	22.65	22.66	1.84	<0.01
Feed conversion rate	1.09	1.04	1.15	0.15	<0.01

3- Application of low-protein diets

(Significant difference between groups)







High protein diet doesn't necessarily result in higher milk yield

There is no statistically significant difference in milk protein content

Urinary nitrogen excretion increases.

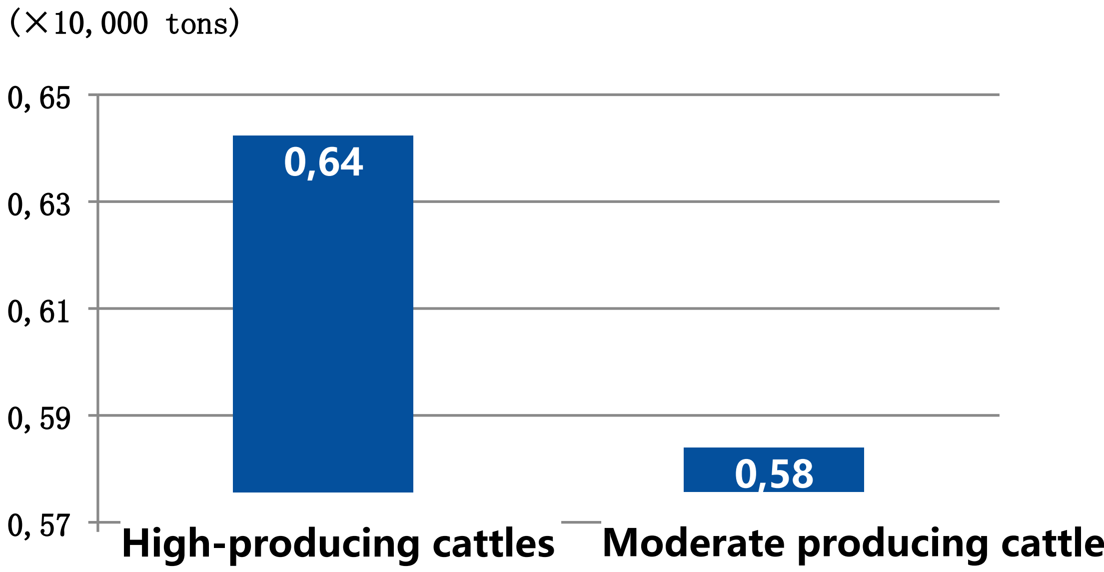
J J Olmos Colmenero,2006

Excessively high dietary protein levels do not improve production performance and can actually increase nitrogen excretion in manure, indirectly leading to greenhouse gas emissions (such as N_2O).

3-Application of low-protein diets

According to research in 2020, there were approximately 5.2 million Holstein dairy cows in China. The dietary protein content for high-yielding cows ranged from 17% to 18%, while for mid-yielding cows, it ranged from 16% to 17%.

Protein level	Lactation stage		3.5% fat-corrected milk (FCM)	Fecal nitrogen content
	Weeks 1-16	Weeks 17-44		
	Dietary crude protein (% DMbasis)		kg/entire lactation period	
Low/Low	15.4	16	10714[b]	127[c]
Moderate/Low	17.4	**16**	**11655[a]**	141[b]
Moderate/Moderate	17.4	**17.9**	**11828[a]**	163[a]
High/Moderate	19.3	17.9	11582[a]	162[a]

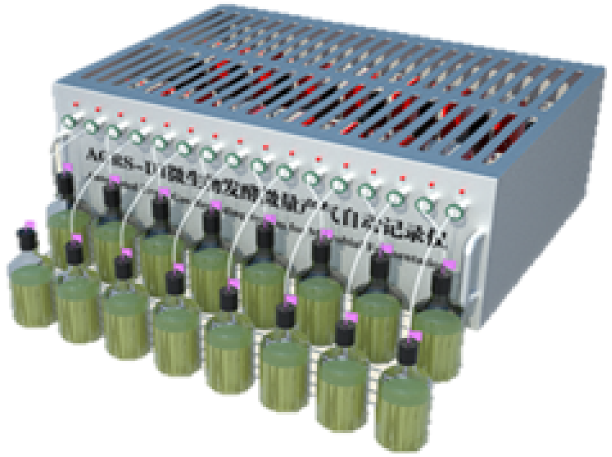


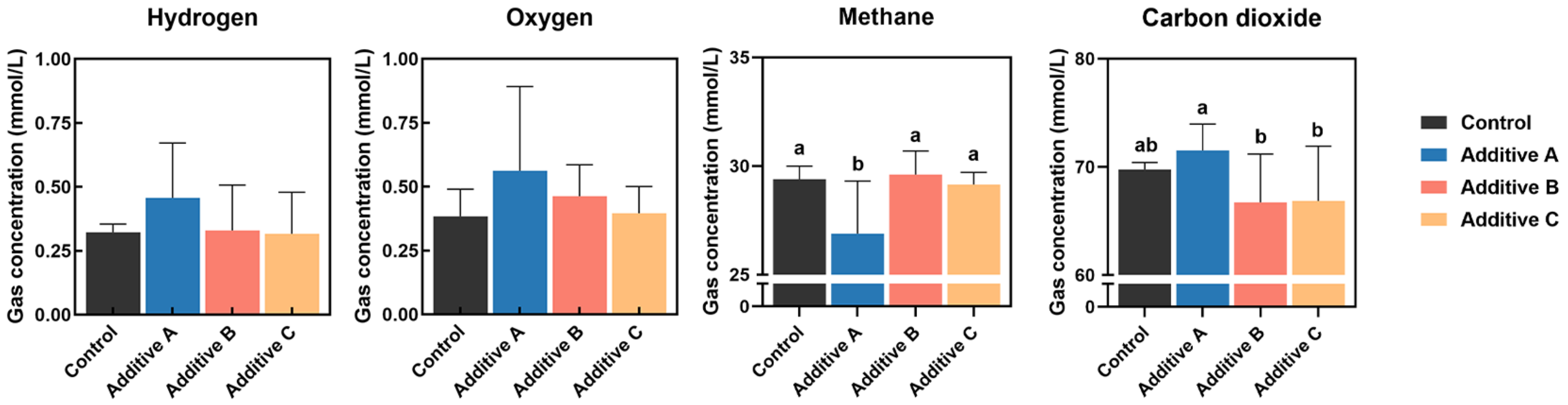
Note: High and moderate-yielding cows are calculated for every 1 million cows; dietary crude protein (CP) reduced by 0.5%.

Suggested protein content for newly calved cows is 17% to 17.5%, for high-yielding cows it is 16.8% to 17.4%, and for late lactation it is 16%.

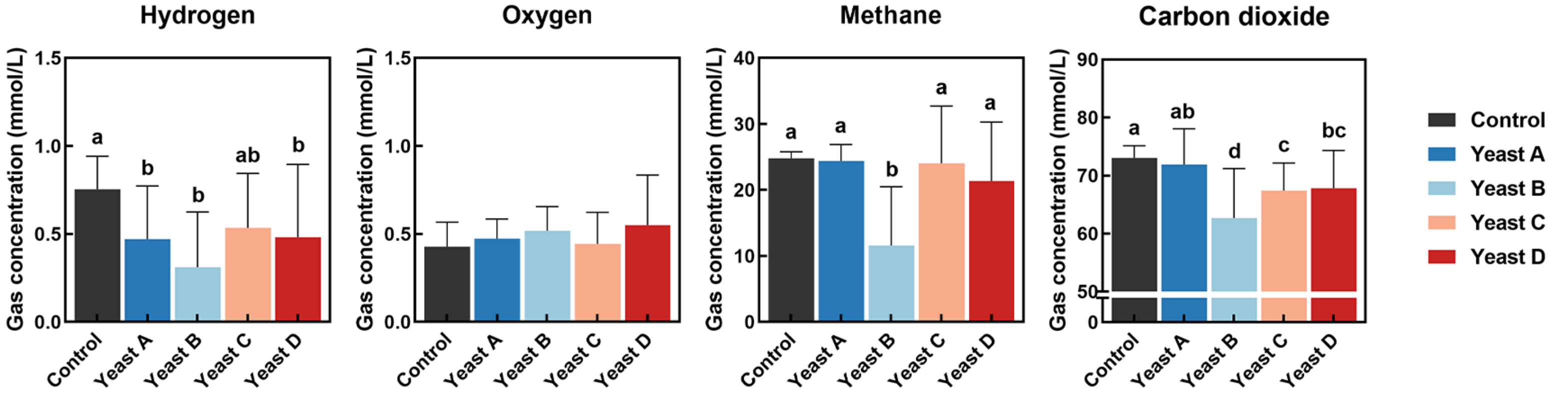
Through dietary amino acid balancing technology, it is possible to reduce nitrogen excretion from lactating dairy cows by 12,200 tons per year.

4-Evaluation of additives—*in vitro*





Effects of different methane inhibitors on in vitro rumen fermentation gas composition in dairy cows (mmol/L)



Effects of different yeast cultures on in vitro rumen fermentation gas composition in dairy cows (mmol/L)

The effects of **methane inhibitors** and certain **yeast cultures** on rumen fermentation gas composition (especially methane) were validated through in vitro fermentation.

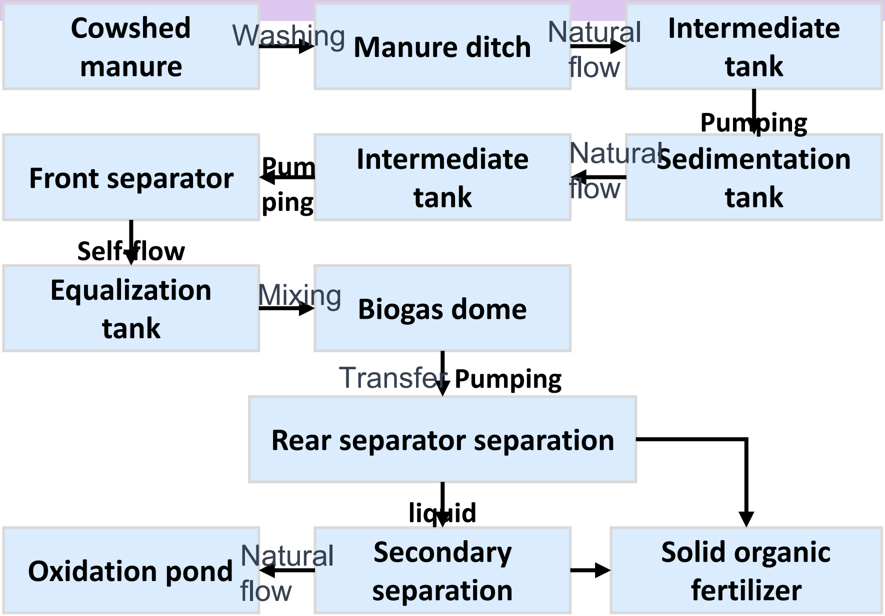
5- Biomass utilization in China's large-scale dairy farms

中國農業大學
China Agriculture University

- Average daily biogas production: 2 9000 m^3
- Maximum designed biogas power generation capacity: 50-60 MW·h/day

  Actual biogas power generation capacity: 30-40 MW·h/day

The average emission factor of the national grid in 2022 as 0.5703 tCO_2e/MW·h; The agricultural electricity price is 0.50 yuan/KW·h; the carbon trading price is estimated at 50 yuan/ t CO_2e :



- ✓ Utilizing biogas for power generation on the ranch can reduce the carbon emissions generated from purchased electricity: 35×365×0.5703=**7285.58 (t CO_2e)**
- ✓ Utilizing biogas for power generation on the ranch can decrease external grid electricity expenses:
- ✓ 3 5000×365×0.50=**6.3875 (million Yuan)**
- ✓ The biogas power generation project can participate in carbon offset trading: 7285.58×50 =**0.3643 (million Yuan)**

Some thoughts for GHG mitigation in the dairy value chain -take home message

中国農業大學
China Agriculture University

Comprehensive improvement in production efficiency is needed across the entire dairy value chain!

- Some countries and dairy companies have already initiated cattle emission reduction plans;
- There are no ready-to-use technology yet;
- Priorizing cost-effective emission reduction strategies;
- The applicability of emission reduction measures depends on farm types and attitudes (technical requirements, time, and financial investment);
- Most existing monitoring tools do not encompass all emission reduction strategies;
- Balancing implementation efforts with the completeness (and accuracy of measurement) of emission reduction plans is essential;
- A comprehensive approach is needed to assess the combined emissions reduction of all categories of mitigation measures
- Integrating various emission reduction measures can enhance efficiency; however, compatibility should be considered when using a combination of methods;
- Downstream stakeholders in the industry should initiate incentive mechanisms for low-emission farms;
- In addition to greenhouse gas emissions, farms also face other sustainability challenges.

THANKS

Wei Wang

Wei.wang@cau.edu.cn

China Agriculture University