

Webinar on “Greenhouse gas reduction on smallholder dairy farms in Asia”

Experiences with reducing GHGs in dairy sector: Thailand



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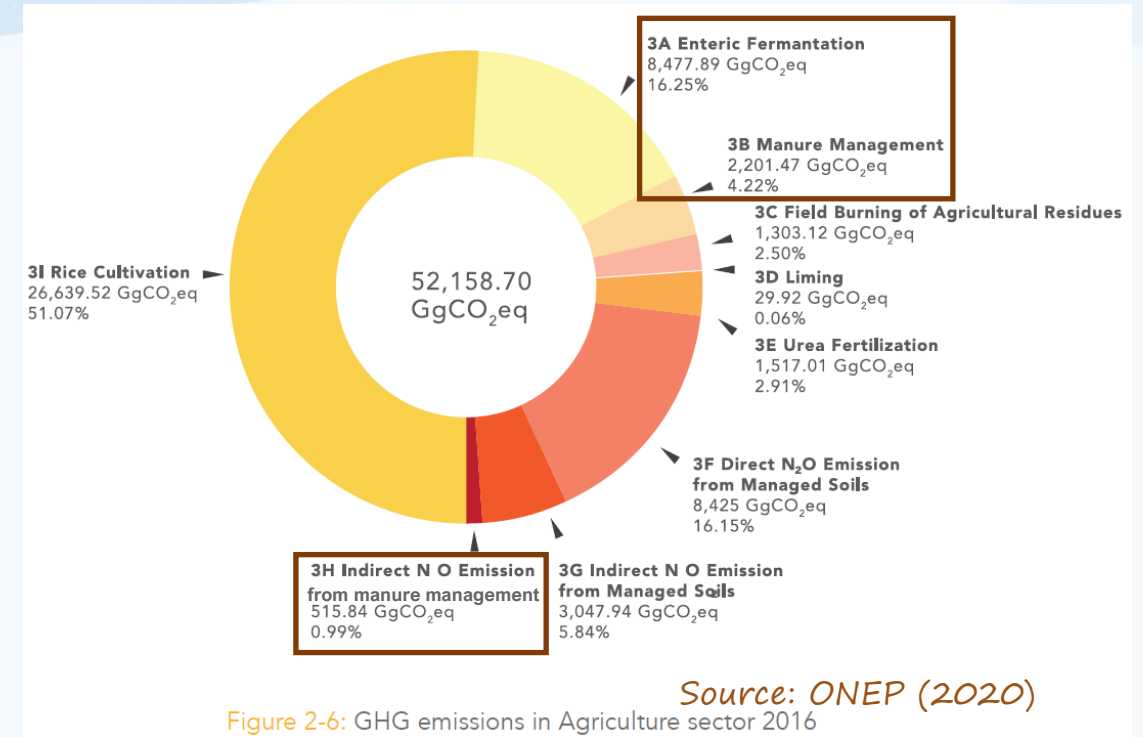
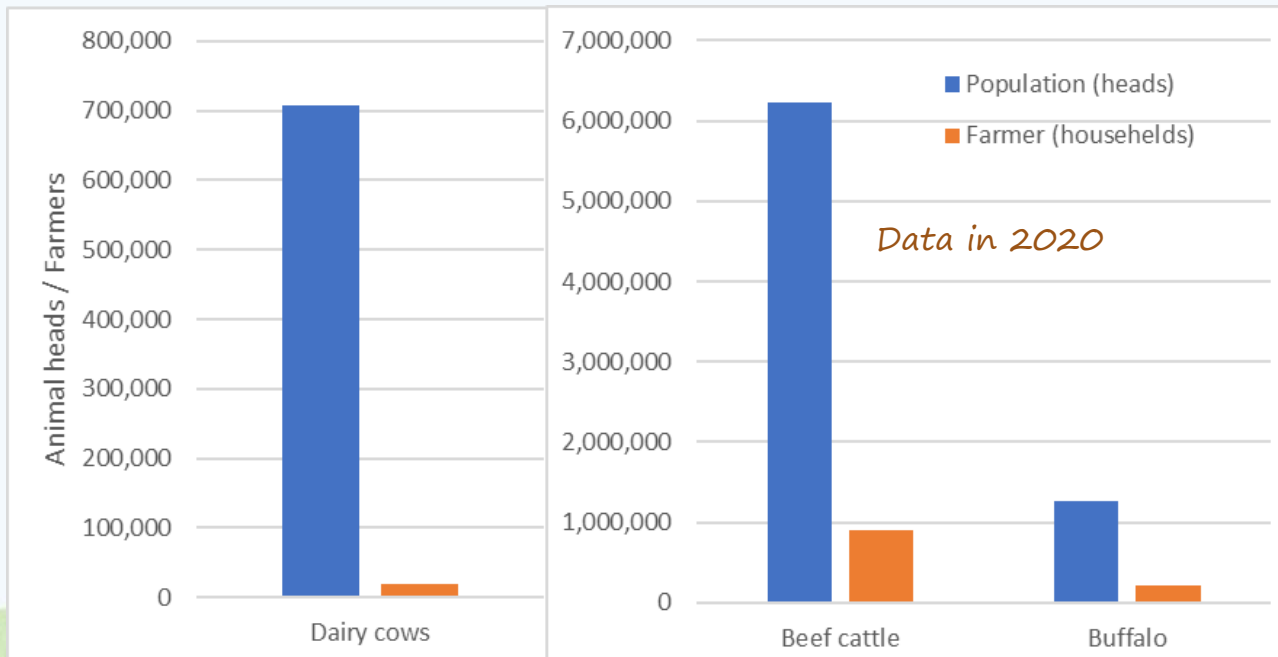
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Livestock and GHG emissions in Thailand

In 2016, livestock contributes GHG emissions by about one-fifth of total emissions in Agriculture sector of Thailand.

- Enteric fermentation and manure management is a major GHG emission of about 76 and 24% in Livestock sector, respectively.
- Most of enteric CH_4 is emitted from beef cattle, buffalo and dairy cattle.



In 2020, Thailand had about 700,000 heads for dairy cattle, while majority was in beef cattle (>6 million heads).

In addition, Thailand's Livestock sector is mostly smallholder farms.

Source: DLD (2021)

Dairy farming in Thailand



- Dairy farming for milk consumption in Thailand started a long time ago.
- His Majesty the King Rama 9 together with King Frederick IX (King Frederick IX) of Denmark had established a training center for raising Thai-Danish dairy cattle, at Muak Lek District Saraburi in 1962.
- This training center later developed into Dairy Farming Promotion Organization of Thailand, as a state enterprise under the Ministry of Agriculture and Cooperatives.
- His Majesty also initiated the establishment of Nong Pho Dairy Company Limited in 1972. Later, this company was named "Nong Pho Ratchaburi Dairy Cooperative Limited under the royal patronage."
- Most of dairy cows in Thailand are Holstein and Red dane.
- 4 important dairy farming areas
 - Saraburi - Nakhon Ratchasima - Lop Buri
 - Prachuap Khiri Khan - Phetchaburi
 - Chiang Mai area
 - Ratchaburi-Nakhon Pathom
- The first three areas deliver milk to the Dairy Farming Promotion Organization of Thailand at (1) Muak Lek District, Saraburi, (2) Pranburi, Prachuap Khiri Khan, and (3) Mueang, Chiang Mai, respectively.
- The last area deliver milk to Nong Pho Ratchaburi Dairy Cooperative Limited (under the Royal Patronage of His Majesty the King).

Source: <https://www.saranukromthai.or.th/>





Relevant livestock GHG mitigation targets from the 20-Year National Strategy Plan of Thailand

1. Enhancing livestock production, including:
 - Improving animal breeding
 - Animal feed improvement
 - Improving feed quality
 - Developing alternative feed stocks (for lowering cost and improving feed conversion ratio)
2. Improving manure management systems
 - Promoting biogas production from animal manure in Livestock sector

Research issues related to GHG mitigation for dairy cows in Thailand



1. Researches on enhancing livestock production are mostly investigated in animal feed improvement.

- Improving feed quality
- Developing alternative feed stocks
- Addition of microorganisms and oil/phenolic/saponin containing materials

Research topics in Thailand	Details
Feed improvement for dairy cattle	E.g., total mixed ration (TMR), rice bran, cashew nut husk, additions of effective microorganisms, lactating bacteria, molasse, glycerin, oils (soybean and oil palm), oil palm meal

2. Improving manure management systems are mostly related to biogas production in farms.

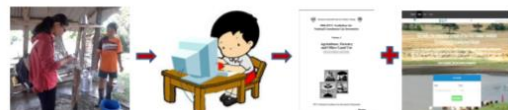
Research topics in Thailand	Details
Biogas production for dairy cattle	Investigated the potentials of biogas production from manure in dairy farms.

Factors Affecting on Enteric Methane Emission from Dairy Cattle integrated with Paddy Rice Farming

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Materials and Methods



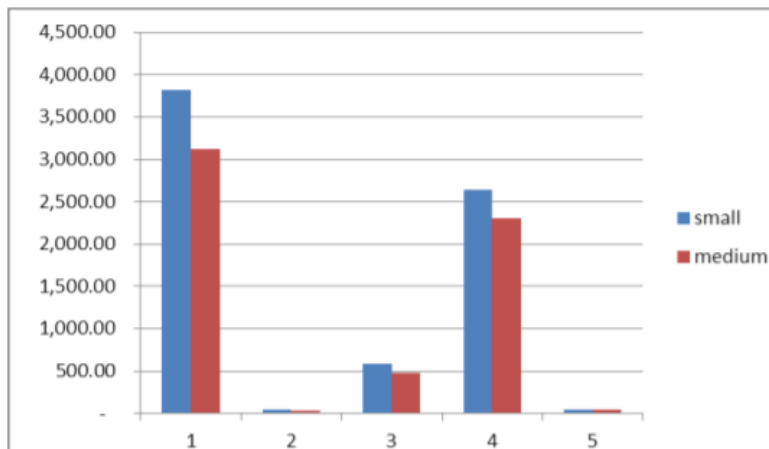
Dairy Cattle Population

	Dairy Cattle (head)	Milking Cow(head)	Paddy Rice Area (Rai)
Skonnakon	4,971	2,525	2,253,125
Thailand	623,427	347,835	56,298,939

Objectives

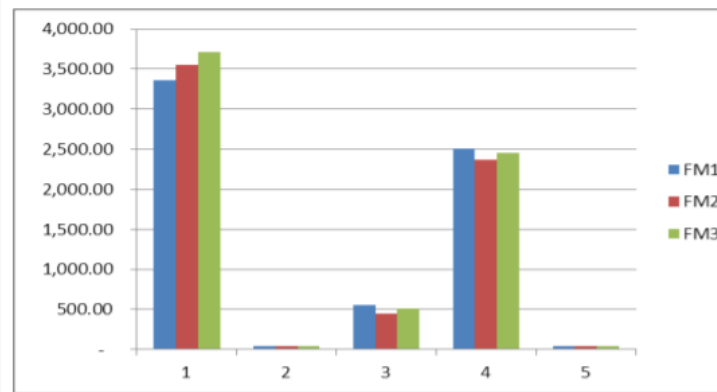
To study the effect of farm size and feeding management on enteric methane emission from dairy cattle integrated with paddy rice farming in Sakon Nakhon Province

Effect of Farm Size on GHG Emission



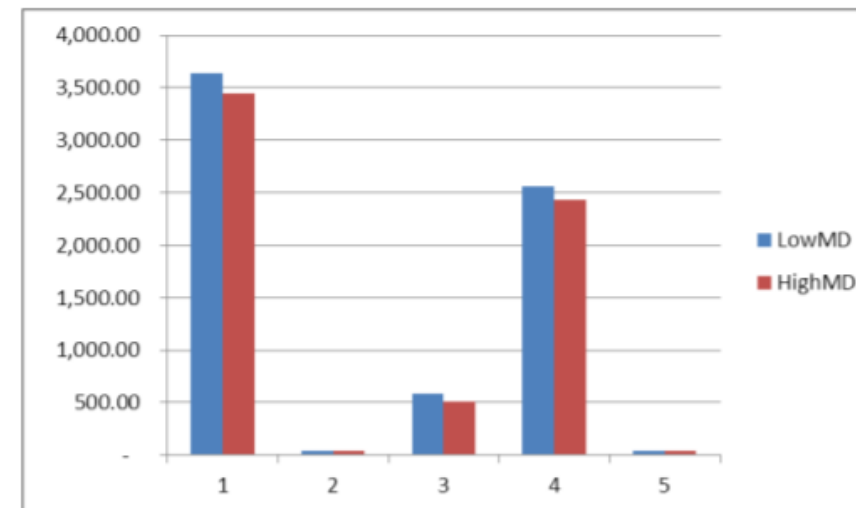
1= milk production (kg/head), 2= enteric methane (kgCH₄/head/year), 3= CO₂ from feed production (kgCO₂-eq/head/year), 4= GHG emission (kgCO₂-eq/head/year), 5= GHG emission/kg protein

Effect of Feed Management on GHG Emission



FM1= concentrate + rice straw, FM2= concentrate + rice straw + fresh grass, FM3= concentrate + rice straw + corn silage and other grain silage, 1= milk production (kg/head), 2= enteric methane (kgCH₄/head/year), 3= CO₂ from feed production (kgCO₂-eq/head/year), 4= GHG emission (kgCO₂-eq/head/year), 5= GHG emission/kg protein

Effect of Milking/Dry Cow on GHG Emission



LowMD= <80%, HighMD= >80%, 1= milk production (kg/head), 2= enteric methane (kgCH₄/head/year), 3= CO₂ from feed production (kgCO₂-eq/head/year), 4= GHG emission (kgCO₂-eq/head/year), 5= GHG emission/kg protein

Conclusions

1. Medium size farms emitted GHG/head/year less than small size farm
2. Better feed management can decrease GHG emission.
3. >80% of milking cow farms have lower GHG emission
4. Rice straw increase enteric CH₄ emission, but lower chemical use

Methane production in Thai native beef cattle fed low quality roughage based diets

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ABSTRACT: The objective of this study was to estimate methane production in Thai native cattle fed dried Ruzi grass or rice straw based diets. Twelve Thai native bull (body weight 342.25 ± 30.46 kg.) were used in this experiment. Dietary treatments were applied in a randomized complete block design (RCBD) consisted of *ad libitum* mixed 70% of concentrate with 30% of dried Ruzi grass based diet (T1), *ad libitum* 70% of concentrate with 30% of rice straw based diet (T2) and 70% of concentrate with 30% of rice straw based diet stair step feeding (T3). The nutrient intake and methane production were not significant different ($P>0.05$) between animals fed dried Ruzi grass and rice straw based diets. Dry matter and organic matter intake (on the basis of % BW and g/kg $W^{0.75}/d$) in animals offered stair step feeding higher ($P<0.05$) than in animals fed *ad libitum* of rice straw based diet. Methane production was ranged 144.82-190.3 L/day and methane energy was ranged 5.72-7.52 MJ/day. Methane production pattern and cumulative at various time of day were not significant different ($P>0.05$) among dietary treatments. The results indicated that methane production was not differ among low quality roughage based diets.

Keyword: Methane production, Thai native beef cattle

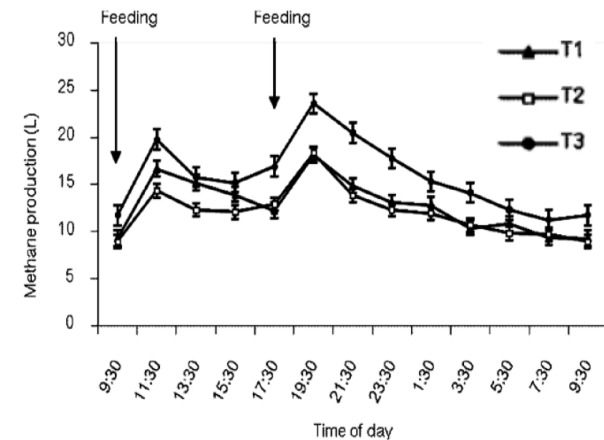


Figure 1 Methane emission pattern at various time of day.

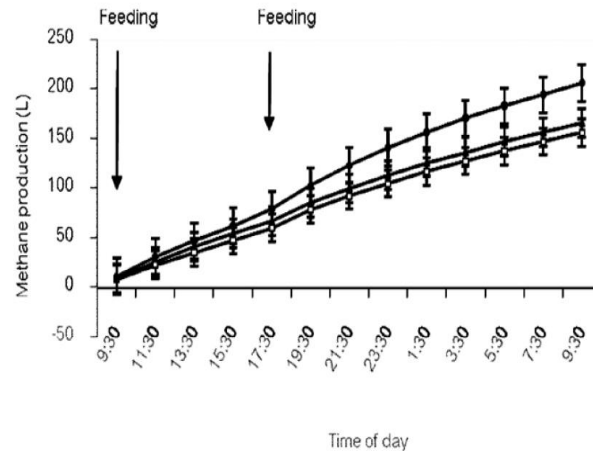


Figure 2 Cumulative methane production of beef cattle at various time of day.

Research finding for GHG mitigation in Thailand: Feed addition

- Prof. Metha Wanapat (Khon Kaen University) conducts various investigations on methane emission and mitigation for ruminants in Thailand.
- Investigations include feed improvement, esp., use of natural feeds for reducing methane emissions in cattle.
 - Mangosteen peels
 - Rambutan peels
 - Banana blossom
 - Yanang leaves and etc.
- Results showed methane reduction was upto 30% comparing with the control, while animal productivity (meat and milk) was not different.

- *ad libitum* mixed 70% of concentrate with 30% of dried Ruzi grass based diet (T1)
- *ad libitum* 70% of concentrate with 30% of rice straw based diet (T2)
- 70% of concentrate with 30% of rice straw based diet stair step feeding (T3).

Source: <https://www.posttoday.com/life/healthy/554910>



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Challenges

- There is relatively small number of dairy cows and involving with small scale farmers in Thailand.
- Methods for GHG mitigation in cattle (including dairy cows) are co-benefit for improving production yields or reducing production costs.
- Understanding of GHG mitigation in Livestock sector in Thailand needs to be improved. Most of investigation was performed in beef cattle and buffalo.

Opportunity

- Thailand's dairy farms are mostly be a member of agricultural cooperatives.
- Capacity building on GHG mitigations in dairy farms may effectively be to farmers and cooperatives, if appropriate supports are available.
- Department of Livestock in Thailand provides a good attention in GHG mitigation in Livestock sector.
- Research investigations and facility (tools and equipment) for GHG investigations are partially available in Thailand.