

Strategi Produktif Civitas PT Menghasilkan Inovasi Berbasis Riset, Publikasi dan HKI



Anuraga Jayanegara
November 2020



- Anuraga Jayanegara
 - Bojonegoro, 2 Juni 1983
 - 2003: S.Pt (IPB University, Indonesia)
 - 2008: MSc (University of Hohenheim, Germany)
 - 2011: PhD (ETH Zurich, Switzerland)
- • • • •
- SCOPUS: articles 104, citations 984, h-index 15
 - Google Scholar: citations 1.978, h-index 22
 - Reviewer: 15 international journals, IF 0.4-3.4, Q1-Q4
 - Editor: 2 journals Q1 + 1 journal Q2



IPB University
— Bogor Indonesia —

Outline

1. Pendahuluan
2. Latar Belakang Riset
3. Hasil Riset dan Publikasi
4. Inovasi dan Hilirisasi



1. Pendahuluan

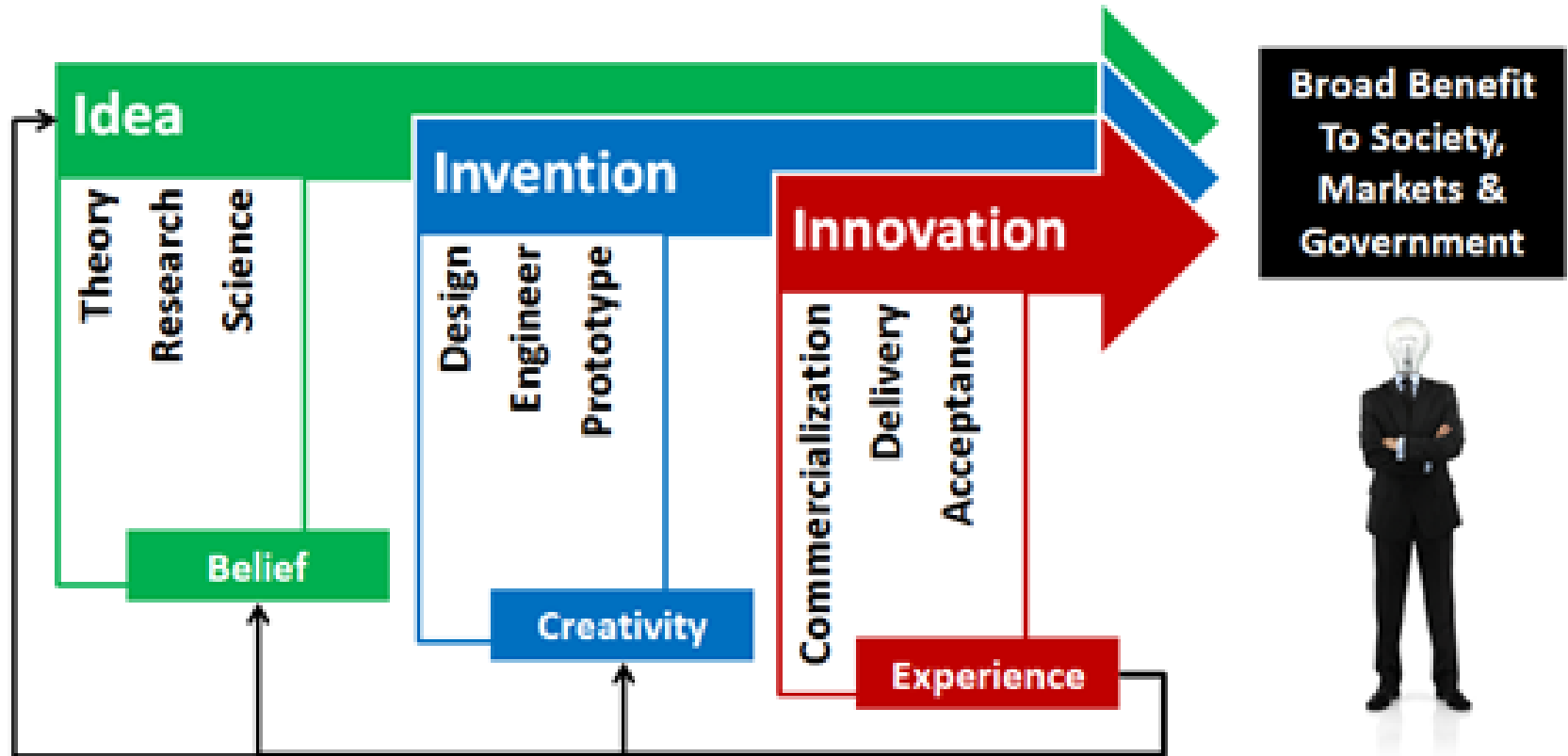


Mitigasi gas metana dan polifenol

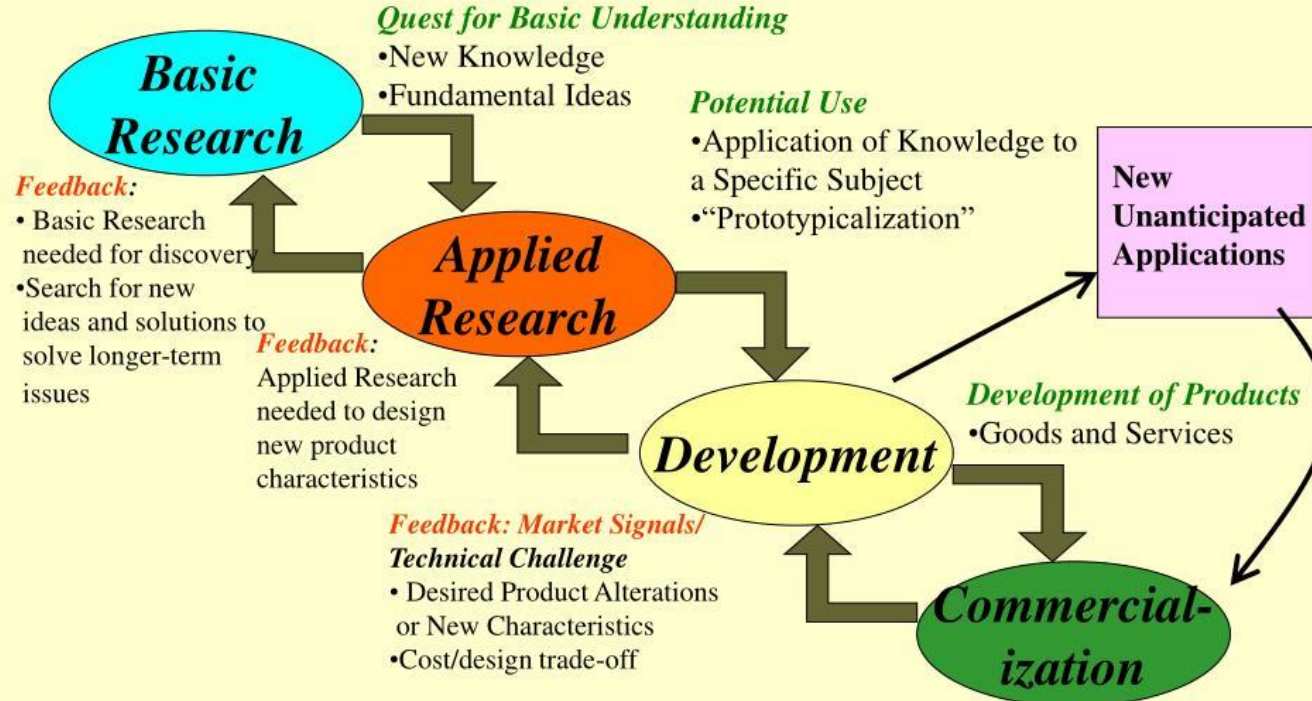
From Research to Innovation



IPB University
— Bogor Indonesia —



Non-Linear Model of Innovation



2. Latar Belakang Riset



Mitigasi gas metana dan polifenol



Masalah Pemanasan Global

Huge Issue of Global Warming

"All the News
That's Fit to Print"

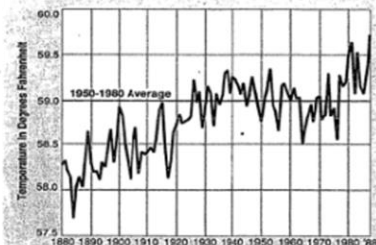
The New York Times

VOL. CXXXVII... No. 47,546

Copyright © 1988 The New York Times

NEW YORK, FRIDAY, JUNE 24, 1988

Global Warming Has Begun, Expert Tells Senate



Global Warming: Greenhouse Effect?

Average global temperatures through the first five months of 1988. As a baseline, scientists use the global average from 1950 to 1980.

Source: James E. Hansen and Sargis Lebedeff

The New York Times/June 24, 1988

Sharp Cut in Burning of Fossil Fuels Is Urged to Battle Shift in Climate

By PHILIP SHABECOFF

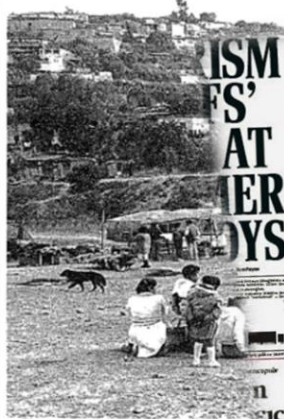
Special to The New York Times

WASHINGTON, June 23 — The earth has been warmer in the first five months of this year than in any comparable period since measurements began 130 years ago, and the higher temperatures can now be attributed to a long-expected global warming trend linked to pollution, a space agency scientist reported today.

Until now, scientists have been cautious about attributing rising global temperatures of recent years to the predicted global warming caused by pollutants in the atmosphere, known as the "greenhouse effect." But today Dr. James E. Hansen of the National Aeronautics and Space Administration told a Congressional committee that it was 99 percent certain that the warming trend was not a natural variation but was caused by a buildup of carbon dioxide and other artificial gases in the atmosphere.

An Impact Lasting Centuries

Dr. Hansen, a leading expert on climate change, said in an interview that there was no "magic number" that showed when the greenhouse effect was actually starting to cause changes in climate and weather. But he added,



Cañon Zapata in Tijuana, Mexico, the busiest ill-

ISM
FS'
AT
ER
OYS

Σπαράγμός στα αποκαΐδια

EXPRESSEN

35 GRADER

EXTREM-LARMET

Rekordhøga temperaturer

Grillningsförbudet utökas

A mobile court team examines the fitness certificate of a bus at Kamalapur in the city yesterday as part of a crackdown on old vehicles, aimed at easing traffic congestion.

Climate change threatens food security in S Asia

Says ADB study

BSS, Dhaka

the study warns that four countries in South Asia — the Philippines, Sri Lanka, Myanmar and Thailand — will lose 10 percent of their rice production, 12 percent of their wheat and 18 percent of their maize production.

thought it couldn't get any hotter, brace yourself for ...

37°C

FURNACE FRIDAY!

THE WORLD'S ON FIRE

Planet ripped by killer heatwave

Hundreds die in Europe and Japan

Drought Raising Food Prices; Inflation Effect Seems Minor

By ROBERT D. HERSHEN JR.

GULF NEWS

WE CAN SAVE OUR PLANET

Today the scientists say that the greenhouse effect is not a distant threat. It is here now, and it is causing the earth to warm up. The scientists say that the greenhouse effect is the most serious threat to the earth's future. It is the most serious threat to the earth's future. It is the most serious threat to the earth's future.

Fourteen days to seal history's judgment on this generation

The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis. The world is facing a crisis.

Star joins global climate crusade

Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade. Star joins global climate crusade.

the government's a "local point" of people will get the data regarding the. The focal point involve the epidemiology, public health, change, communication, (BCC) specialists, said the health. Syed Modasser, addressing a seminar on "Health for its prevention" organised by the Kapur and Dr. Jyoti Prasad Chandra. Meanwhile, the of twice the number of infected to the country. Swiss flu, conducting wide to find out unknown virus formed joint

Quality

O

SU

FR

LA STAMPA

Ospiti

LA STAMPA

Ospiti

LA STAMPA

Ospiti

Huge Issue of Global Warming

INVESTOR DAILY KAMIS 21 MARET 2019 | 3

21

BAPPENAS:

Kurangi Emisi Rumah Kaca untuk Antisipasi Perubahan Iklim

JAKARTA - Badan Perencanaan Pembangunan Nasional (PPN) men-

sungai-sungai besar untuk mengan-
tisipasi peningkatan curah hujan
dan kenaikan permukaan laut,"

inklusi dan...
Harian Tempo - 24 September 2014

COP-24 KATOWICE

Indeks Performa Perubahan Iklim Indonesia Turun

Yuni Ikawati
dari Katowice, Polandia

KATOWICE, KOMPAS — Indeks Per-
forma Perubahan Iklim Indone-
sia tahun ini turun satu peringkat
dibandingkan pada 2017. Penu-
runan performa antara lain kare-
na perkembangan energi terba-
rukan yang relatif rendah dalam
beberapa tahun terakhir.

Pada 2017, Indeks Performa
Perubahan Iklim atau Climate
Change Performance Index
(CCPI) Indonesia berada di perin-
gkat ke-37. Berada di perin-

kat ke-38 pada CCPI Results
2018, Indonesia tetap diklasifika-
sikan sebagai negara berkinerja
rendah. Indeks ini dinilai dari
emisi gas rumah kaca (GRK),
energi terbarukan, penggunaan
energi, dan kebijakan iklim.

Pada kategori emisi GRK dan
penggunaan energi, Indonesia
berada di peringkat menengah.
Konsumsi energi per kapita ma-
asih sangat rendah, tetapi mening-
kat pesat beberapa tahun ter-
akhir. Di kategori energi terba-
rukan, Indonesia dinilai rendah.
Hal ini ironi dengan potensi sum-

ber-sumber energi terbarukan
yang melimpah di Indonesia.

Belum serius

Juru Kampanye Iklim dan
Energi Greenpeace Indonesia
Bondan Andriyana, Selasa
(11/12/2018), mengatakan, Indo-
nesia belum melakukan hal se-
rius di sektor energi. Dia men-
contohkan, terkait emisi udara
pada PLTU batubara, Indonesia
masih menggunakan baku mutu
standar rendah. Alih-alih memi-
kirkan penghapusan bertahap

pembangunan dan pengoperasi-
an PLTU batubara, Indonesia
malah menggenjot pembangun-
an PLTU batubara untuk men-
capai target 35.000 MW.

Selain itu, ia menduga nilai
rendah indeks disebabkan akses
dan ketersediaan data yang ren-
dah bagi publik. Peta sebaran
emisi sektor industri per nama
perusahaan ataupun wilayah ad-
ministratif yang dikelola Kemen-
terian Lingkungan Hidup dan
Kehutanan tidak menampilkan
data jumlah emisi.

Dari sisi kebijakan iklim, para

(Bersambung ke hlm 11 kol 3-5)

ASEAN Harus Satu Suara Hadapi Isu Perubahan Iklim

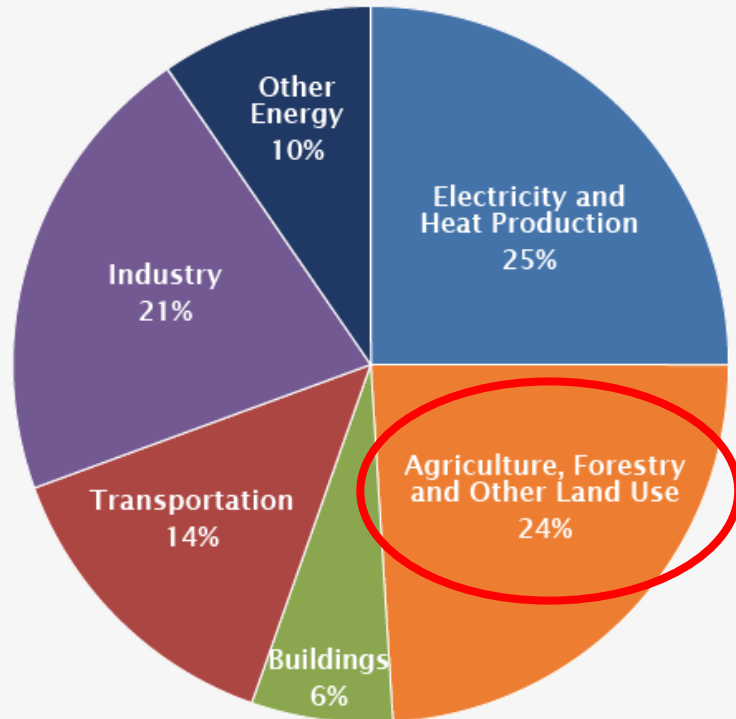
JAKARTA — Perubahan iklim telah membawa
dampak negatif ke wilayah Asia Tenggara.
Dalam satu dekade terakhir bencana akibat
perubahan cuaca ekstrem telah memakan
ribuan korban jiwa dan kerugian lebih dari
US\$ 4 miliar per tahun.

Koalisi lembaga swadaya masyarakat
ASEAN for a Fair, Ambitious and Binding
Global Climate Deal (A-FAB) menyatakan
para anggota Asosiasi Negara-negara Asia
Tenggara harus bekerja sama menghadapi

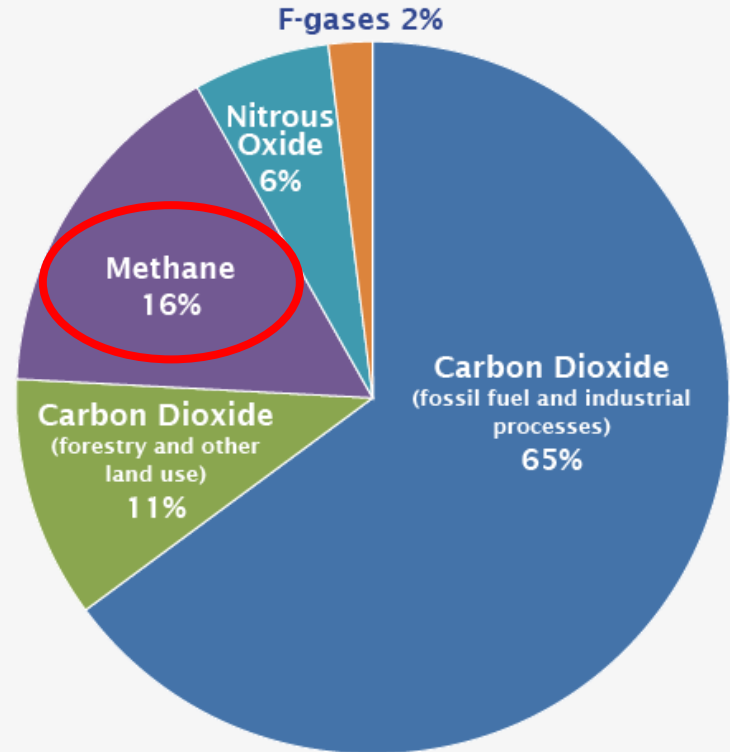
Emisi Gas Rumah Kaca

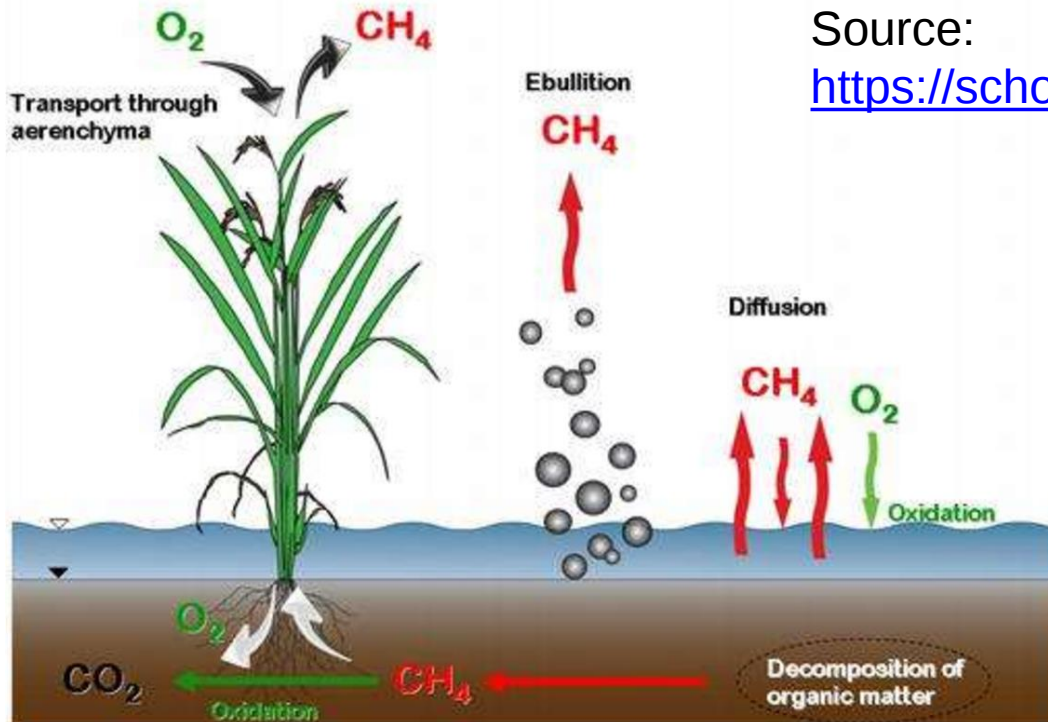
IPCC (2014)

Global Greenhouse Gas Emissions
by Economic Sector



Global Greenhouse Gas Emissions by Gas





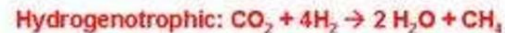
Source:

<https://scholarship.claremont.edu/>

Methane oxidation:



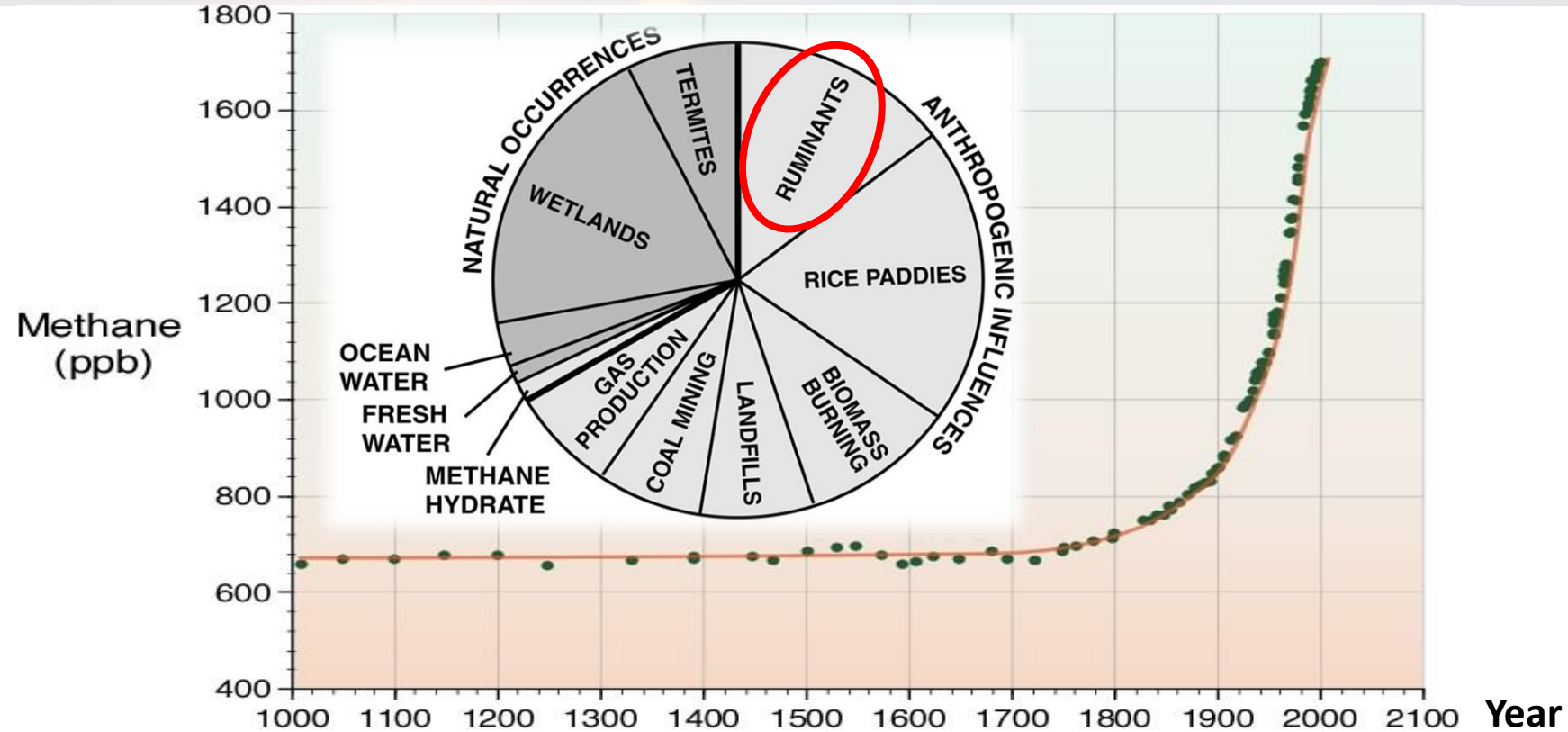
Methanogenesis:



Emisi Gas Rumah Kaca



IPB University
— Bogor Indonesia —



Isu Utama Peternakan



IPB University
— Bogor Indonesia —

3. Environment

CH_4

- Global warming
- Loss of energy (4-16%)

Feed



Meat



CH_4

Microbial fermentation

Enzymatic digestion

Microbial fermentation

1. Production:

- Daily weight gain
- Milk production

Milk



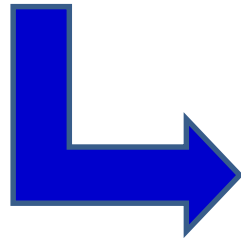
Excreta



2. Quality of products:

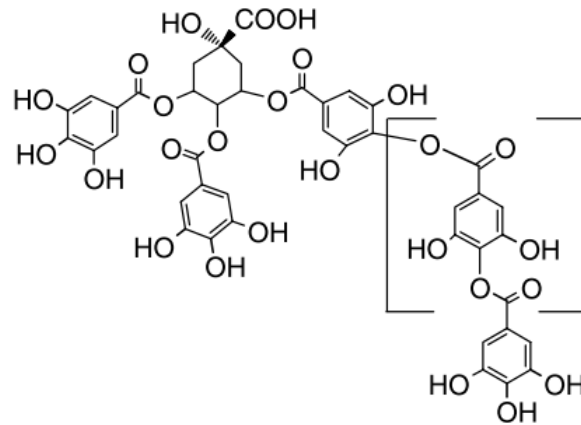
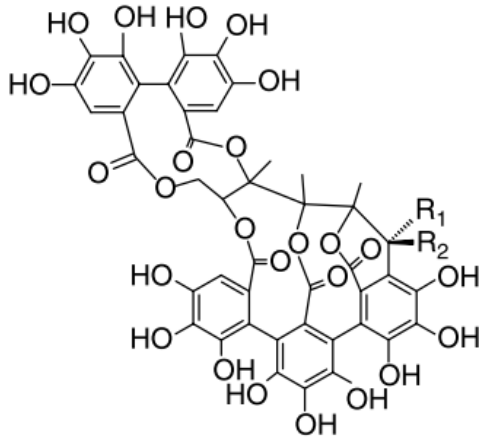
- Fatty acid profiles

1. Peningkatan **produktivitas** ternak
2. Peningkatan **kualitas produk** asal ternak
3. Mitigasi **emisi GRK (metana)**



Natural feed additive:
Polifenol

Mengapa Polifenol?



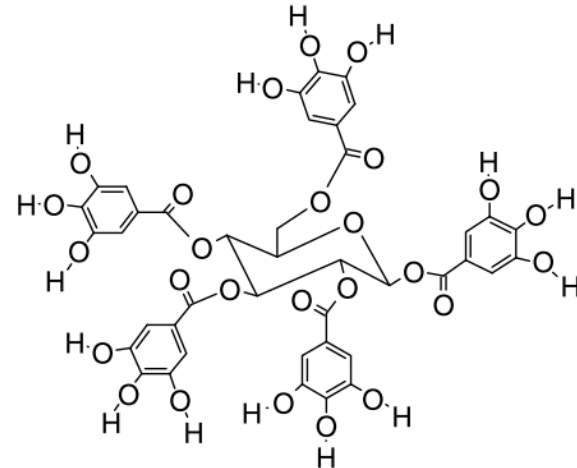
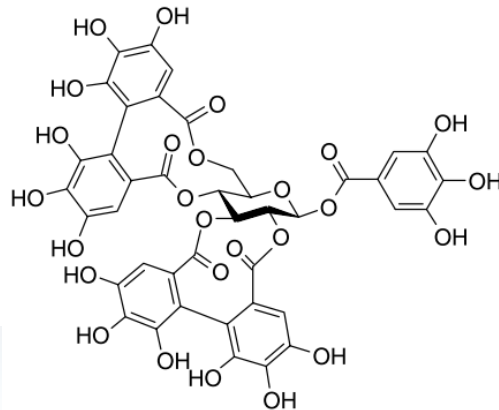
Senyawa alami

Tanpa residu berbahaya

Banyak terdapat di tropis

Anti-mikroba

Multi fungsi



3. Hasil Riset dan Publikasi

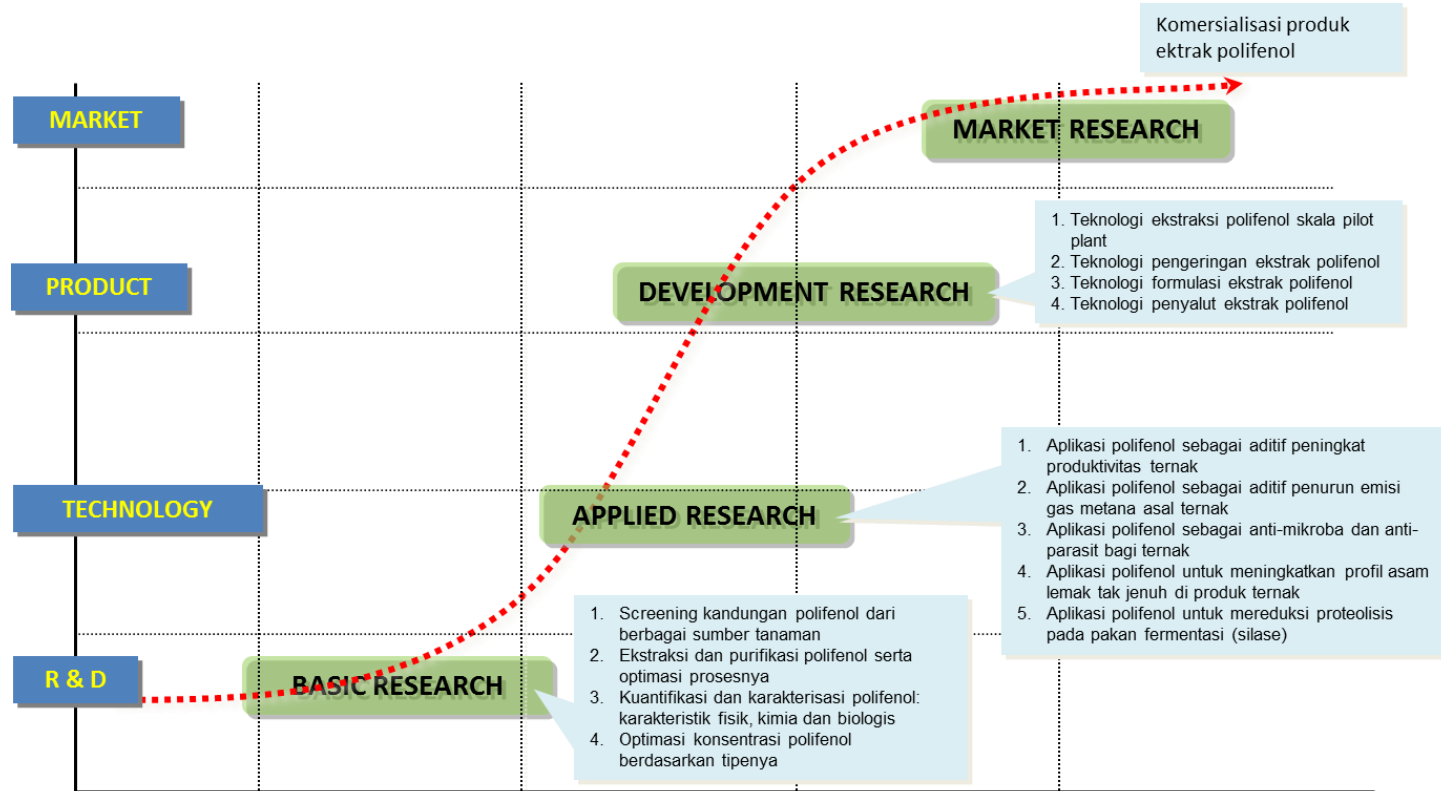


Mitigasi gas metana dan polifenol

Roadmap Penelitian



IPB University
— Bogor Indonesia —

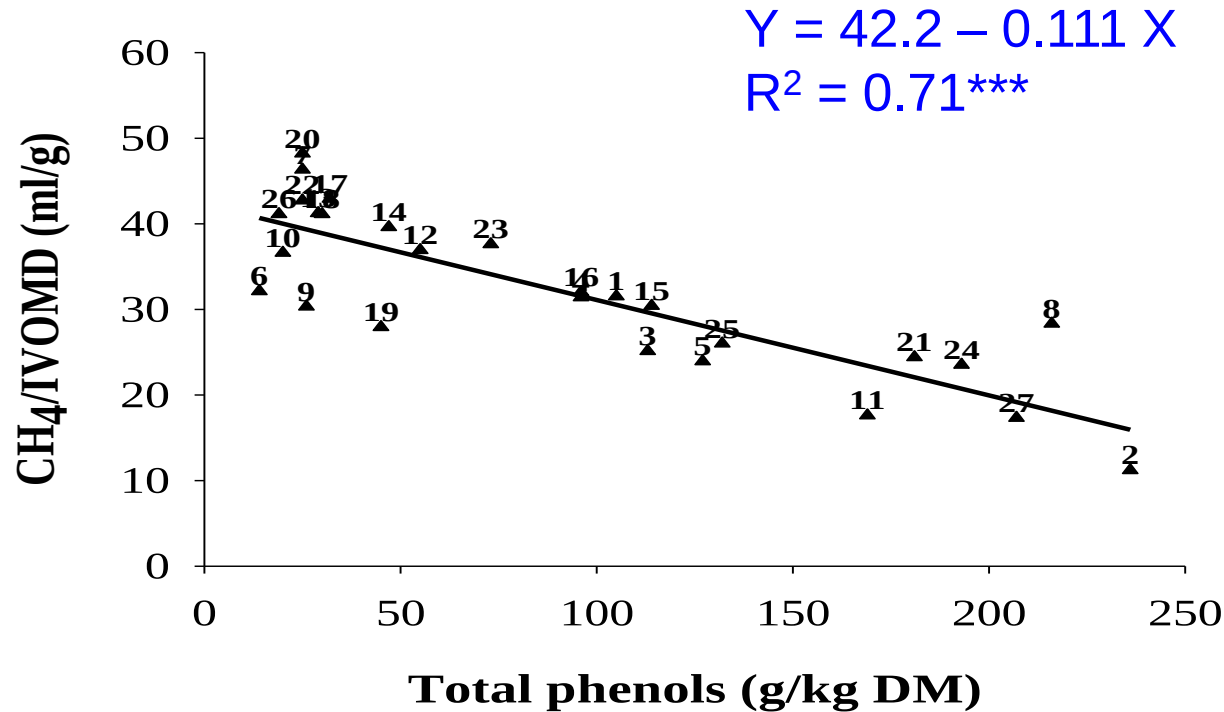


WAKTU (2008 – 2025)

1. Pakan mengandung polifenol



IPB University
— Bogor Indonesia —



Jayanegara et al. (2011)
Animal Feed Science
and Technology 163,
231-243

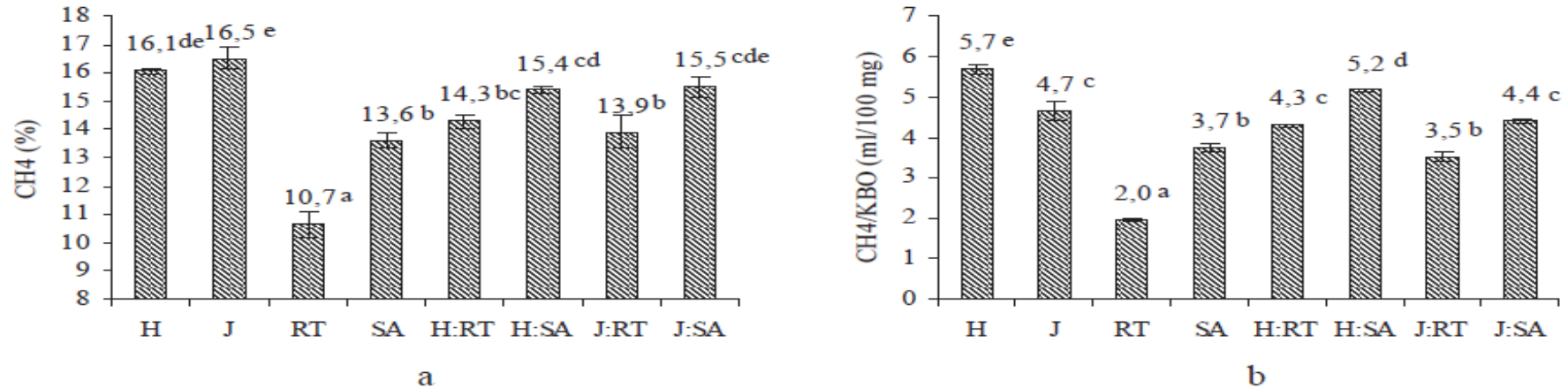
Relationship between total phenols in tropical plants and CH₄/digestible OM

2. Pakan campuran mengandung polifenol



IPB University
— Bogor Indonesia —

Total tannins (%DM): RT = 20.9, SA = 3.6



Gambar 1. Produksi metana/CH₄ (a) dan produksi metana per unit bahan organik tercerna (b) dari ransum perlakuan. KBO = kecernaan bahan organik; H = hay; J = jerami; RT = *Rhus typhina*; SA = *Salix alba*; H:RT = Hay:*R. typhina* 70:30 (w/w); H:SA = Hay:*S. alba* 70:30 (w/w); J:RT = Jerami:*R. typhina* 70:30 (w/w); J:SA = Jerami:*S. alba* 70:30 (w/w). Superskrip berbeda menunjukkan berbeda nyata (P<0,01).

3. Efek sinergistik mitigasi



Chemical composition of the plants (g/kg DM)

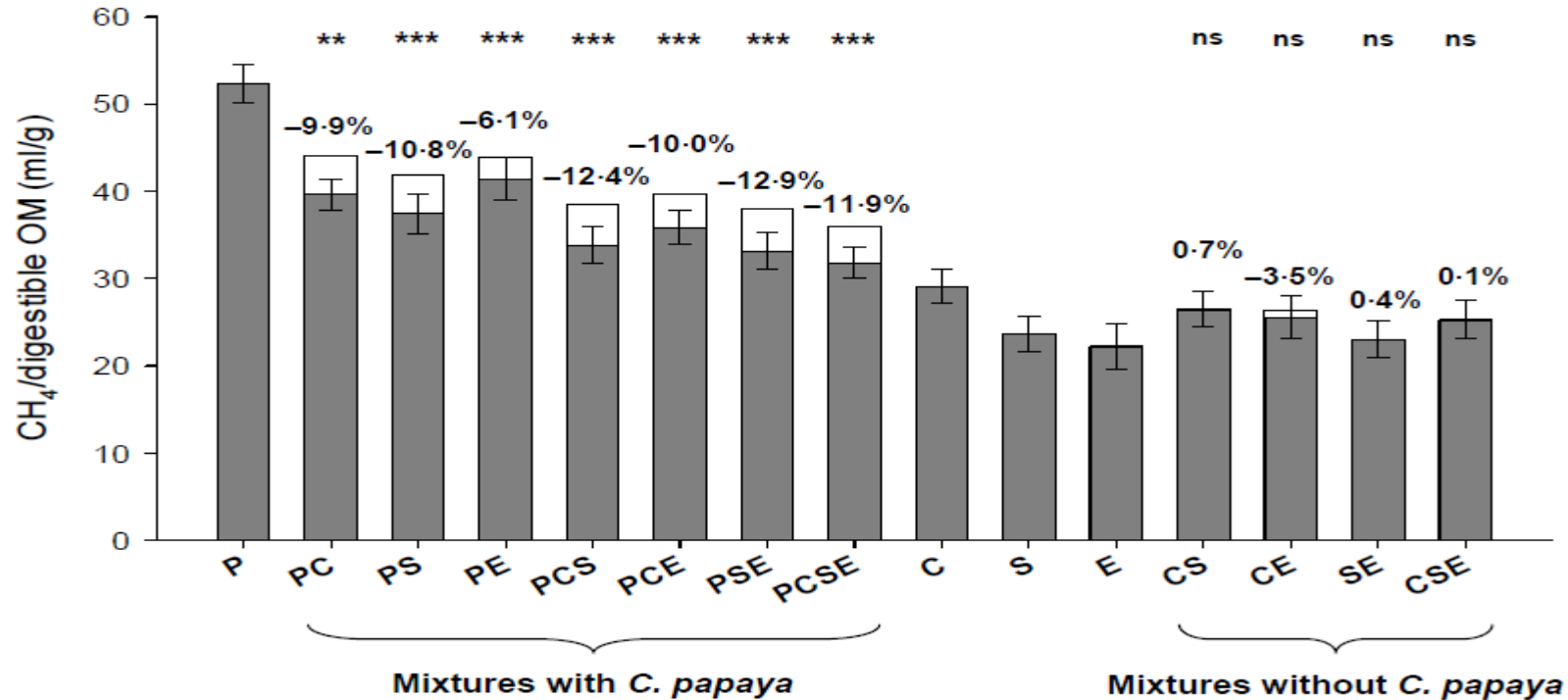
Treatment	CP	EE	NDF	ADF	ADL	TP	NTP	TT	CT	HT
<i>Carica papaya</i>	386	47	155	135	46	25	17	8	0	8
<i>Clidemia hirta</i>	129	22	232	181	69	216	4	212	10	202
<i>Swietenia mahagoni</i>	112	45	281	222	78	207	69	138	86	52
<i>Eugenia aquea</i>	100	35	479	382	181	169	102	67	40	27

CP, crude protein; **EE**, ether extract; **NDF**, neutral detergent fiber; **ADF**, acid detergent fiber; **ADL**, acid detergent lignin; **TP**, total phenols; **NTP**, non-tannin phenols; **TT**, total tannins; **CT**, condensed tannins; **HT**, hydrolysable tannins.

3. Efek sinergistik mitigasi



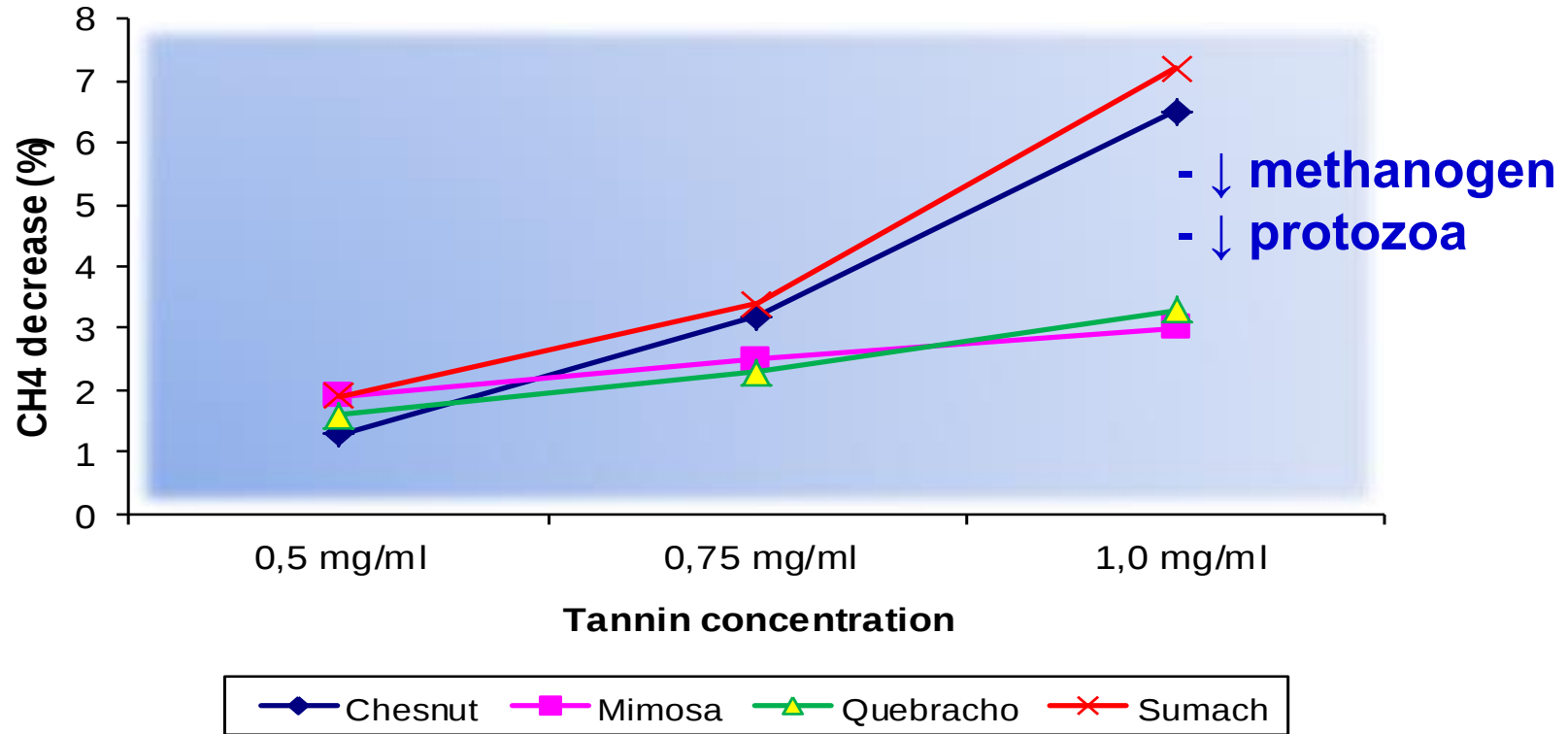
Methane emission (ml/g)



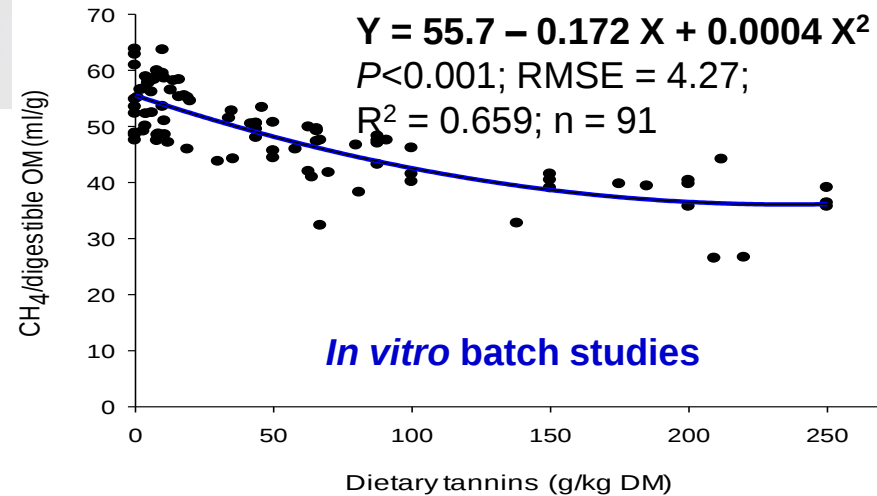
4. Ekstrak polifenol murni



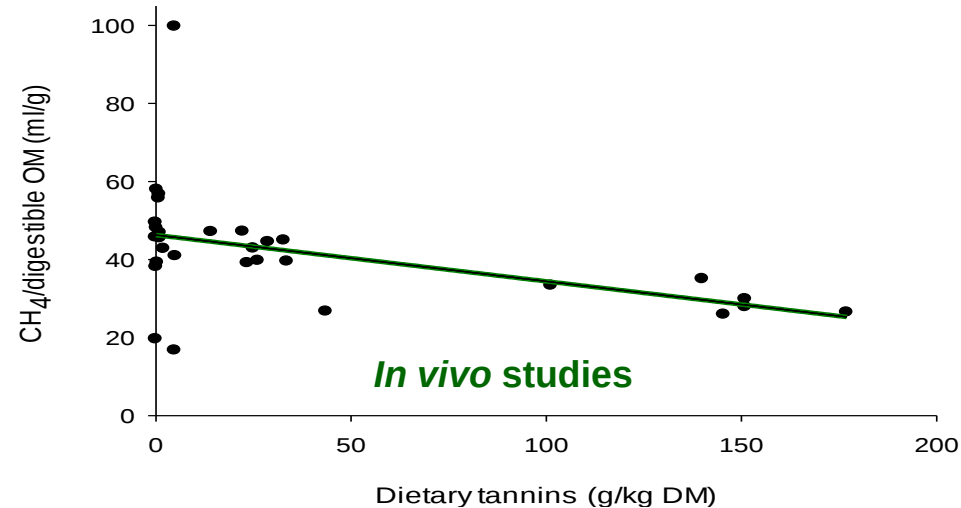
IPB University
— Bogor Indonesia —



5. Meta-analysis

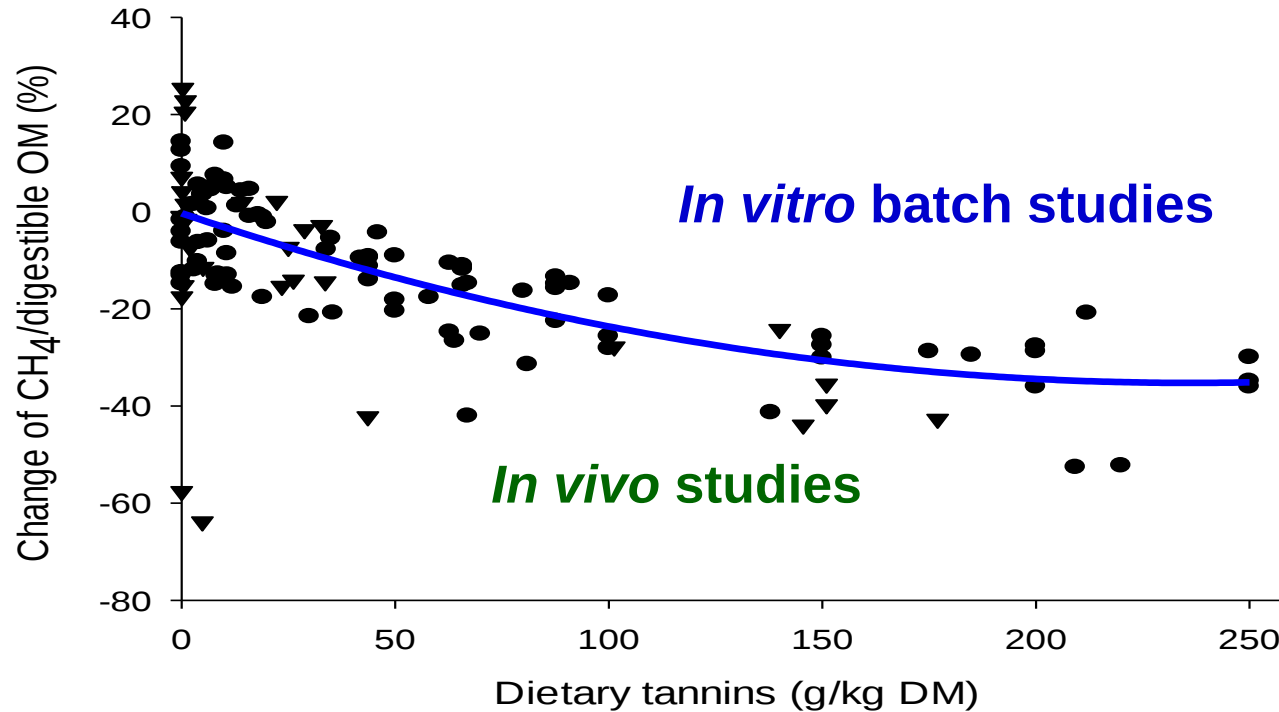


- Database development from literatures
- Total: 30 experiments, 171 treatments
 - *In vitro* batch: 15 experiments, 130 treatments
 - *In vivo*: 15 experiments, 41 treatments
- Statistical analysis with mixed-model methodology
- Weighting data by number of replicates/animals in each experiment



Jayanegara et al. (2012)

Journal of Animal Physiology and
Animal Nutrition 96, 365-375

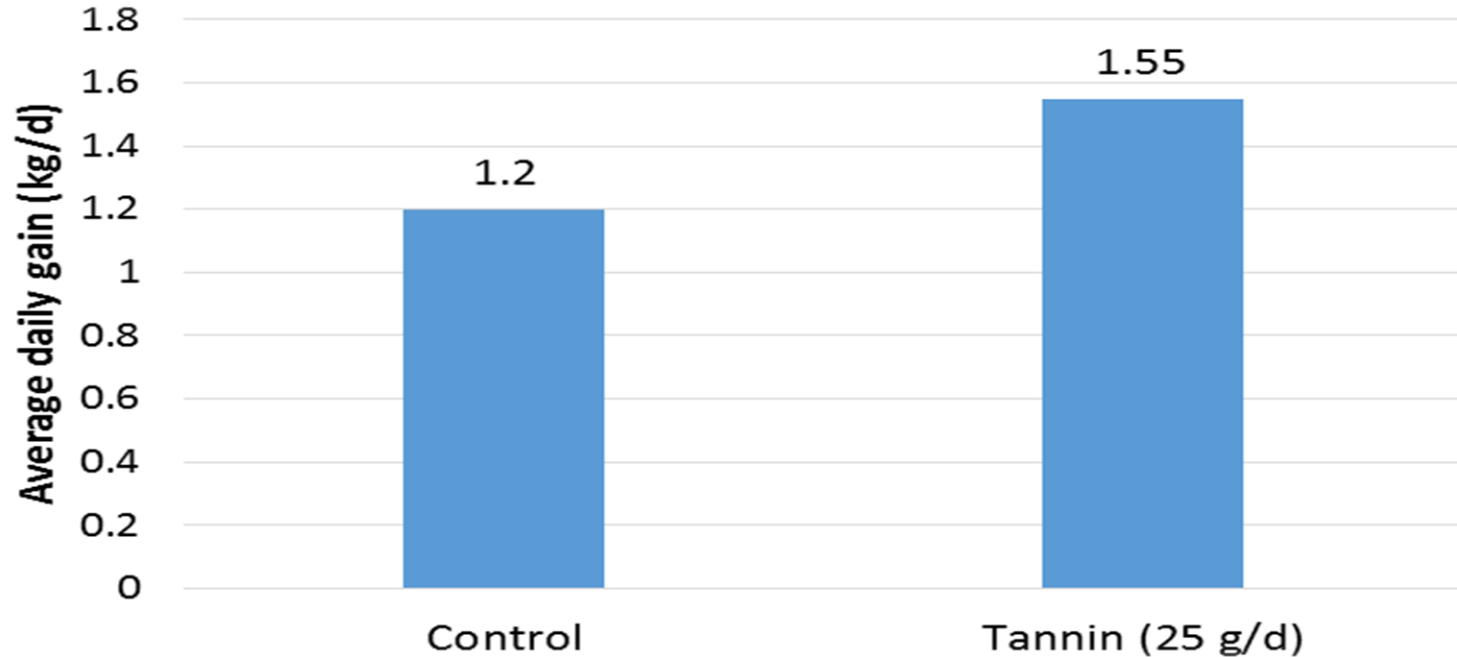


6. Efek multifungsi: Performa ternak



IPB University
— Bogor Indonesia —

Feedlot trial on 40 beef cattle (Brahman cross)



Source: [Jayanegara et al. \(2019\)](#), SEARCA Publication

7. Efek multifungsi: Kualitas produk



Correlation coefficients (n = 27)

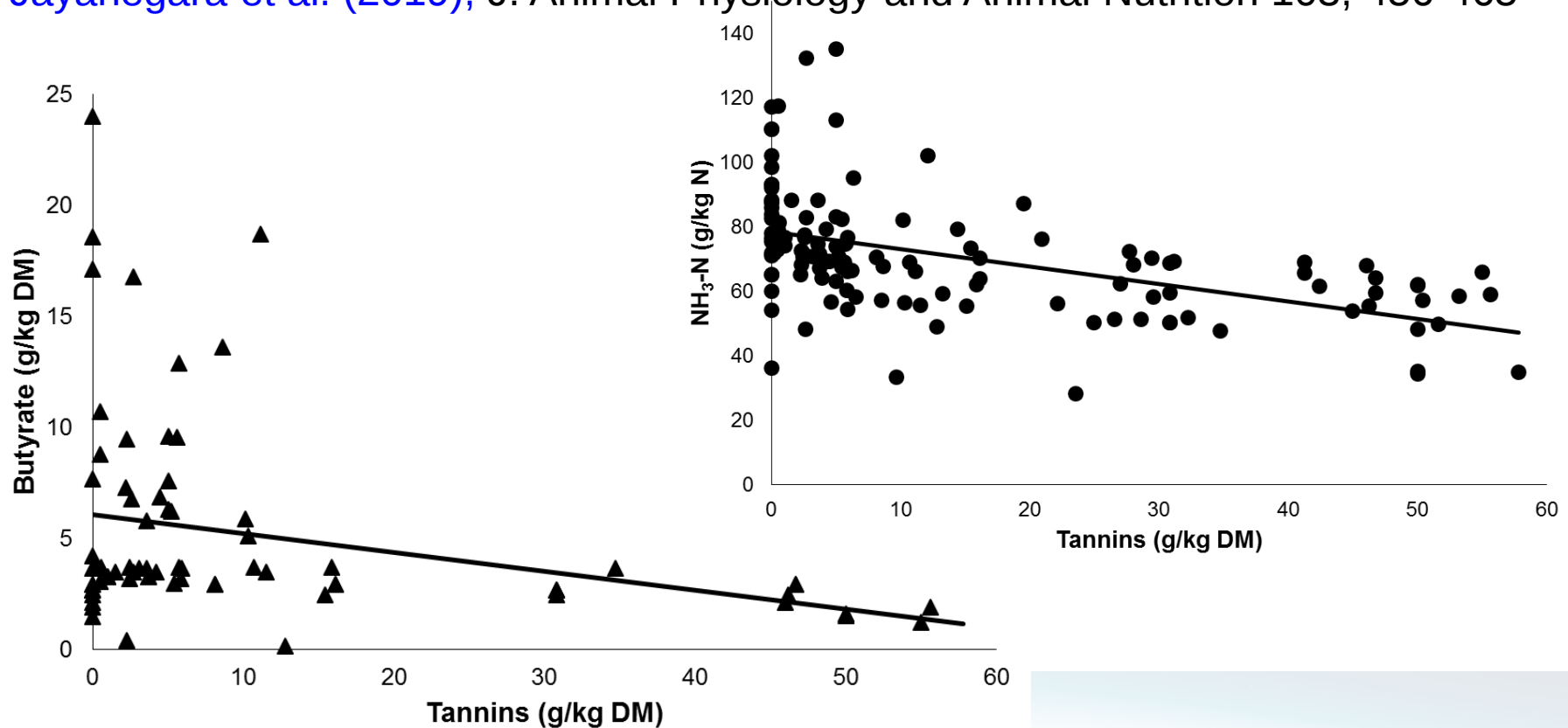
Fatty acid	Total phenols	Non-tannin phenols	Total tannins	Condensed tannins	Hydrolysable tannins
Disappearance					
C18:3 <i>n</i> -3	−0.69***	−0.25	−0.65***	−0.24	−0.63***
C18:2 <i>n</i> -6	−0.72***	−0.23	−0.69***	−0.34	−0.64***
C18:1 <i>n</i> -9	−0.76***	−0.42*	−0.66***	−0.73***	−0.46*
Appearance					
<i>c</i> 9, <i>t</i> 11-C18:2	0.55**	0.21	0.52**	0.64***	0.33
<i>t</i> 11-C18:1	−0.01	0.02	−0.02	0.26	−0.12
C18:0	−0.47*	−0.22	−0.43*	−0.44*	−0.31

8. Efek multifungsi: Pakan fermentasi



IPB University
— Bogor Indonesia —

Jayanegara et al. (2019), J. Animal Physiology and Animal Nutrition 103, 456-465



4. Inovasi dan Hilirisasi



Mitigasi gas metana dan polifenol



Jeng-jeng



Sungkai



Kelapa



Jati



Durian



Aprikot



Karet



Nangka



Akasia



Mahoni



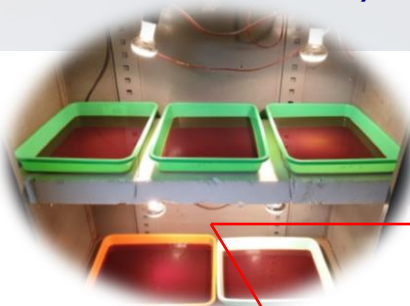
Rambutan

Ekstraksi Polifenol Akasia



IPB University
— Bogor Indonesia —

Oven 50°C, 24 jam



Potongan Limbah Kayu Akasia



Limbah Kayu Akasia



Hot Water Extraction
2 bar, 120°C, 2 jam



Ekstrak Cair Tanin Akasia



Serbuk Tanin Akasia



Sudah diajukan
untuk **Paten**

Marketisasi Produk



IPB University
— Bogor Indonesia —



Botani Mart IPB

Diseminasi Inovasi



IPB University
— Bogor Indonesia —

1st di Indonesia: Polifenol
sebagai feed additive



INCORPORATING WITH



INDO
LIVESTOCK
2019 EXPO & FORUM



INCORPORATING WITH

INDOFEED
2019 EXPO & FORUM
INDONESIA'S NO.1 FEED INDUSTRY EVENT

INDO DAIRY
2019 EXPO & FORUM
INDONESIA'S NO.1 DAIRY INDUSTRY EVENT

INDO
FISHERIES
2019 EXPO & FORUM
INDONESIA'S NO.1 FISHERIES INDUSTRY EVENT



**The Biggest and Most Comprehensive
Technology Event in Indonesia**

**The 14th Indonesia's No.1 Livestock,
Feed, Dairy & Fisheries Industry Event**



3 - 5 July 2019

Grand City Convex Surabaya - Indonesia

Book your
space

Show report
2017 Surabaya

Show report
2018 Jakarta



Adopsi Inovasi



IPB University
— Bogor Indonesia —



Ekstrak polifenol di industri:

1. PT Ultra Peternakan Bandung Selatan → 1,1 ton ekstrak polifenol/bulan → 1.500 sapi perah
2. PT Agrisatwa Jaya Kencana → 2,3 ton ekstrak polifenol/bulan → 3.000 sapi pedaging
3. PT Citra Agro Buana → 1,5 ton ekstrak polifenol/bulan → 2.000 sapi pedaging



PT ULTRAJAYA MILK INDUSTRY Tbk.

[Home](#)

[Company ▾](#)

[Products ▾](#)

Acknowledgement

1. LPPM UNEJ
2. IPB University
3. Mahasiswa bimbingan



TERIMA KASIH



anuraga.jayanegara@gmail.com



+62 81313 524847



anuragaja.staff.ipb.ac.id