# 1st IPB-SNU
# Green-Bio Science Forum

Date/Time February 9 Thursday 2023, 09:00-13:30
Venue Senate Meeting Room, Rectorate Building 6th floor IPB University

IPB-SNU Center for Agriculture and Bioscience
IPB University — Bogor Indonesia —
KOICA Korea International Cooperation Agency

# 1st IPB-SNU Green-Bio Science Forum

**Date/Time** February 9 Thursday 2023, 09:00-13:30

**Venue** Senate Meeting Room, Rectorate Building 6th floor IPB University

# 1st IPB-SNU Green-Bio Science Forum

Dealing with environmental and economic challenges for a sustainable future will require the development and application of new technologies. **Green-Bio Science** is uniquely positioned to use environmentally-friendly solutions as an alternative to traditional agriculture, horticulture, and animal breeding processes. **Green-Bio Science** greatly contributes to reducing $CO_2$ emissions and climate change impacts on food security with the aims to improve agricultural productivity and resource use.

The Korea International Cooperation Agency (KOICA) supports building and operating capacity enhancement program in science and technology for higher education. As part of its support, KOICA, IPB University, and Ministry of Education, Culture, Research, and Technology have agreed to launch a project, titled, "**Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia**," which is to be implemented in the years of 2022-2028. The project seeks to foster research performance by strengthening R&D capacity in the fields of agriculture and bioscience; to provide a high-quality education service by strengthening the capacity of faculty members; and to promote industry-academia cooperation through exchange program, joint research, and green-bio forums.

We take great pleasure in inviting you to the first **IPB-SNU Green-Bio Science Forum** to be held at IPB University, which will be held on 9 February 2023. The Forum is organized by IPB University and Seoul National University (SNU) supported by KOICA. The Faculty of Seoul National University and IPB University will give lectures during this event. The Forum will be a place of gathering and exchange of opinions among the participants including scientific community, policy-makers, industry, and academia. The Forum will address relevant issues important for the state of play in Indonesia and Korea, starting with Korean strategy on agriculture , biotechnology, biomedicine, and veterinary medicine.

# Welcoming Remarks

Byung Chul PARK, Ph.D.
Project Leader
Professor
Graduate School of International Agricultural Technology &
Institutes of Green Bio Science and Technology,
Seoul National University

Honorable Members of Guests,

Distinguished Delegates,

Ladies and Gentlemen,

Good morning, Selamat Pagi!

I am Byung Chul PARK, Project Leader of "Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia".

It is a great pleasure for me indeed to extend to all of you a cordial welcome on behalf of Seoul National University and to pay tribute to your efforts and cooperation in holding the 1st IPB-SNU GreenBio Science Forum, here in Bogor, Indonesia.

This forum is held as a part of the Project titled "Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia" which is supported by Korea International Cooperation Agency (KOICA) and the Government of Indonesia. This Project aims to promote R&D capacity and research performance by remodeling the Center for Agriculture and Bioscience and providing training programs to researchers in Indonesia. Taking this opportunity, I would like to extend my sincere gratitude to all concerned persons for their efforts to realize this meaningful Project.

As we all have known, today, the globe has come to share a considerable number of issues and problems regarding environmental matters. In this regard, the importance of Green-Bio Science is significantly increasing, and it is positioned as an environmentally-friendly solution as an alternative to traditional agriculture, horticulture, and animal breeding processes.

Therefore, I am sincerely happy to have a chance to discuss the theme of 'Green-Bio Science' with honorable professors and distinguished researchers and guests in both countries, the Republic of Indonesia and Korea.

We have invited renowned scholars here to offer you an opportunity to obtain the information necessary for green-bio science areas. So, I am pleased to invite many distinguished scholars to share their knowledge and experience and explore better ways of achieving sustainable development in agruculture and bioscience.

I am confident that you would get very meaningful knowledge through the active and close exchange of academic information with world-class scholars.

In addition, this forum would continue throughout the project. The following forum is scheduled for May this year in South Korea. If you have any comments and ideas for future forums, please feel free to suggest us. I hope to make a more practical and valuable forum for both countries.

Once again, I offer my warmest welcome and express my appreciation to all of you, and expect your time in this forum would be pleasant.

Thank you very much.

Teri ma kasih

# Congratulatory Remarks

Prof. Dodik Ridho Nurrochmat

*Vice Rector for International Affairs,*

*Collaboration, and Alumni Relations*

Assalamualaikum warahmatullahi wabarakatuh,

Good morning, ladies and gentlemen.

First of all, I would like to convey my warmest greetings to the honorable speakers from Seoul National University,

Prof. Jeong Bin IM, Director General of Institutes of Green Bio Science and Technology

Prof. Ju Kon KIM, Dean of Graduate School of International Agricultural Technology

Prof. Cheol-Heui Yun, from College of Agriculture and Life Sciences

Prof. Kangmoon Seo, from College of Veterinary Medicine

And all honorable team member of the I-CAB Project

Welcome to IPB University, Dramaga Campus. It is my great pleasure to once again welcome all of you to our esteemed university.

And I also would like to convey my sincere gratitude to the invitees from IPB University, the honorable

Prof. Ernan Rustiadi, Head of Institute of Research and Community Service

The honorable chairmen, deans, directors, and all delegates that I cannot mention one by one.

Ladies and Gentlemen,

Just yesterday, on February 8, 2023, we just witnessed a very monumental event, which is the Launching Ceremony on Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia or the I-CAB project.

The launching ceremony was a kick-start for the project that is going to be implemented until 2028.

The project seeks to foster research performance by strengthening R&D capacity in the fields of agriculture and bioscience, to provide a high-quality education service by strengthening the capacity of faculty members, and to promote industry-academia cooperation through exchange program, joint research, and green-bio forums.

Ladies and Gentlemen,

Today we are going to start the implementation of our project by organizing the IPB-SNU Green-Bio Science Forum. I would like to thank the professors from Seoul National University for being here today to share their knowledge, experiences, and opinions regarding relevant issues that are important for the state of play in Indonesia and Korea, starting with Korean strategy on agriculture, biotechnology, biomedicine, and veterinary medicine.

I am with great hope that all participants can gain beneficial information from this forum. I wish you all a fruitful session.

Wassalamualaikum warahmatullahi wabarakatuh.

# Timetable

| | |
|---|---|
| 9.00 a.m. – 9.30 a.m. | **Registration** |
| 9.30 a.m. – 10.00 a.m. | **Welcoming Remarks**<br>Speaker: Prof. Byung Chul Park (Project Leader, IPB-SNU Center for Agriculture and Bioscience)<br>**Congratulatory Remarks**<br>Speaker: Prof. Agus Purwito (Vice Rector for Resources, Planning and Finance) |
| 10.00 a.m. – 10.30 a.m. | **Topic: Korea's Policy Experience for Enhancing Agricultural Productivity and Farm Income**<br>Lecturer: Prof. Jeong Bin IM (Director General, Institutes of Green Bio Science and Technology, SNU) |
| 10.30 a.m. – 11.00 a.m. | **Topic: Improvement of Nitrogen-use-efficiency of Crops**<br>Lecturer: Prof. Ju Kon KIM (Dean, Graduate School of International Agricultural Technology, SNU) |
| 11.00 a.m. – 11.30 p.m. | **Topic: Immunosecurity in Domestic Animals to Maximize Their Health Status)**<br>Lecturer: Prof. Cheol-Heui Yun (College of Agriculture and Life Sciences, SNU) |
| 11.30 p.m. – 12.00 p.m. | **Topic: Veterinary Talent Cultivation in Seoul National University**<br>Lecturer: Prof. Kangmoon Seo (College of Veterinary Medicine, SNU) |
| 12.00 p.m. – 12.30 p.m. | **Panel Discussion**<br>Moderator: Prof. Ario Damar (Vice Head of Community and Research Center)<br><br>Panellists:<br>Dr. Suryo Wiyono (Dean, Faculty of Agriculture, IPB)<br>Prof. Dr. drh. Deni Noviana (Dean, School of Veterinary and Biomedical Science, IPB)<br>Prof. Dr. Erika Budiarti Laconi (Head, IPB Science Techno Park, IPB)<br>Dr. Ir. Idat Galih Permana (Dean, Faculty of Animal Science, IPB) |
| 12.30 p.m. – 01.30 p.m. | **Lunch** |

# Korea's Policy Experience for Enhancing Agricultural Productivity and Farm Income

**Prof. Jeong Bin IM**

Director General,

Institutes of Green Bio Science and Technology, SNU

# Prof. Jeongbin IM

**BRIEF CURRICULUM VITAE**

Dr. Jeongbin IM is Professor of Department of Agricultural Economics and Rural Development in College of Agriculture and Life Sciences, Seoul National University. Professor Im holds Ph. D. in Agricultural and Resources Economics from the University of Maryland at College Park (U.S.A) after having M.A and B.A. from Seoul National University. His academic research and publication covers a wide range of agricultural policy and trade topics such as agricultural risk management program, rural development, WTO and Free Trade Agreement (FTA) issues. He is author of more than 70 papers in the peer reviewed journal. He is contributing to many academic fields as editorial board member for Journal of Korean Agricultural Policy, Journal of Korean Livestock Management and as Editor-in-chief for Journal of Korean Agricultural Economics. He also served as the president of Korean Agricultural Economics Association and Korean Dietary Education Society. In addition, he has advised several developing country governments, international organizations as well as various Korean ministries on agri-food policy and trade issues. Professor Im is currently the director general of Institute of Green-Bio Science and Technology (GBST) in Seoul National University.

**EDUCATION & CAREER:**

**2006 - Current:** Professor at *Seoul National University (SNU), Korea*

**2002 - 2006:** Professor at *Gyungsang National University, Korea*

**1999 - 2002:** Research Fellow at *Korea Rural Economic Institute (KREI), Korea*

**1994 - 1999:** Ph.D. at *University of Maryland, USA* (Major: *Agricultural Economics*)

**1985 - 1991:** B.S./M.S. at *Seoul National University* (Major: *Agricultural Economics*)

**EDITORIAL & ACADEMIC APPOINTMENTS:**

**2016 - 2019:** Chief Editor of *Journal of Korean Agricultural Economics*

**2007 - 2015:** Editorial Board of *Journal of Korean Agricultural Policy*

**2007 - 2015:** Editorial Board of *Journal of Korean Livestock Management*

**2021 - 2022:** President of *Korean Agricultural Economics Association*

**2017 - 2018:** President of *Korean Society of Dietary Education*

**2021 - Current:** Director General of *Institute of Green-Bio Science & Technology (GBST), SNU*

# Korea's Policy Experience for Enhancing Agricultural Productivity and Farm Income

**February . 2023**

Jeongbin IM
Professor, Department of Agricultural Economics
Director General, Institute of GBST
Seoul National University

## CURRICULUM VITAE

■ **Education**
- Ph.D. Department of Agricultural and Resource Economics University of Maryland at College Park, USA, 1999
- M.A. Seoul National University, Seoul Korea, 1991
- B.A. Department of Agricultural Economics, Seoul National University, Seoul Korea, 1989

■ **Major Research Fields**
- Agricultural Policy and Trade Analysis
- WTO and FTA Issues on Agricultural Sector
- Agricultural and Rural Development Strategy

■ **Employment and Appointment**
- Professor, Seoul National University (2002~Current)
- Research Fellow, Korea Rural Economic Institute(1999~2001)
- President, Korean Agricultural Economics Association(KAEA, 2021~2022)
- Member of Advisory Committee for Agricultural Policy, MAFRA(2003~ Current)


2

# Contents of Presentation



## I. Introduction

- Korea was a typical underdeveloped country by the early 1970s
- However, successful export-oriented industrialization transformed it into the advanced industrialized country
  - With rapid economic growth of over 7% per annum over 40years(1960s~1990s)
  - GDP: US$ 8 billion(1970) to US$ 1.8 trillion(2021), 10th in the world
  - Per Capita GNI : US$ 254(1970) to US$ 35,168(2021), 27th in the world
- So the most people in urban and rural areas enjoy one of the highest living standards in Asia-Pacific region.

❖ **Objectives of presentation are to answer the following questions?**

- How has the Korean agriculture and policy been changed in the process of rapid economic development and trade liberalization?
- What is the agricultural development strategy in Korea?

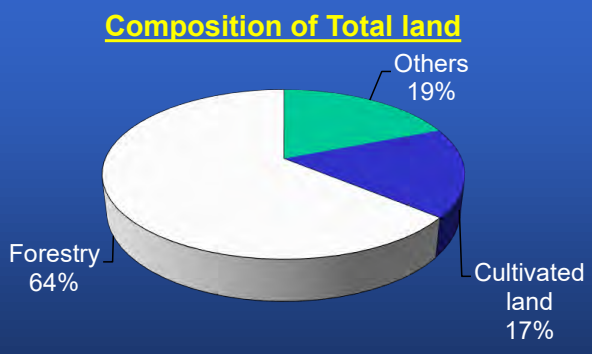
Before introducing the situation of agriculture and agricultural policy in Korea, let's watch a short video showing the development of agriculture and rural areas from 1950s to recent years.

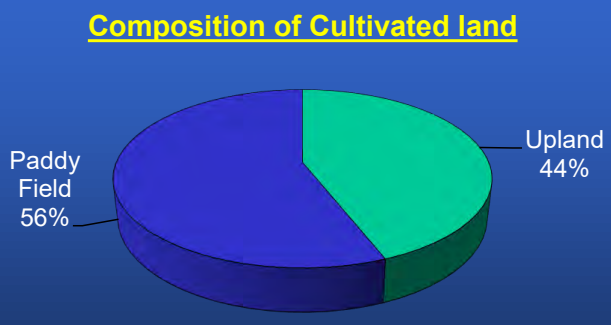



# II. Agricultural Situation in Korea

## (1) Farmland Structure of Korea

- Total land: 10 million ha (99,538㎢)
- Agricultural land: 1.7million ha, 17% of total land area
  - Paddy Field : 0.93 million ha, 56% of total cultivated land
  - Upland : 0.76 million ha, 44% of total cultivated land
- About 64% of total land is mountainous and hilly area



## (2) Status of Agriculture in the Korean Economy

- Agricultural share in national GDP is decreasing
  : 27.4%(1970) → 7.9%(1990) → 1.8%(2020)
- The share of agriculture in total employment is also declined
  : 50.4%(1970) → 17.9%(1990) → 5.4%(2020)
- The radical decreases of agricultural share in national economy have been occurred in Korean agricultural sector within one generation

: It is a result of the rapid industrialization and urbanization.

- However Korean agriculture still plays important roles in not only the land use and employment, but also social and economic stability and livelihood in rural area



### ➢ Change in agricultural status in the process of economic development

- Korea has made a rapid economic growth since 1960s
  - Annual average growth rate of GDP is 5.3% during 1970-2020, which is mainly led by the growth of non-agricultural sector such as manufacturing and service sectors
  - Manufacturing sector grew sharply, annual growth rate is 7.4%
  - Service sector grew at the speed of 5.5% annual growth rate
  - But, agricultural sector showed a relatively low growth rate of 1.6% for the last 50 years

< Table 1> Annual Growth Rate by Sector(CAGR, %)

| Period | GDP | Ag-Forestry& Fisheries | Mine & Manufacturing | Electricity, Gas & Water | Service |
|---|---|---|---|---|---|
| 1970~1979 | 8.4 | 3.6 | 15.5 | 12 | 9.7 |
| 1980~1989 | 8.6 | 4.0 | 10.2 | 9.6 | 9.9 |
| 1990~1999 | 7.2 | 2.0 | 9.5 | 10.2 | 8.6 |
| 2000~2010 | 3.8 | 1.0 | 8.3 | 7.5 | 4.7 |
| 2011~2020 | 2.9 | 0.6 | 2.1 | 1.8 | 2.8 |
| 1970~2020 | 5.3 | 1.6 | 7.4 | 8.1 | 5.5 |

## (3) Production Share by Commodity

- Agricultural production has been steadily increasing from KRW 6 trillion (1980) to 50 trillion(2020)

- The share of Livestock, Fruits and Vegetable in the total value of agricultural production has been increasing

- However the share of rice production in total agricultural production has been decreasing since 1990s

< Table 2> Production Value and Share by Farming Type

Unit: KRW trillion won, %

| | 1980 | 1990 | 2000 | 2020 |
|---|---|---|---|---|
| Total Agriculture Production | 6.34(100) | 17.73(100) | 31.97(100) | 50.15(100) |
| Rice | 2.18(34.4) | 6.54(36.8) | 10.50(32.8) | 8.45(16.8) |
| Livestock | 1.27(20.0) | 3.95(22.3) | 8.08(25.3) | 20.35(40.6) |
| Fruit | 0.25 (3.9) | 1.31(7.4) | 2.58(8.1) | 4.57(9.1) |
| Vegetable | 1.44(20.6) | 3.32(18.7) | 6.74(21.1) | 11.24(22.4) |
| Others | 1.20 (18.9) | 2.61(14.7) | 4.07(12.7) | 5.54(11.0) |



## (4) Farmland Size

- Agricultural land is decreasing in the process of industrialization and urbanization
  : 2.3 million ha(1970) → 1.7million ha(2020) (30% decrease)

- Number of farm-household is decreasing much faster than planted land
  : 2,483 thousands(1970) → 1,035 thousands(2020)
  (58% decrease)

- Average farmland size per farm is increasing
  : 0.93 ha(1970) → 1.56 ha(2020)

- But farmland size in Korea are still very small compared to other countries
  : Arable Land size per farm
  Korea-1.6ha, Japan-1.7ha, Netherlands-22ha, U.S.A.-120ha

## (5) Rice Dominant Farming System

- Rice farming takes dominant position in ag. production and farm economy in Korea
- As of 2020 year, Rice farming accounts for
  1) 17% of total agricultural production
  2) 56% of total agricultural land
  3) 52% of total farm household
  4) 19% of total farm revenue
- The reasons are as follows:
  1) Staple food, government have maintained price and income support
  2) Rice farming is relatively easy and time saving due to mechanization
  3) Rice has been exempted from market opening through WTO and FTA.



## (6) Agricultural Trade

- Agricultural import is increasing rapidly
  : 0.5 billion US $ (1970)→ 39.8 billion US $ (2020)
- Agricultural export is also increasing
  : 0.1 billion US $ (1970)→ 9.9 billion US $ (2020)
- Agricultural trade deficit has increased greatly
  : 0.4 billion US $ (1970)→ 29.9 billion US $ (2020)

< Table 3> Situation of Agricultural Trade

Unit: US$ billion

| | | 1970 | 1980 | 1990 | 2000 | 2020 |
|---|---|---|---|---|---|---|
| Import | Nation wide | 1.8 | 21.6 | 69.8 | 160.4 | 467.6 |
| | Agriculture | 0.5 | 3.1 | 5.4 | 6.8 | 39.8 |
| Export | Nation wide | 0.9 | 17.2 | 65.4 | 172.3 | 512.5 |
| | Agriculture | 0.1 | 1.1 | 1.1 | 1.3 | 9.9 |

## (7) Food Self-sufficiency Rate

- Self-Sufficiency rate for all grains (including feed grains) has continuously dropped since the 1980s
  : 48.4%(1985) → 20.2%(2020)
- Self- sufficiency rate for wheat and corn became less than 1%
  : However rice is almost self-sufficient level

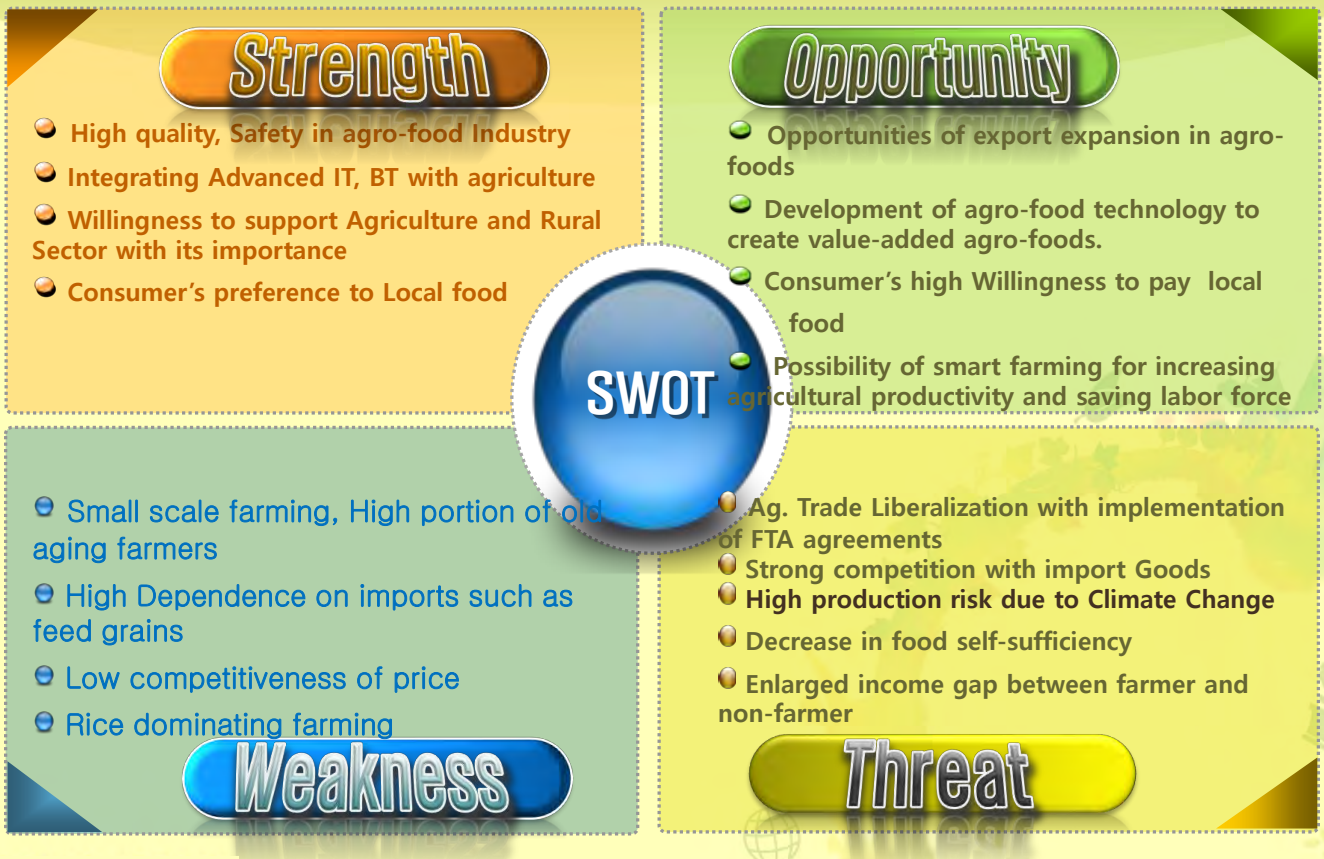
<Table 4> Self-sufficiency Rate of Major Grain

Unit: %

| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Rice | 103.3 | 108.3 | 91.4 | 102.9 | 102.0 | 104.6 | 101.0 |
| Barley | 63.7 | 97.4 | 67.0 | 46.9 | 60.0 | 24.3 | 36.5 |
| Wheat | 0.4 | 0.1 | 0.3 | 0.1 | 0.2 | 0.9 | 0.5 |
| Corn | 4.1 | 1.9 | 1.1 | 0.9 | 0.9 | 0.9 | 0.7 |
| Soybeans | 22.5 | 20.1 | 9.9 | 6.8 | 9.7 | 10.1 | 7.5 |
| Total for all grains | 48.4 | 43.1 | 29.1 | 29.7 | 29.4 | 27.6 | 20.2 |



## (8) SWOT of Korean Agriculture



## III. Agricultural Policy Changes: Historical Perspective

### (1) Agricultural Policy : 1950s and 1960s

**1950s ~60s**

- Policy Goals:
  Main goals of the agricultural policy were to resolve food shortage and to terminate the problems of tenant farmers and landowners.

- Policy Direction:

(1) Creation of owner farming through "Land Reform"
: Farmland reform was implemented from 1950 until 1957 to create independent family farming

(2) Establishment of agricultural administration system
: Rural Development Administration(1962) and ag. cooperative organization(1961) were founded and 'the Basic Agricultural Law (1967)' was enacted to conduct the systematic ag. policy.

⇒ With the farmland reform for creating family farm which has own farmland during 1950s, the basic foundations of agricultural development were established in the 1960s



## Rural Situation in the 1960s

**Korean Rural Sector in the 1960s**

- **70% of the Korean population lived in rural areas**
- **80% lived in the houses with rice-straw roofs and used oil lamps**
- **Poor farmers with per capita income with US $ 100 in 1964**
- **Frequent famine : Flooding, Drought**
- **Low productivity & Low Income**

⇨ **Desperate situation to achieve poverty reduction and rural development**

## (1) (continued) Agricultural Policy : 1950s and 1960s

- Many Korean suffered from chronic food shortages and severe poverty until the mid-1960s
  : Absolute Poverty Rate(APR) reached 34 % in 1965
  * APR: The share of households whose income is below the minimum living cost.

- Particularly, rural poverty was one of the most important issue to be solved since the early 1960s
  - The key solutions to fight rural poverty was to increase agricultural productivity and farm household income in rural area

- In this regard, the Korean government tried to strengthen the basic factors for increasing agricultural productivity and farm household income in terms of (1) production bases, (2) physical infrastructure, (3) organization and institutional systems



**(Ex.) Major Policies for enhancing Agricultural Productivity and Farm Income , which were conducted by the Korean government since 1960s**

- The Korean government had made various policy efforts for improving agricultural productivity and income in rural area since 1960s. As a result, the Korea has been evaluated as a successful model in rural development and poverty reduction.

| Major Policy Instruments for enhancing Agricultural Productivity and Farm Income | |
|---|---|
| Type | Core Policies conducted by Government |
| Production Bases | Agricultural R&D, Extension Service,<br>Agricultural Water Supply and Management<br>Farmland Supply and Management |
| Physical Infrastructure | Roads, Transportation, Communication, Electricity |
| Organization and Institutional System | Agricultural Cooperatives,<br>Agricultural Marketing System<br>Governance System from central government to the village, county, province |

# (2) Agricultural Policy : 1970s

**1970s**

• Policy Goals:

Main goals of the policy were to increase agricultural productivity and to improve living conditions in rural area.

• Policy Direction:

(1) Increase of productivity through "Green Revolution"
: Expansion of agricultural R &D investment, development of high-yield variety, improvement of irrigation system, agricultural mechanization were pursued.

(2) Price support policy for rice and barley began in 1970.
: As a result, self-sufficiency of rice was achieved in 1977

(3) New town movement called 'Saemaul Undong' launched in 1970.
: Government provided financial and materials supports to farmers and villages for improving the rural living conditions
- Basic philosophy : Diligence, Self-help, Cooperation to escape from poverty, disease and illiteracy in rural area

➢ The spirit "we can do it" was widespread throughout the country



**Constructing a bridge to connect other villages**

**Villagers ' group discussion for community development planning**

## (3) Agricultural Policy : 1980s

1980s

- Policy Goals:

Main goals of the agricultural policy were to increase farm households income to reduce the enlarged income gap between urban and farm households due to the rapid growth in non-agricultural sector.

- Policy Direction:

(1) Promotion of cash-crop production such as livestock, fruit, and vegetables

: Price stabilization policy for livestock, fruit, and vegetables began

(2) Creation of off-farm income sources through making the rural industrial complexes

: Rural Income Source Development Law(1983) was enacted
Financial incentives for rural company such as favorable loan and tax exemption

As a result, production of livestock, fruit, and vegetables began to increase and industrial complexes began to appear in rural area



## (4) Agricultural Policy : 1990s

1990s

- Policy Goals :

Main goals of the agricultural policy were to promote the structural reform and to enhance competitiveness in the era of trade liberalization according to the implementation of WTO AoA and FTA .

- Policy Direction:

(1) Reforming agricultural structure to enhance competitiveness

: Large investment plans for agricultural sector and rural area were made in 1991, 1994, 1998 and 2003.

- First investment plan amounting 42 trillion won(1991)
- Second investment plan amounting 15 trillion won(1994)
- Third investment plan amounting 45 trillion won(1998) to reform the agricultural structure and improve the living conditions in rural areas from 1992 to 2004
- Fourth investment plan amounting 119 trillion won was made in 2003, which is a 10-year plan from 2004 to 2013.

## (4) Agricultural Policy : 1990s (continued)

1990s

- Policy Direction:

(2) Creation of large scale commercial farming
- The farm size ownership limit was increased from 3 ha to10 ha(1993) and was abolished(2002) to create large scale commercial farming
- A new farmland banking system was introduced in 2005 to minimize the fragmentation of farmland and encourage young full-time farmers to increase the scale of their farms more easily

(3) Stabilization and support of farm income
- Several DP programs have been introduced for supporting farm income
- Direct payment for early retirement of aged farmers(1997)
- Direct payment for environmentally friendly farming (1999)
- Direct payment for rice income support(2001, 2002, 2005)
- Direct payment for less favorable areas(2004)
- Direct payment for small farming and upland farming (2020)



## (4) Agricultural Policy : 1990s (continued)

1990s

- Policy Direction:

(4) Promotion of environmentally friendly farming to maintain sustainable agricultural production and to preserve environment
: 'Environment-friendly Agricultural Promotion Act' was legislated in 1997
- Introduction of direct payment for environmentally friendly farming (1999 )

(5) Strengthening of rural development policy to enhance the quality of life in rural areas
: 'The Special Law for the Improvement of Quality of Life in Rural Areas' enacted in 2005
- Investment plan for RD amounting 20 trillion won, which is a comprehensive plan for RD during 2005-2010

# (5) Agricultural Policy : since 2000

**Recent**

- Policy Goals:

Main goals of the agricultural policy to find the new engines of growth for the continuous development in agricultural sector

- Policy Direction:

Since 2008, the government is pursuing a more offensive approach in agricultural policy

(1) Promotion of value added agro-food processing industry
: Scope of Ag. policy was broadened from primary agricultural production into secondary food processing industry and thirdly green tourism.

(2) Building up a consumer-oriented agricultural system and Strengthening a food safety management system
: Customer of Ag. policy changed from mainly farmer to not only farmer, but also consumer and food processing enterprises.

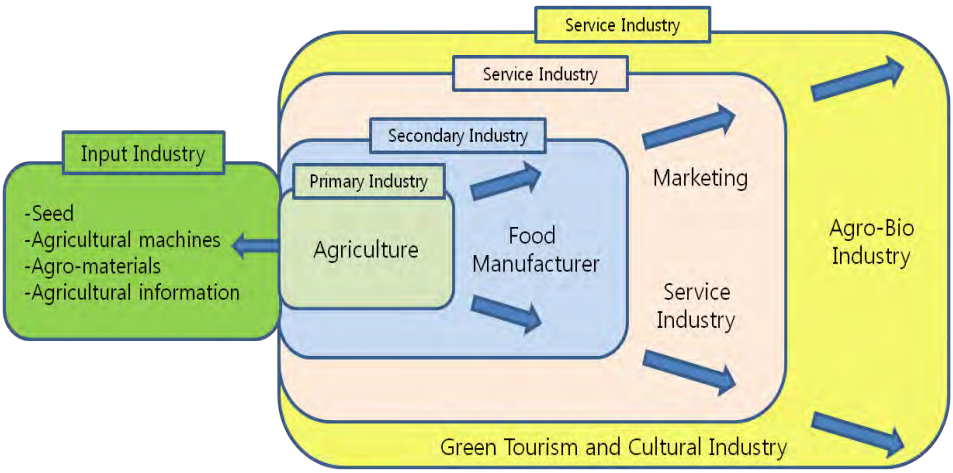
(3) Promotion of agro-food exports
: 5 billion US $(2012) → 10 billion US $(2020)



## Recent Agricultural Policy Focus: 6th industrialization of agriculture

◯ Recently the Korean government is pursuing the integration of tradition agriculture with food processing, leisure and tourism industry.
- It is for creating the high value-added agriculture and enhancing the farmer's income.

**<Figure 1> Expansion to value-added agribusiness from traditional agriculture**



# IV. Outcomes and Success Factors of Korea

- Since 1960s in the early stage of economic development, the Korean government has adopted various policies for enhancing agricultural productivity and farm income

| Policy Area | Implemented Policy |
|---|---|
| Farmland | Land reform with the introduction of the land-to-the-tillers principle: reallocation of farmland to tenant family farmer from landlords. |
| R&D and Extension Service | Expansion of agri. R&D for high-yielding, superior breed improvement and extension service with establishment of RDA in 1962 |
| Agricultural Infrastructure | Agricultural water resources development, farmland development, agricultural mechanization with establishment of KRC in 1962 |
| Agricultural Cooperatives | Creation of Ag. cooperatives and farmer's organizations since 1961 for increasing farmer's bargaining power and welfare. |
| Price Support | Price support and stabilization policy in major crops(rice and barley) which play a vital role in farm income since 1970 |
| Agricultural marketing | Reasonable price formation with establishment of public wholesale markets at the hub region since mid-1970s |
| Rural Development | Launch of "New Community Movement called 'Saemaul Undong in 1970 for improving rural infrastructure and living standard, and creating new income sources for rural residents |

- Based on these policies, periodic 5-year or 10-year public investment plan has been conducted in agricultural sector for improving ag. productivity and developing income source of farmhousehold



# IV. Outcomes and Success Factors of Korea

## 1. Major Outcomes

### (1) Agricultural productivity

- Agricultural productivity has steadily increased in most crops such as rice, barley, soybeans and corn et.al.

: Rice productivity: 330kg/10a (1970) → 451kg(1990) → 539kg/10a(2016) → 483kg/10a(2020), due to quality oriented environmental friendly rice farming

### (2) Farm Income

- Average farmhousehold income has continuously increased

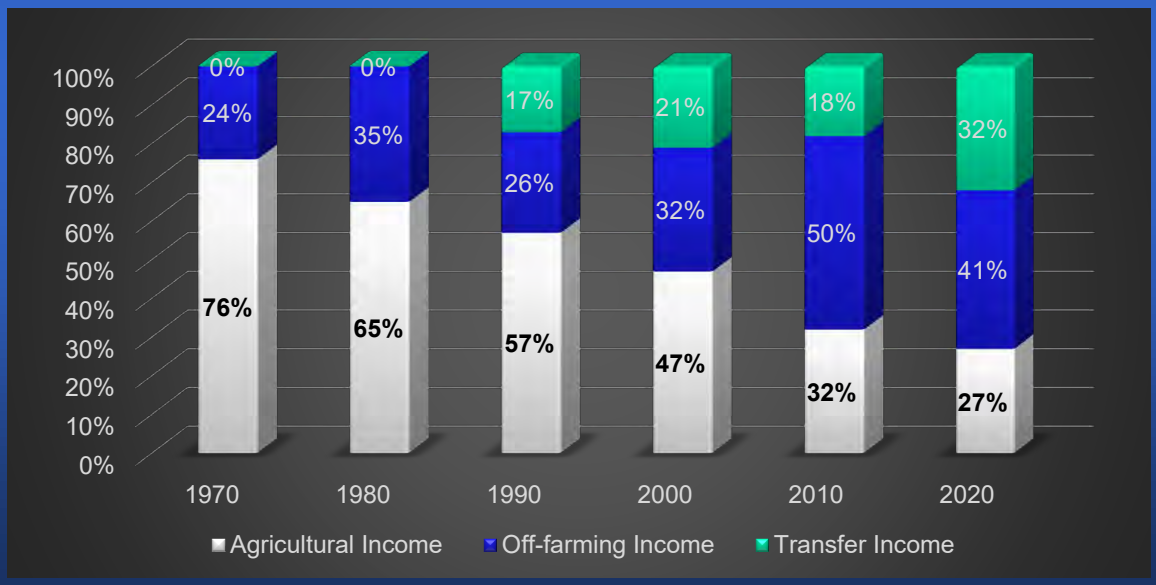
: US$ 249 (1970) → $ 2,448 (1980) → $ 10,024(1990) → $ 23,072(2000) → $40,935(2020)

# IV. Outcomes and Success Factors of South Korea

## (3) Farm Household Income Sources

- Farm household income sources has been diversified
  : Agricultural income, off-farming income, transfer income

**<Figure 2> Composition of Farm household Income Source**





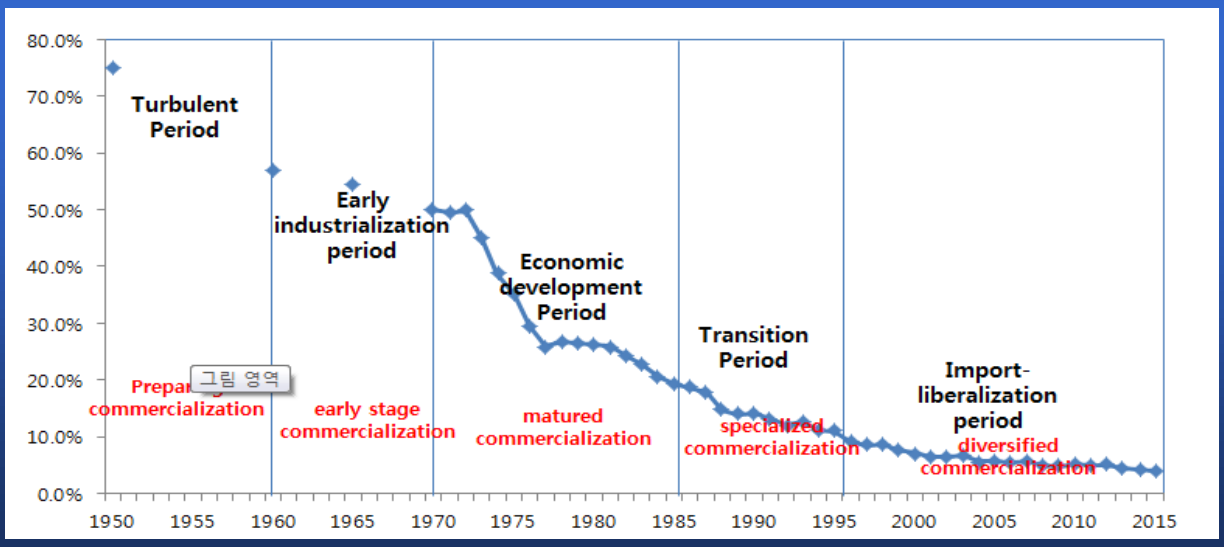

# IV. Outcomes and Success Factors of South Korea

## (4) Commercialization of Agriculture

- Commercialization of agricultural production has much progressed

: Self-consumption rate of rice : 57% (1960) → 26%(1980) → 7%(2000) → 2%(2015)

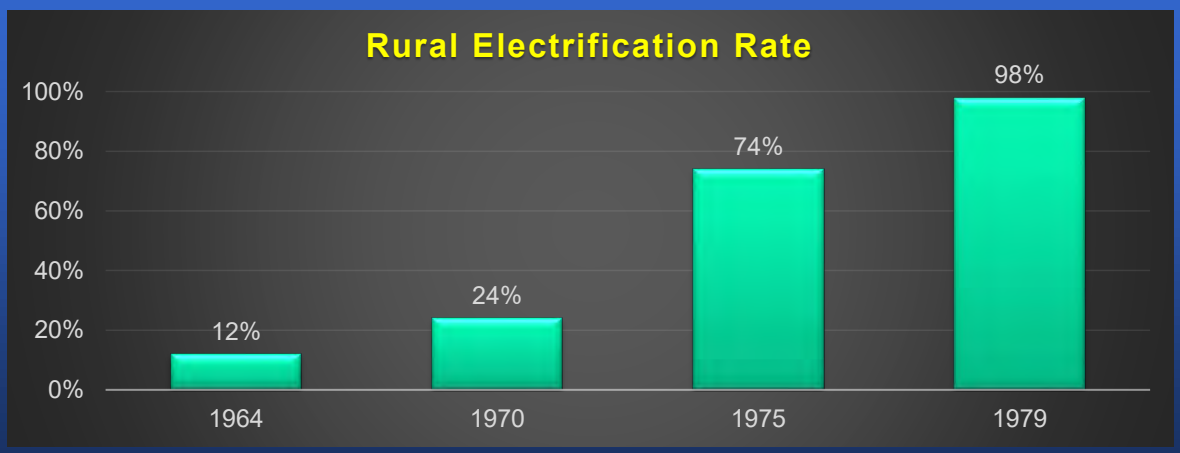
**<Figure3> Share of Own Consumption by Farm in total Rice Production**



# IV. Outcomes and Success Factors of South Korea

## (5) Improvement of Living Conditions in Rural Area

- Living conditions in rural areas have greatly improved
  : For example, rural electrification was successfully accomplished through Rural Electrification Project (1966–1979) based on "Rural Electrification Promotion Act (1965)"
  - Rural electrification rate : 12% (1964) → 98% (1979) → 100% since 1982






## 2. Success Factors of Korea's Agricultural Development and Rural Poverty Reduction

(1) National leader's strong will and support for rural development

(2) Establishment of legal foundations for implementing various policies based on national consensus

(3) Implementation of comprehensive policies for increasing ag. productivity and farm household income

(4) Proper role sharing among between central-local government, and relevant public agencies (ex: RDA, KRC, aT)

(5) Cooperative partnership between the public and private sector for improving living conditions in rural area(ex: Saemaul Uudomg)

(6) Sufficient financial capacity for agricultural investment due to continuous economic growth

# V . Agricultural Development Strategies in Korea

## 1. Basic Structure of Agricultural Policy

### "Four Areas for Government Policy"

1) Policy for Farmer, which is to make economically self-survival farmers

2) Policy for Agriculture, which is to make productive and sustainable agriculture with enhancing the competitiveness of agricultural sector

3) Policy for Rural Community, which is to create vitality of rural society and to improve the living conditions in rural area

4) Policy for Agricultural Related Industry, which is to effectively set up the vertical integration from input industry(Seed, Fertilizer, Pesticide, Machinery and Equipment) to value added food-processing industry

## 2. Objectives of Agricultural Policy

### "Five Objectives of Agricultural policy"

1) Goal for Farmers, which is to provide opportunity for high income

2) Goal for agricultural industry, which is to create higher value chains

3) Goal for Consumers, which is to provide freshness, quality and safe food

4) Goal for Rural Residents, which is to enhance the quality of life

5) Goal for Future Generations, which is to transfer clean environment and beautiful landscape in rural area

# Thank you for listening!

jeongbin@snu.ac.kr

# Improvement of Nitrogen-use-efficiency of Crops

**Prof. Ju Kon KIM**

Dean,

Graduate School of International Agricultural Technology, SNU

# Prof. Ju-Kon KIM

**BRIEF CURRICULUM VITAE**

Prof. Ju-Kon Kim is the Dean of Graduate School of International Agricultural Technology, Seoul National University. He earned his MSc in Biological Engineering from Korea Advanced Institute of Science and Technology (KAIST) and his PhD in Plant Molecular Biology from Cornell University, United States. Prof. Kim is Head of Laboratory of Crop Biotechnology. His group is taking a genomics-based approach to unravel the regulation of genes in rice under environmental stresses. He is also working on improvement of nitrogen-use-efficiency of crops in order to reduce N fertilizer usage while maintaining crop yield. He is using ethyl methanesulfonate (EMS) mutant pools that contain an N molecular sensor by employing forward and reverse genetics approaches including genome-editing technologies. He is author of over 50 research articles and over 30 international patents.

**EDUCATION & CAREER:**

**2013 - Current:** Professor at *Seoul National University (SNU), Korea*

**1996 - 2013:** Professor at *Myongji University, Korea*

**1983 - 1995:** Research Fellow at *Rural Development Administration (RDA), Korea*

**1987 - 1992:** Ph.D. at *Cornell University, USA* (Major: *Plant Molecular Biology*)

**1980 - 1982:** M.S. at *Korea Advanced Institute of Science and Technology (KAIST),* (Major: *Biological Engineering*)

**1977 - 1981:** B.S. at *Seoul National University* (Major: *Agricultural Chemistry*)

**EDITORIAL & ACADEMIC APPOINTMENTS:**

**2016 - Current:** Editorial Board of *Frontiers in Plant Science*

**2008 - 2015:** Chief Editor of *Plant Biotechnology Reports*

**2003 - 2007:** Editorial Board of *Molecules and Cells*

**2014 - 2015:** President of *Korean Applied Biological Chemistry*

**2014 - 2018:** Director of *Crop Biotechnology Institute, GBST, SNU*

**2021 - Current:** Dean of *Graduate School of International Agricultural Technology (GSIAT), SNU*

# Improvement of nitrogen-use-efficiency of crops

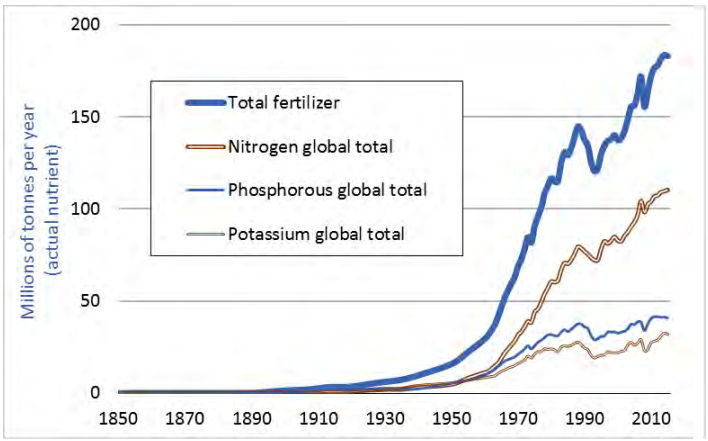

## Ju-Kon Kim

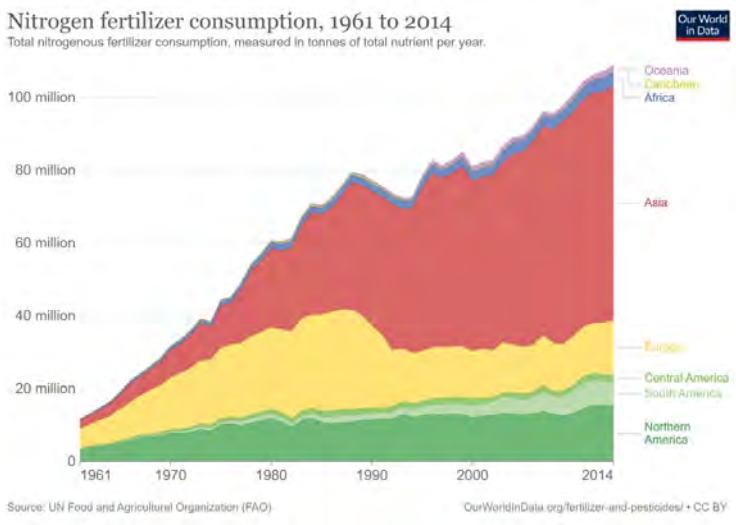
**Seoul National University**




## Nitrogen fertilizer consumption

Global consumption of fertilizers,1850 to 2015




(Reference: https://ourworldindata.org/)

For 2 times increase of crop productivity, we use 7 times more N fertilizers

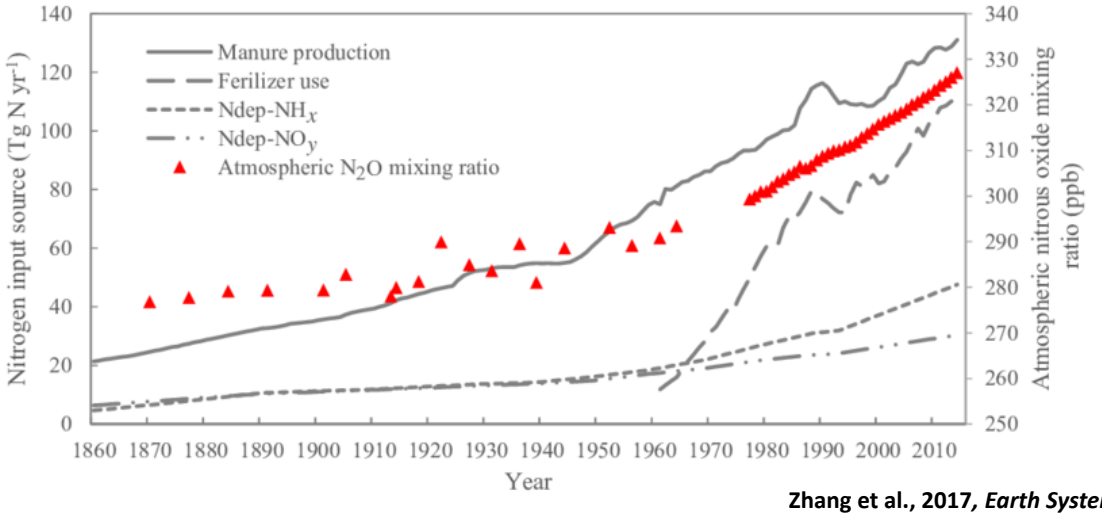

GBST INSTITUTES OF GREEN BIO SCIENCE & TECHNOLOGY

CROP BIOTECHNOLOGY LABORATORY

# Global warming and nitrogen fertilizer

Global Warming Potentials (IPCC Second Assessment Report)

| Species | Chemical formula | Lifetime (years) | Global Warming Potential (Time Horizon) | | |
|---|---|---|---|---|---|
| | | | 20 years | 100 years | 500 years |
| Carbon dioxide | $CO_2$ | variable § | 1 | 1 | 1 |
| Methane * | $CH_4$ | 12±3 | 56 | 21 | 6.5 |
| Nitrous oxide | $N_2O$ | 120 | 280 | 310 | 170 |



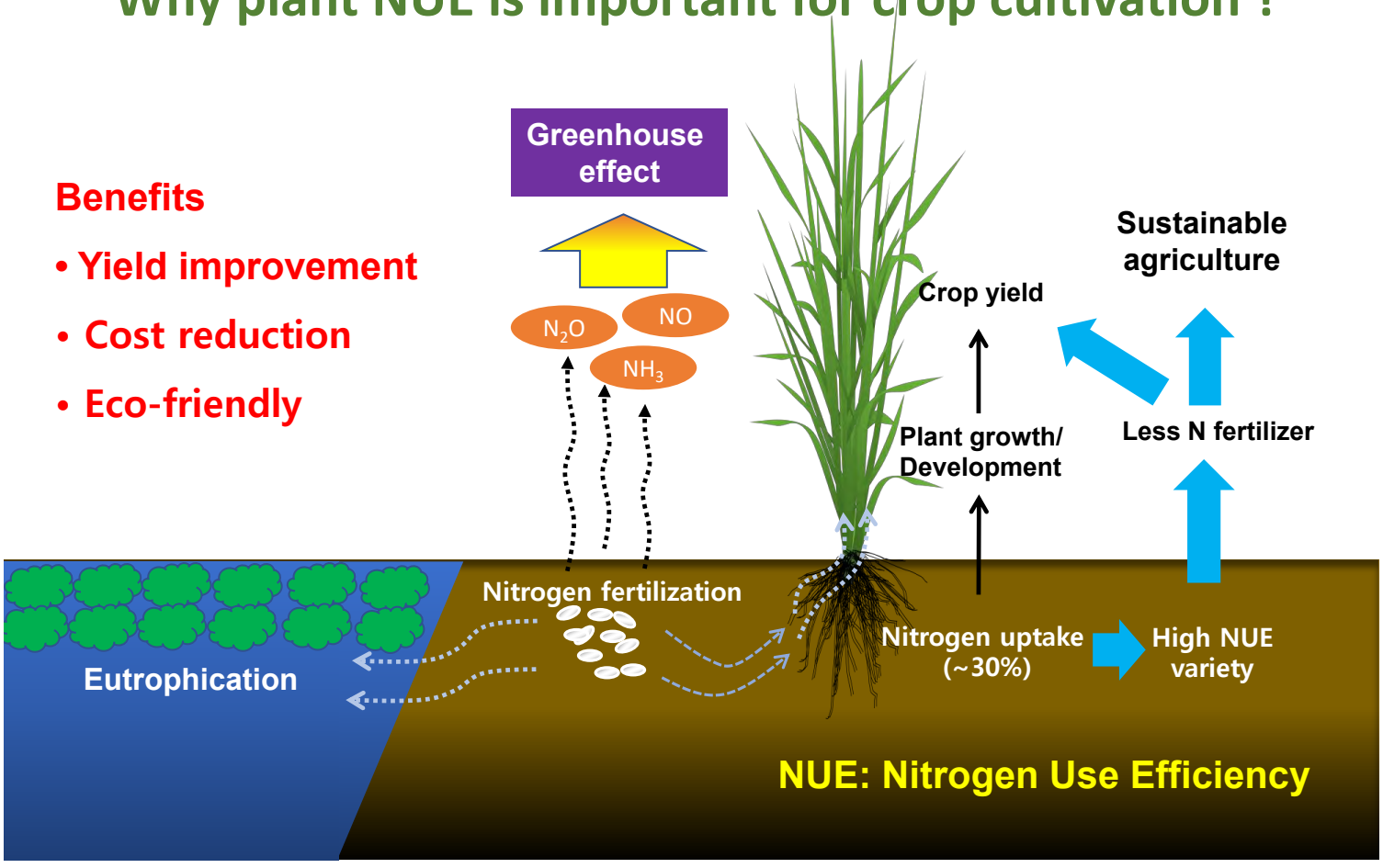

Zhang et al., 2017, *Earth System Science Data*



# Why plant NUE is important for crop cultivation ?

**Benefits**

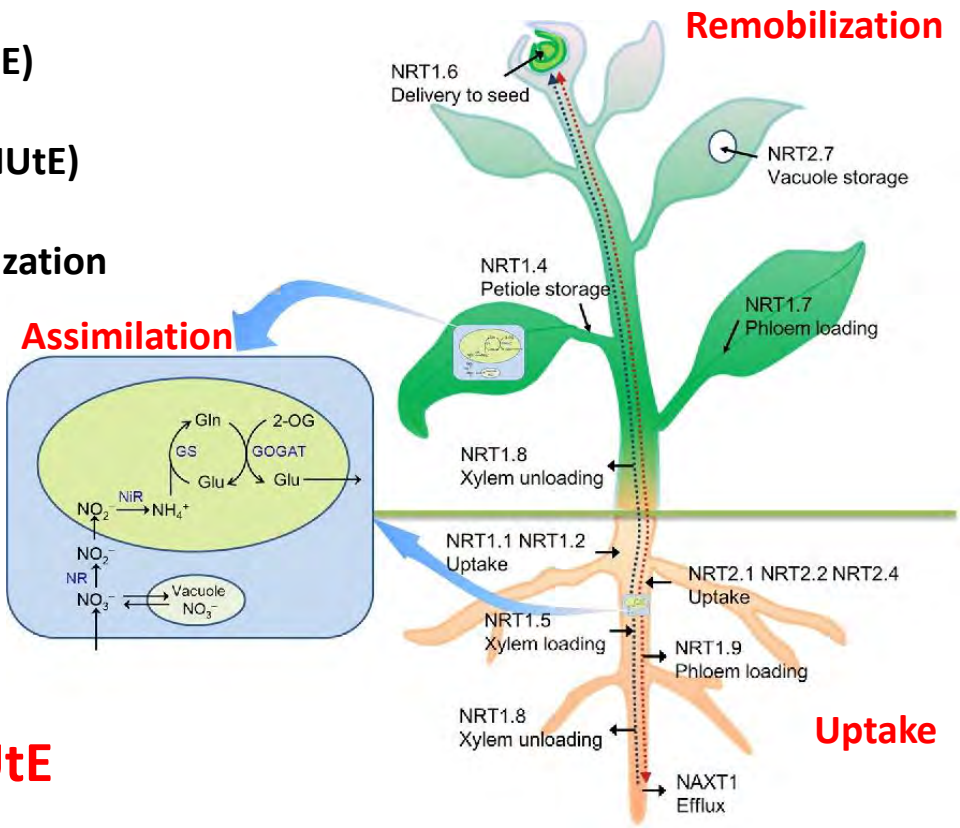
- **Yield improvement**
- **Cost reduction**
- **Eco-friendly**



# What is NUE in plants?

- N Uptake Efficiency (NUpE)
- N Utilization Efficiency (NUtE)

→ Assimilation + Remobilization



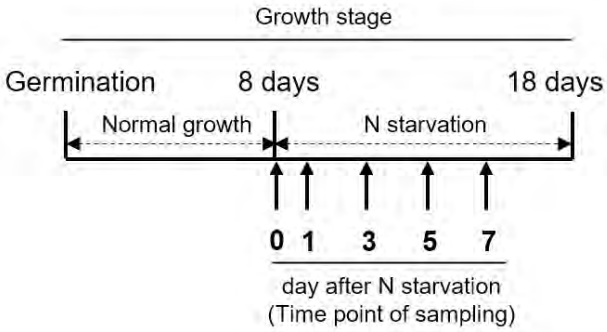

**NUE = NUpE + NUtE**

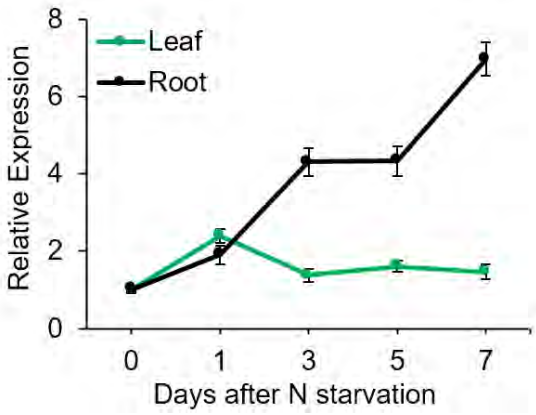


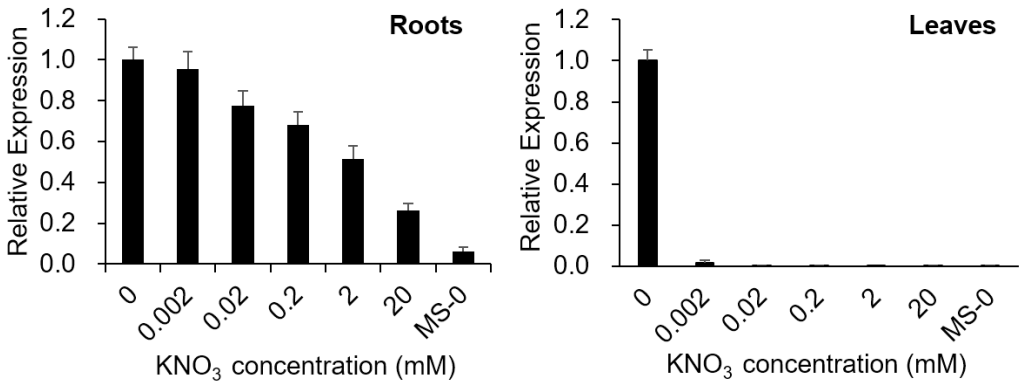
# The *NF-YA5/miR169a* module that enhances NUE of rice

GBST INSTITUTES OF GREEN BIO SCIENCE & TECHNOLOGY
CROP BIOTECHNOLOGY LABORATORY

# Expression pattern of NF-YA5

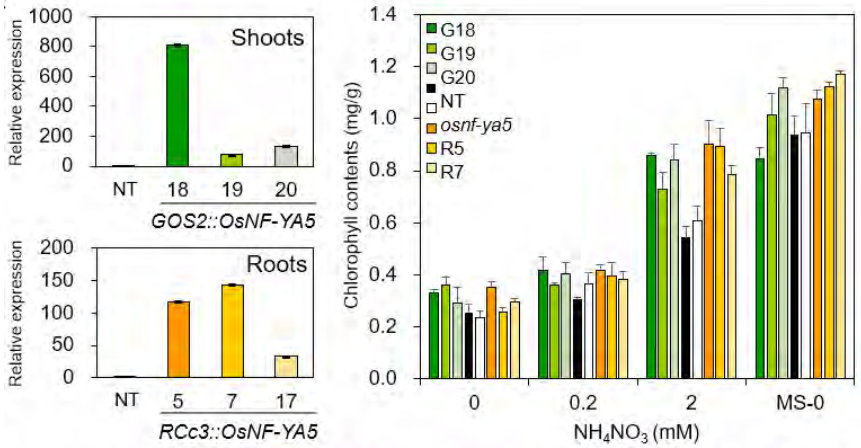


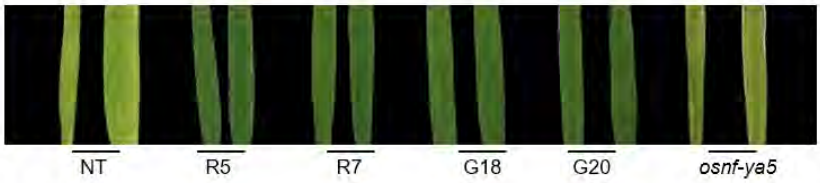



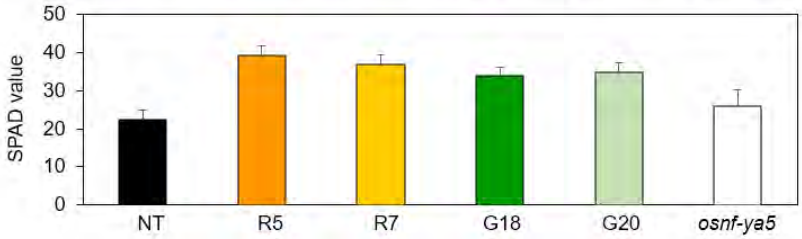





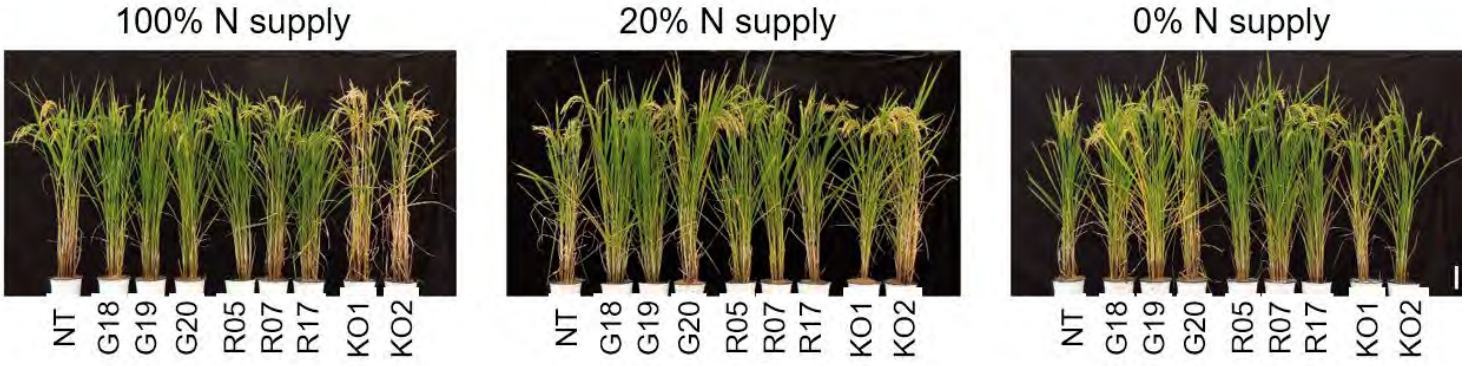

# Chlorophyll content in NF-YA5 transgenic plants

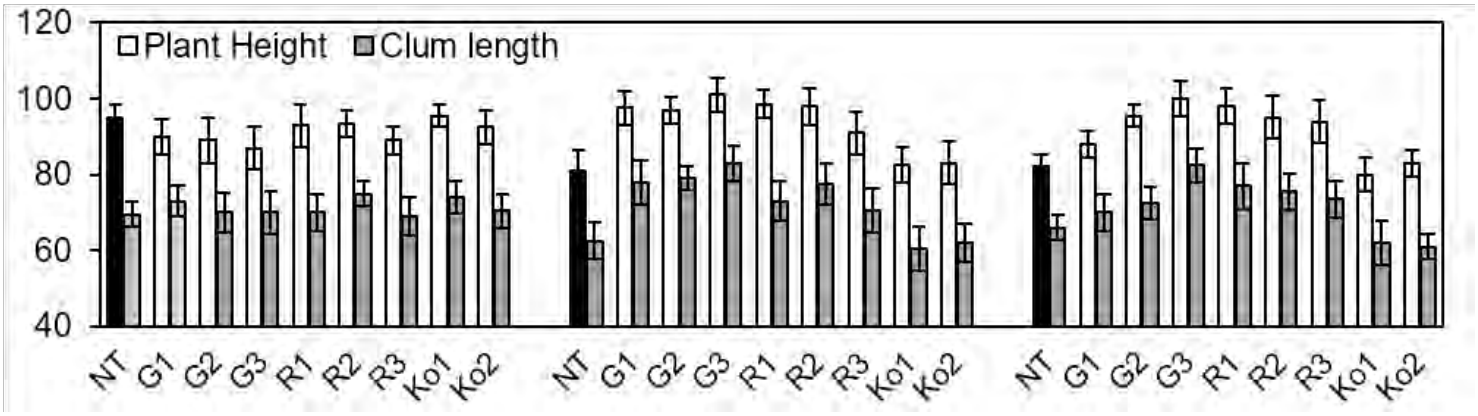


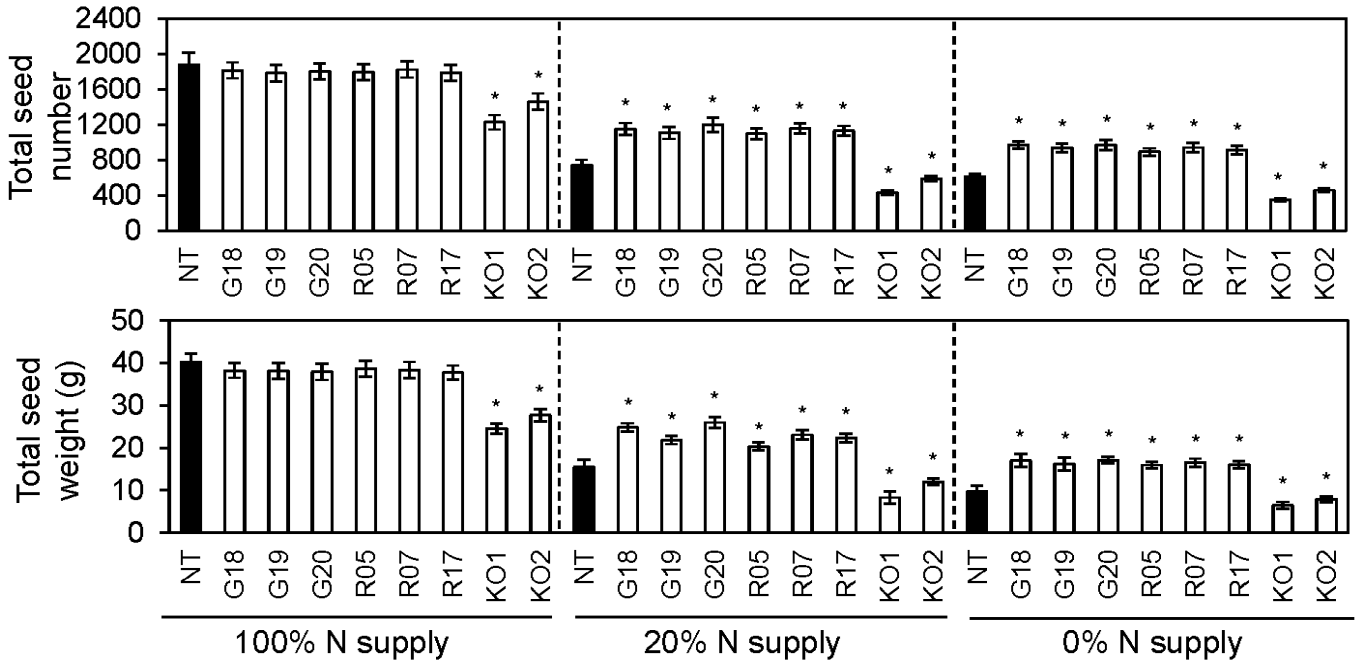
# Phenotype in N modified field conditions



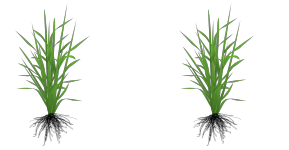






# Yield traits in N modified field conditions (2020)



# Target screening by DEX inducible system



Control

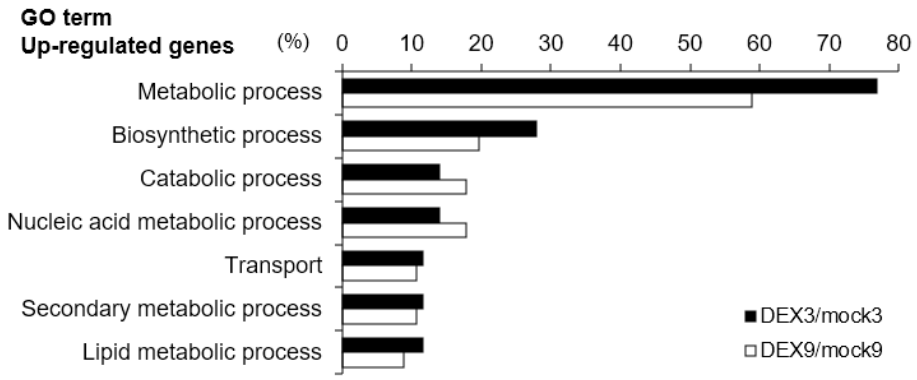


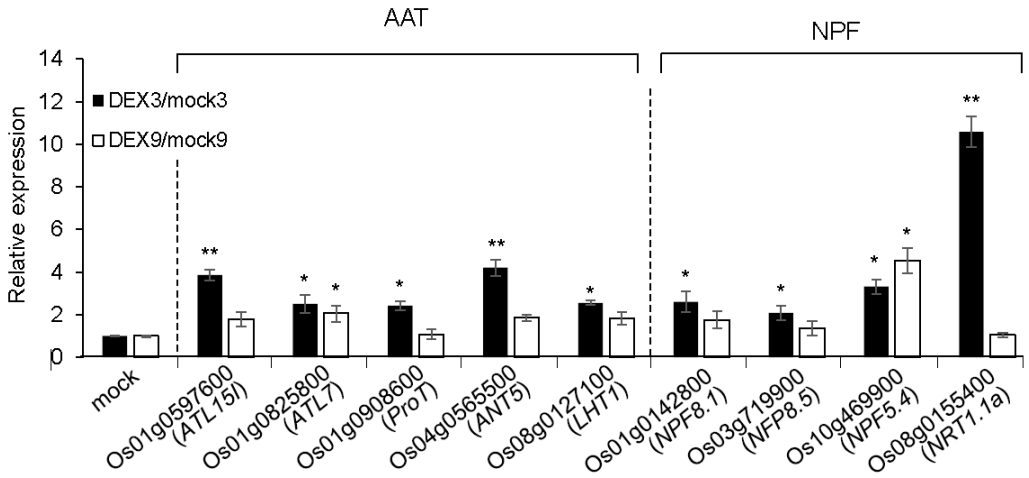
Inducible line

Dexamethason Treatment (3hr, 9hr)

Sampling and RNA extraction

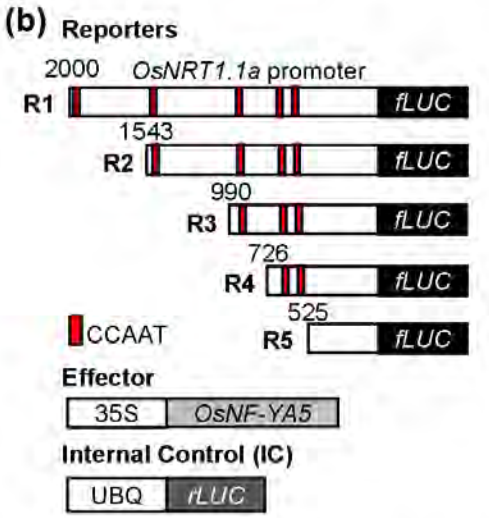
RNA-seq DEG analysis

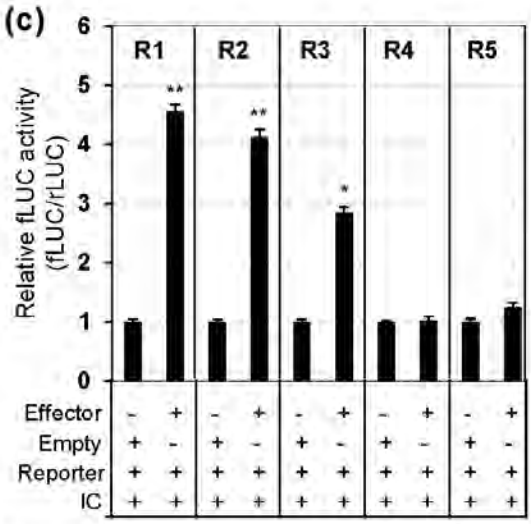


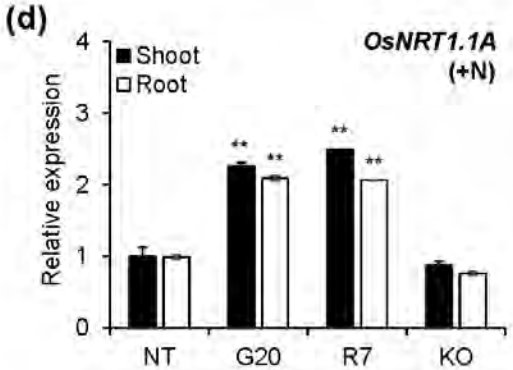



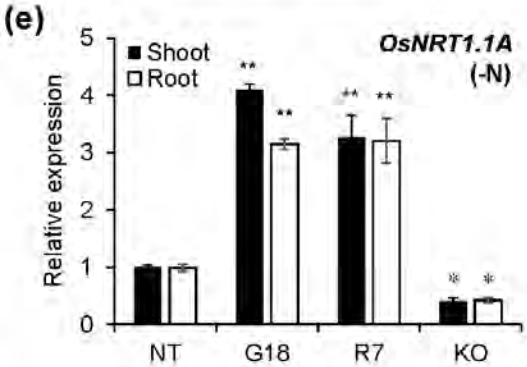



# *OsNRT1.1a* is the target of OsNF-YA5



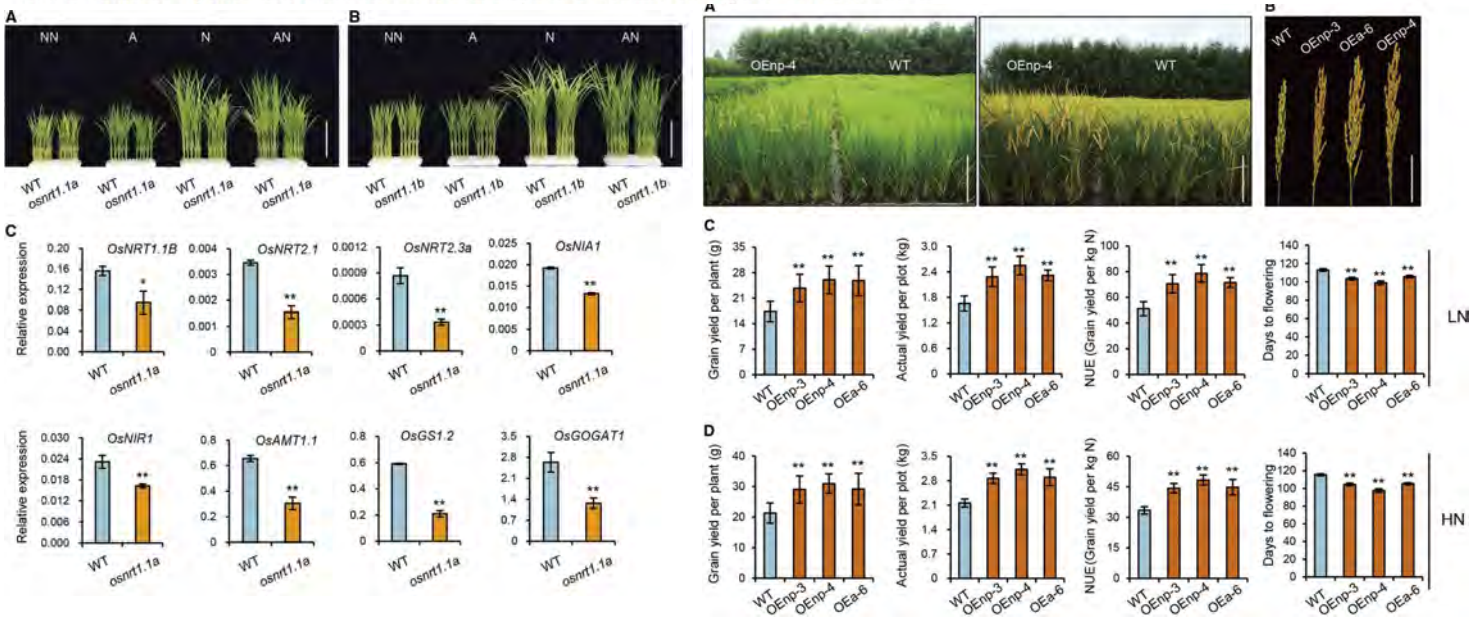



# Expression of the Nitrate Transporter Gene *OsNRT1.1A/ OsNPF6.3* Confers High Yield and Early Maturation in Rice OPEN

Wei Wang,[a,1] Bin Hu,[a,1] Dingyang Yuan,[b] Yongqiang Liu,[a,c] Ronghui Che,[a] Yingchun Hu,[d] Shujun Ou,[e] Yongxin Liu, Zhihua Zhang,[a,c] Hongru Wang,[a] Hua Li,[a,c] Zhimin Jiang,[a] Zhengli Zhang,[a] Xiaokai Gao,[f] Yahong Qiu,[a,c] Xiangbing Meng,[a] Yongxin Liu,[a] Yang Bai,[a] Yan Liang,[a,c] Yiqin Wang,[a] Lianhe Zhang,[f] Legong Li,[g] Sodmergen,[d] Haichun Jing,[h] Jiayang Li,[a] and Chengcai Chu [a,2]

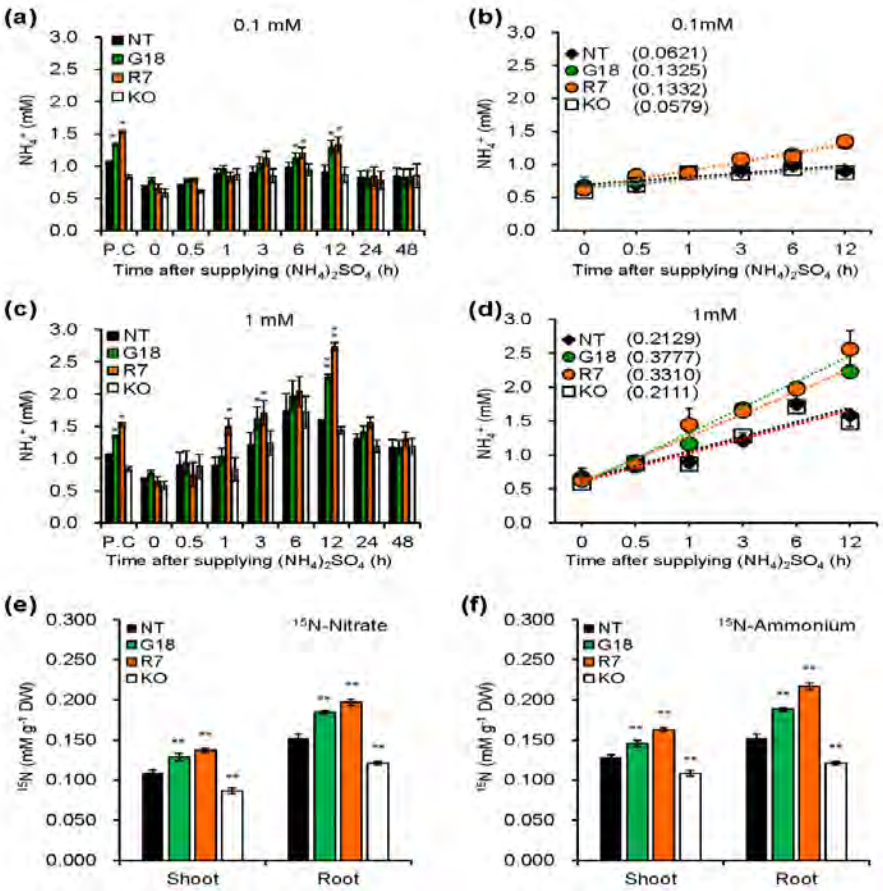
[a] State Key Laboratory of Plant Genomics and National Center for Plant Gene Research (Beijing), Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing 100101, China
[b] China National Hybrid Rice Research and Development Center, Changsha 410125, China

*Plant Cell (2018)*

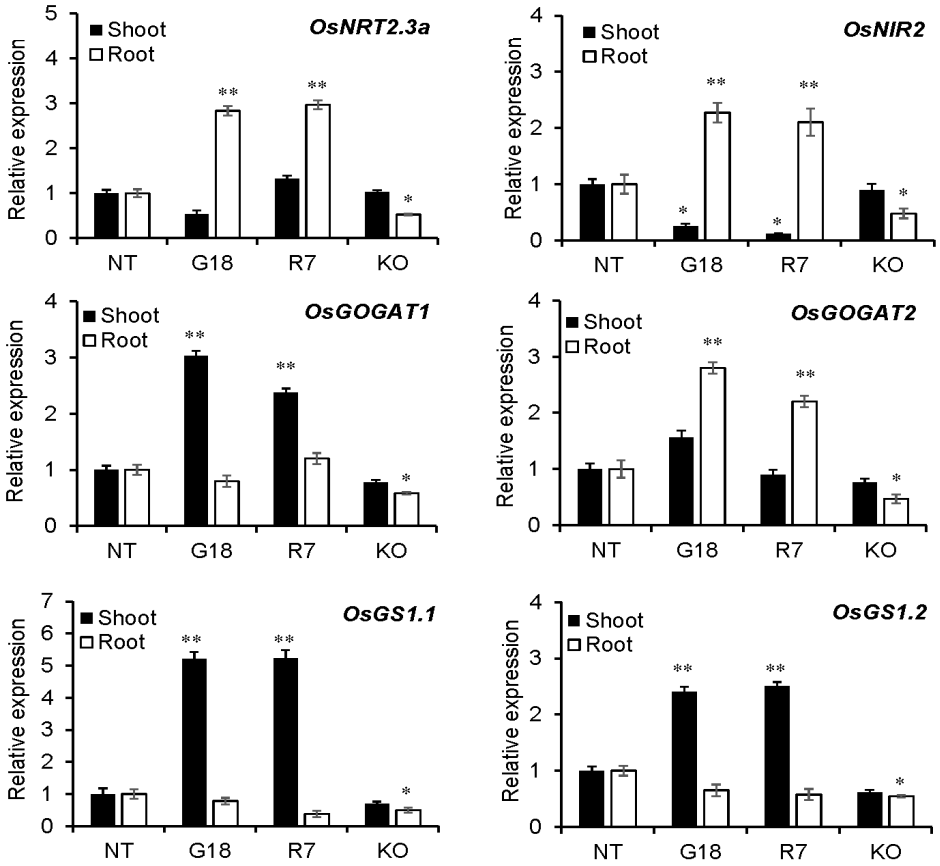





# Ammonia uptake in *OsNF-YA5* transgenic plants

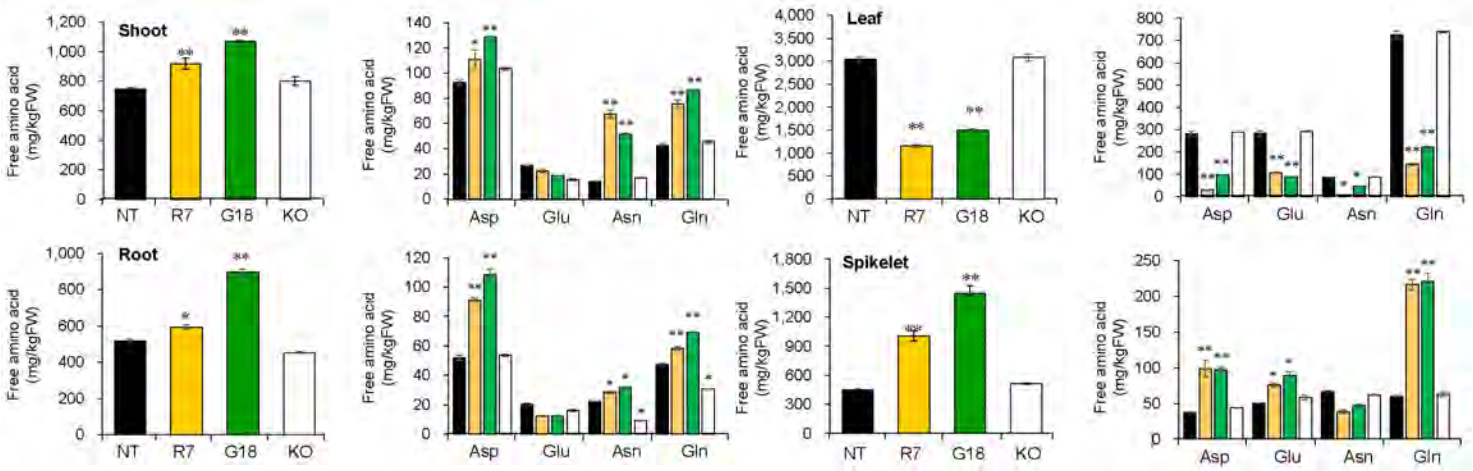


# Expression levels of N assimilating genes






# Free amino acid contents in *OsNF-YA5* transgenic plants

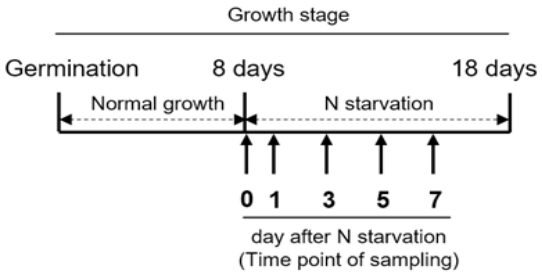


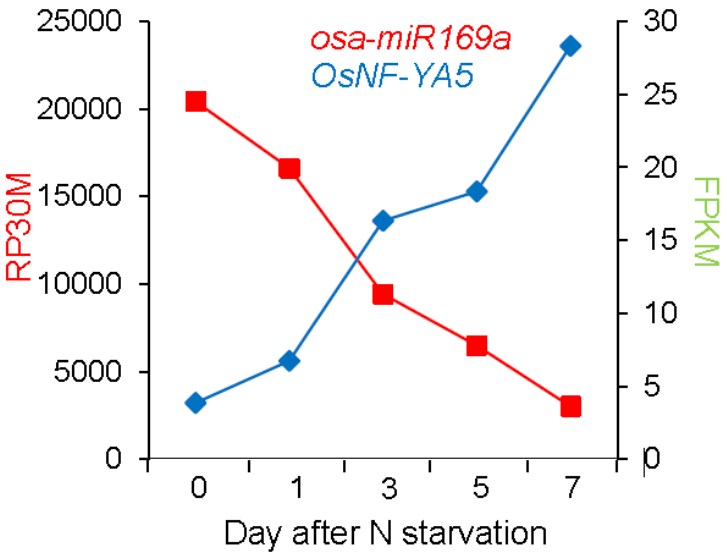

Vegetative stage

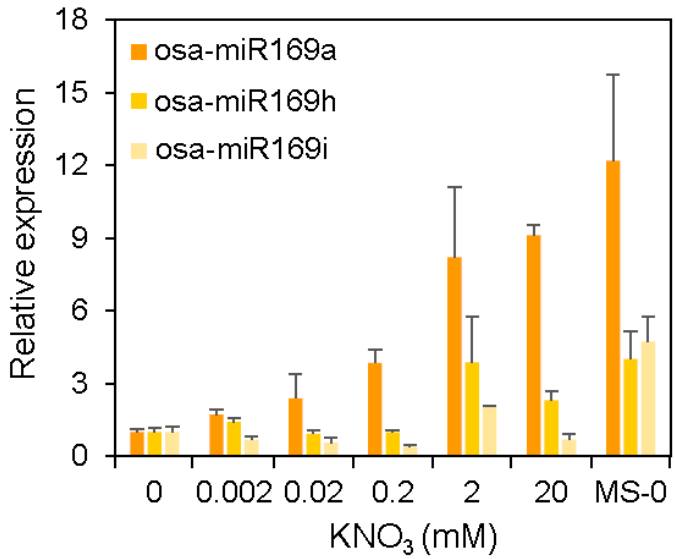
Reproductive stage

**Amino acid composition changes depending on developmental stage**

# Expression pattern of *miR169a*



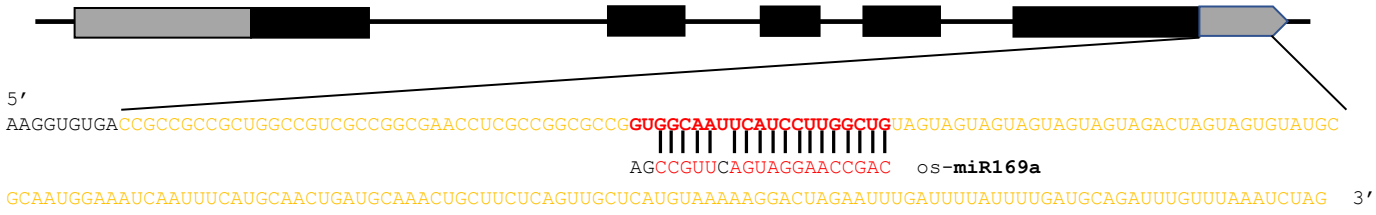



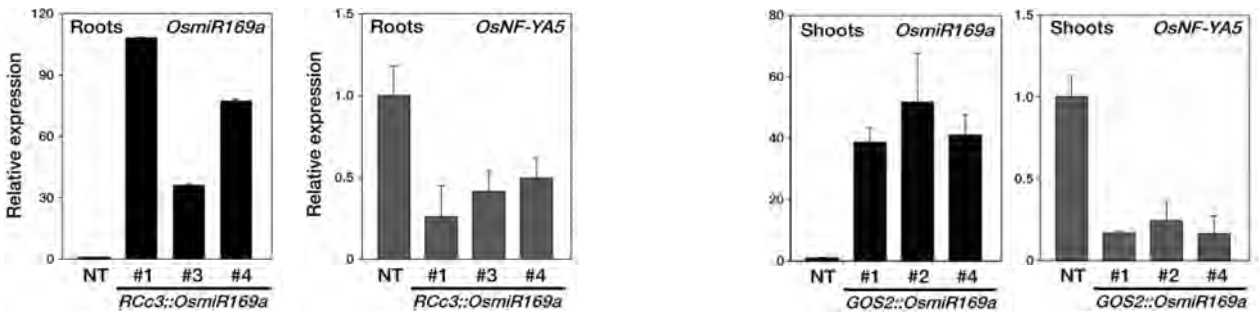






# *OsNF-YA5* is the target of *miR169a*

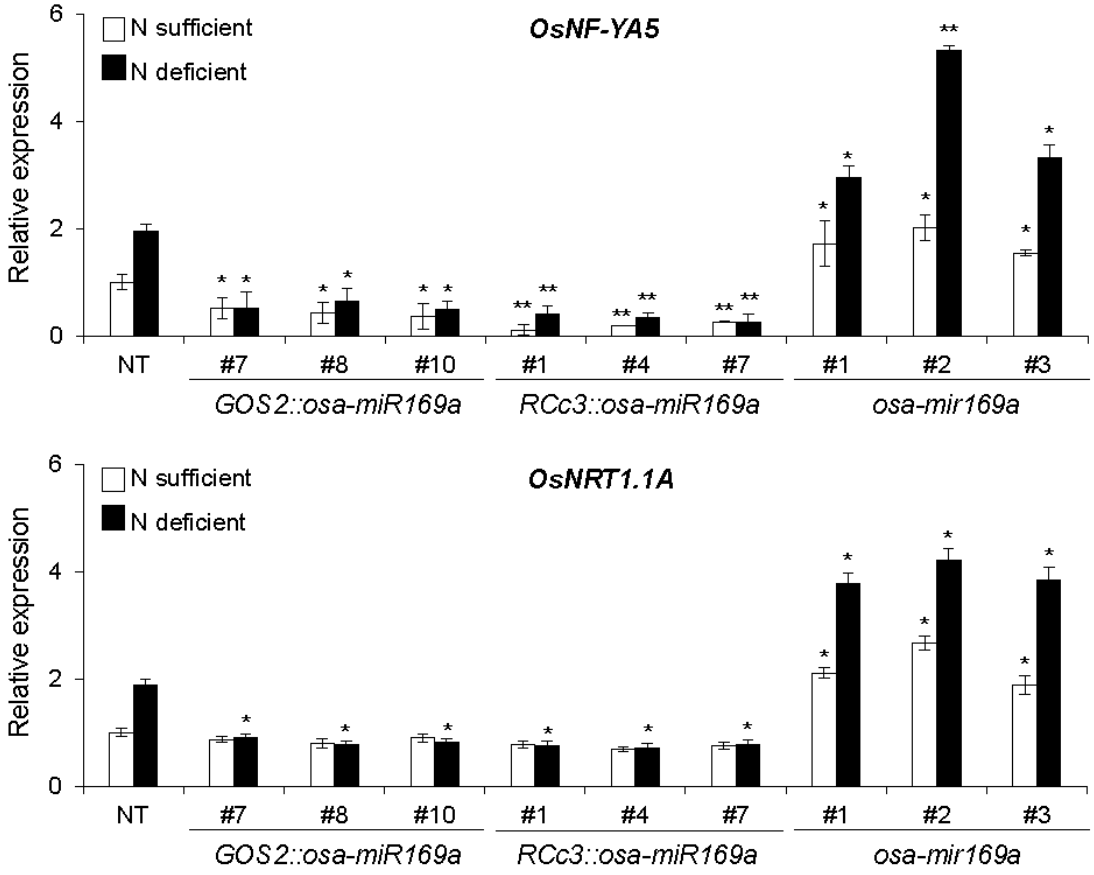
**LOC_Os07g06470.1 (OsNF-YA5)**



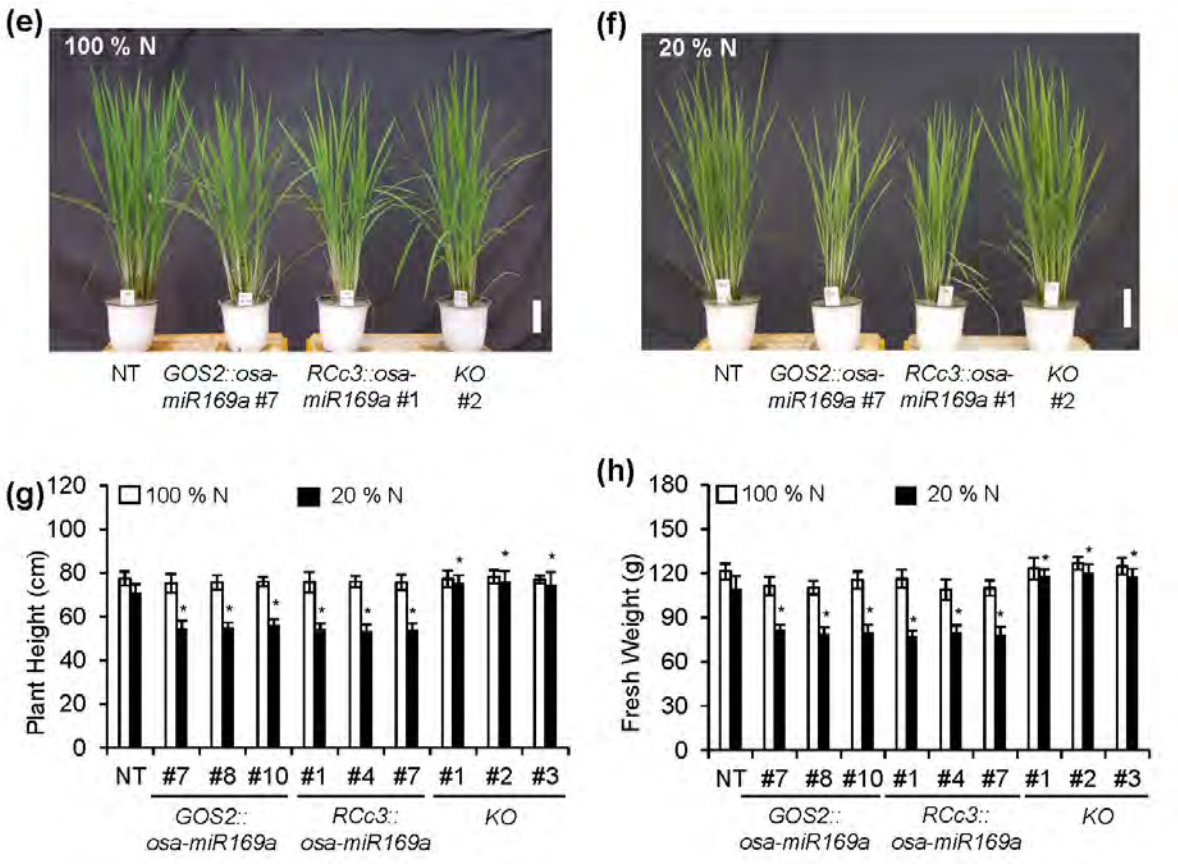

***OsmiR169a* overexpressing transgenic plants**

# Gene expression in osa-miR169 transgenic plants

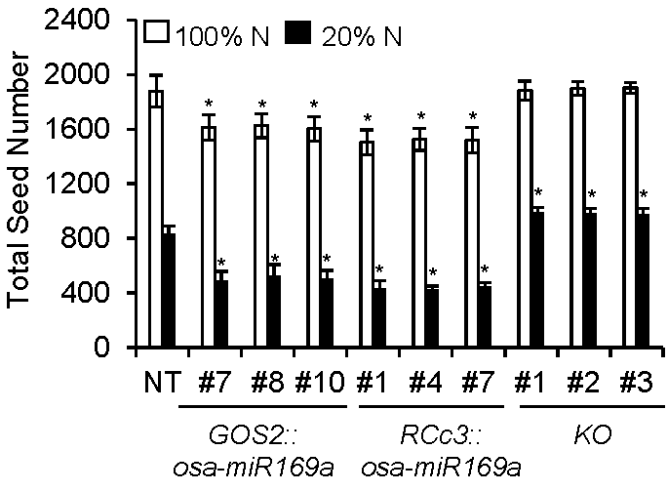


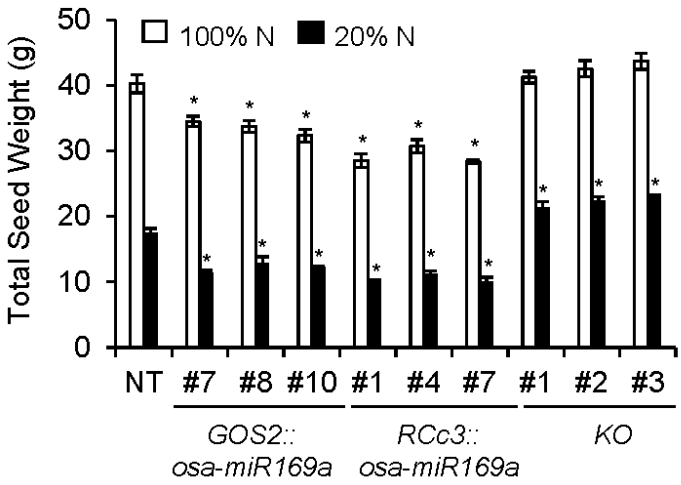



# Phenotype of osa-miR169 transgenic plants



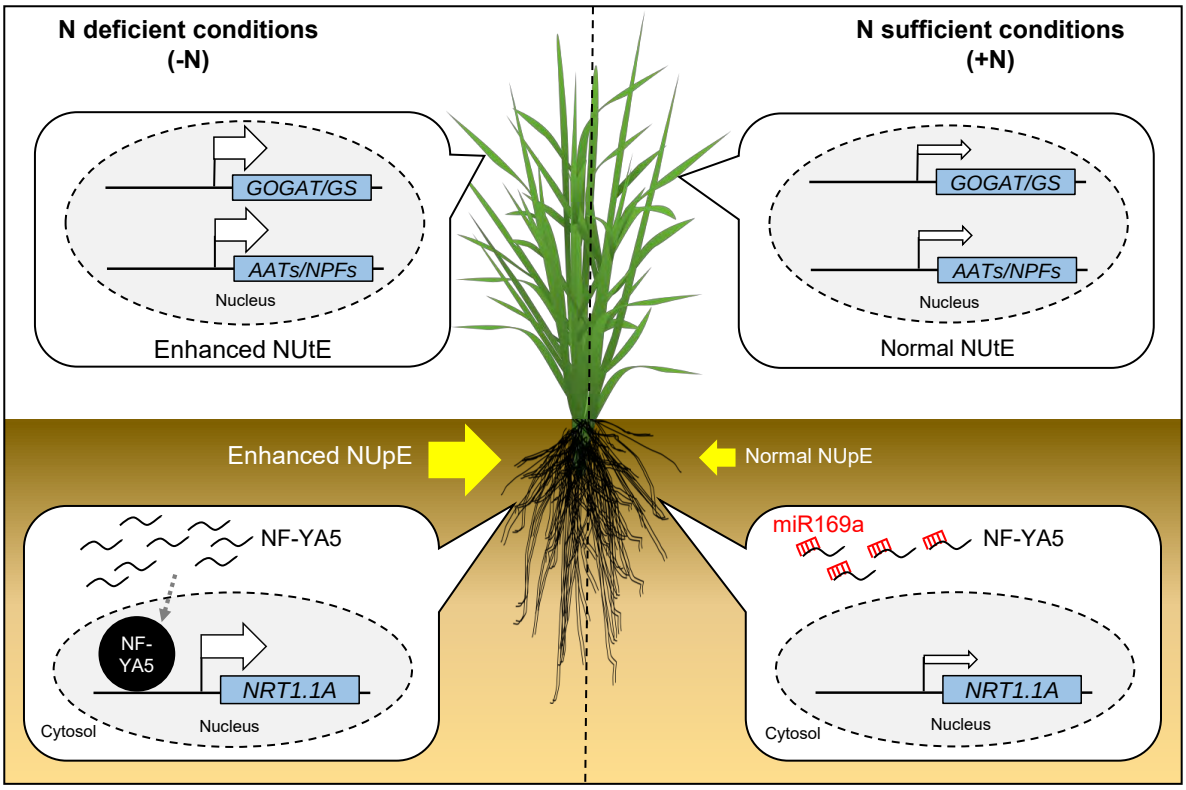
# Agronomic traits of osa-miR169 transgenic plants






# Summary



# Acknowledgement


**Crop biotechnology lab, Seoul National University**

**Prof. Ju-Kon Kim**

Dr. Se-Jun Oh
Dr. Jun Sung Seo

*Graduate Students*

So Yoon Seong
Ho Bin Yoon
Go Eun Kim



**Funding**

농촌진흥청 | ABRC Agricultural Biotechnology Research Center 농업생명공학연구단 | NBTC 신육종기술 실용화사업단 New Breeding Technology Center

# Immunosecurity in Domestic Animals to Maximize Their Health Status

**Prof. Cheol-Heui YUN**

College of Agriculture and Life Sciences, SNU

# Prof. Cheol-Heui YUN

**BRIEF CURRICULUM VITAE**

Professor Cheol-Heui YUN grew up in Gwang-ju, a southwest of Republic of Korea. He was educated at the Chonnam National University for B. Sc. and the Seoul National University for his M. Sc. in Animal Nutrition. He obtained his Ph. D. at the University of Saskatchewan, Canada in the area of immune modulation and mucosal immunology. Then, he pursued his professional career at leading research institutes in different region of the world including International Vaccine Institute (IVI, Korea), USDA and NIH (MD, USA) and Gothenburg University (Sweden) where he undertook research related to stress, vaccine/adjuvant, infection and host protective immunity. He published over 260 SCIE papers to date and has been the recipient of prestigious awards, including Cargill-KAST (Korean Academy of Science and Technology) Bioscience Award (2023), Seoul National University Excellence in Teaching Award (2018), Distinguished teaching award by Kukdam Foundation (2010), and official commendation from the cabinet minister of the Ministry of Science and Technology (2007, 2022). He was invited as a professor at Seoul National University since 2006, and currently serves as editors of a number of societies including Frontiers in Immunology, as an Ethics editor for the science editing, and Korean Journal of Women Health Nursing, and as a co Editor-in-Chief of Animal Bioscience. On the other hand, he is acting as a Chair of Committee on Publication Ethics at the Korean Council of Science Editors (KCSE) and has been a Secretary General of the Council of Asian Science Editors (CASE). He has been selected as a regular member of Korean Academy of Science and Technology in 2023. For scientific researches, Prof. YUN and his team have focused on the action mechanism of protective immune responses against various biological stresses including infection, mucosal immunity, vaccine/adjuvant, and nutritional immunology and immunometabolism.

**EDUCATION & CAREER:**

**2006 - Current:** Professor at *Seoul National University (SNU), Korea*
**2004 - 2006:** Section Chief at *International Vaccine Institute (IVI), Korea*
**2002 - 2004:** Research Scientist at *Gothenburg University, Sweden*
**1999 - 2001:** Post-Doctoral Fellow at *National Institutes of Health (NIH), USA*
**1997 - 1999:** Post-Doctoral Fellow at *U.S. Department of Agriculture (USDA), USA*
**1991 - 1997:** Ph.D. at *University of Saskatchewan, Canada* (Major: *Immunology*)
**1989 - 1991:** M.S. at *Seoul National University* (Major: *Animal Nutrition*)
**1982 - 1989:** B.S. at *Chonnam National University, Korea* (Major: *Animal Science*)

**EDITORIAL & ACADEMIC APPOINTMENTS:**

**2020 - Current:** Co Editor-in-Chief of the *Animal Bioscience*
**2020 - Current:** Ethics Editor of the *science editing*
**2019 - Current:** Associate Editor of the *Frontiers in Immunology*
**2020 - 2022:** Secretary General of *Council of Asian Science Editors*
**2020 - 2022:** Chief of *Biosafety Section, SNU*
**2022 - Current:** Director of *Institutional Animal Care and Use Committee (IACUC), SNU*

KOICA
Korea International Cooperation Agency

The 1st IPB-SNU GreenBio Science Forum
FEB 23, 2023
IPB University, Bogor, Indonesia

# Immunosecurity in domestic animals to maximize their health status

**Cheol-Heui YUN**, Ph.D., Professor

Seoul National University
KOREA

The 1st IPB-SNU GreenBio Science Forum
FEB 23, 2023
IPB University
Bogor, Indonesia

## Contents

The 1st IPB-SNU GreenBio Science Forum

FEB 23, 2023
IPB University
Bogor, Indonesia

# Introduction



# Current issues on animal farming

## Climate changes

Climate change: World now sees twice as many days over 50C

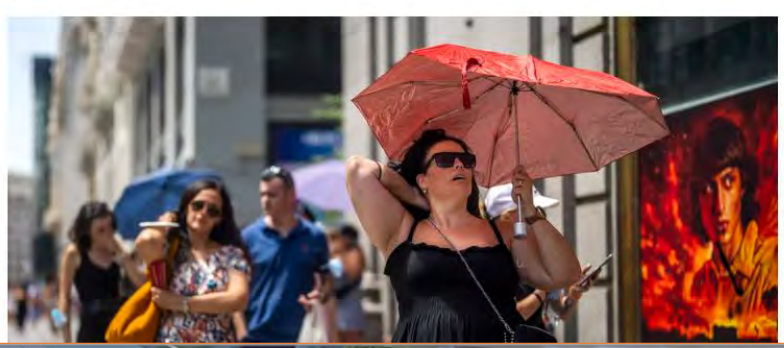
By Becky Dale & Nassos Stylianou

**Europe is burning like it's 2052**

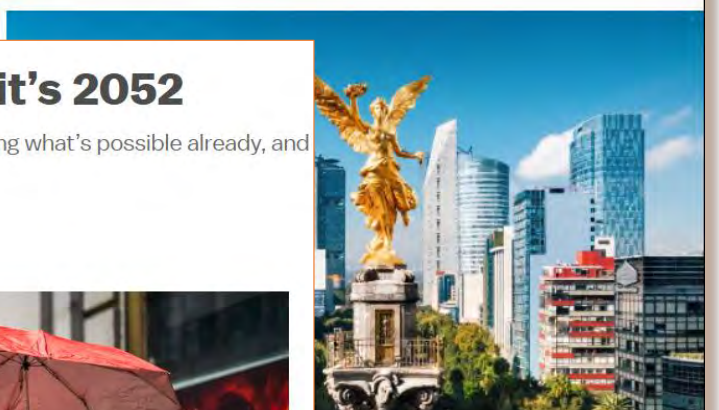
The extraordinary heat wave in Europe is showing what's possible already, and what lies ahead under climate change.

By Umair Irfan | Jul 19, 2022, 3:00pm EDT

SHARE



**Climate change is helping sink Mexico City**



gating changes in rainfall, a enched inequity in water access.

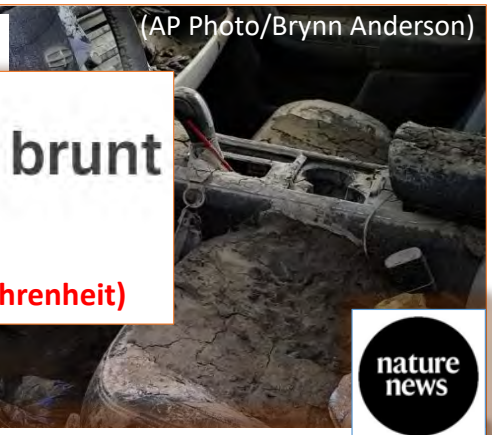
ber 23, 2021]

MIT Technology Review

# Current issues on animal farming

**Climate changes**

Global: Volcanoes in Iceland and Flooding in Kentucky




8 minute read · June 14, 2022 11:04 PM GMT+9 · Last Updated 4 months ago

## In hottest city on Earth, mothers bear brunt of climate change

By Charlotte Greenfield and Gloria Dickie

Jacobabad in **Pakistan hits 51 Celsius (124 Fahrenheit)**

## animal encounters – and boost viral outbreaks

Modelling study is first to project how global warm between species.


nature news

NEWS | 23 May 2022

## Climate change made South Asian heatwave 30 times more likely

Global warming will make record-breaking temperatures in India and Pakistan much more frequent, report finds.



# Current issues on animal farming

**Alternative meats**

World Population to Reach 9.9 Billion by 2050 [7.8 billion in 2020]

Alternative meats to make up 60% market in 2040 [AT Kearney]

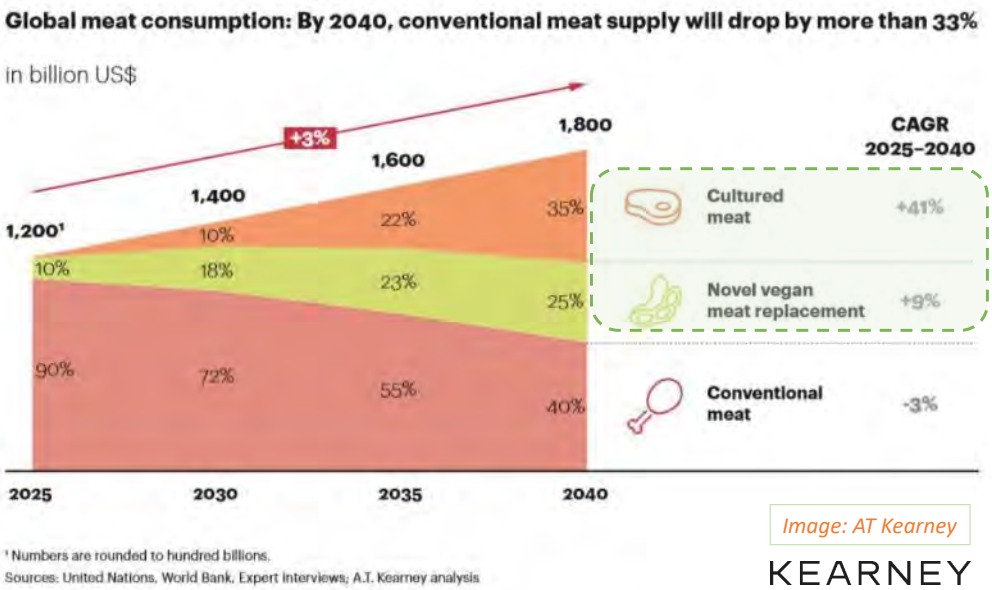



*Image: AT Kearney*

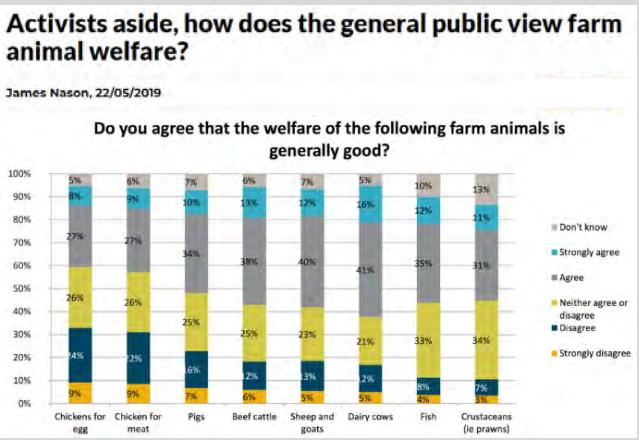
KEARNEY

# Current issues on animal farming

## Animal welfare

**Activists aside, how does the general public view farm animal welfare?**

James Nason, 22/05/2019




**Australia's Shifting Mindset on Farm Animal Welfare** – was commissioned by the Department of Agriculture and Water Resources.

Source : Beef Central (http://beafcentral.com)

**Call for higher animal welfare standards for Parma ham pigs**

By Claire Marshall & Malcolm Prior
BBC Rural Affairs Team

7 July

**Animal welfare campaigners** say it is time supermarkets **stopped selling** premium ham produced by EU farmers **still using methods banned in the UK**.

Source : BBC (https://www.bbc.com/)

**Virginia bans testing cosmetics on animals**

By Kelly McCleary, CNN
Updated 1804 GMT (0204 HKT) March 20, 2021

Virginia Gov. Ralph Northam signed a bill **banning the testing of cosmetics on animals** in his state.

Source : CNN (https://edition.cnn.com)



# Current issues on animal farming

## Food crisis → Market recession

April 5 OPINION

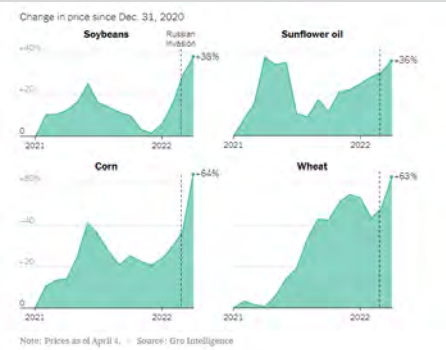
**Putin's War Has Started a Global Food Crisis**

These are the countries that will be most affected by rising food prices.

The New York Times

By Sara Menker and Rajiv Shah

'**Agricultural prices are rising** steeply due to the war between Russia and Ukraine.




Meanwhile, **people in poorer countries**, like Sudan and Afghanistan, **are finding it far more expensive to eat**.

Source : The New York Times (https://www.nytimes.com)

**Ukraine war causes giant leap in global food prices, says UN**

8 April · Comments

The Ukraine war led to a **"giant leap" in food prices** last month to another record high, the UN says.

Source : BBC (https://www.bbc.com/)

**Inflation soars to nearly 80% in Turkey as food prices double**

By Anna Cooban and Isil Sariyuce, CNN Business

Updated 1452 GMT (2252 HKT) July 4, 2022

**Inflation: consumer prices increased by near 80% in Turkey** last month compared to June 2021, driven by the soaring cost of food and drink and transportation.

Source : CNN (https://edition.cnn.com)

# Current issues on animal farming

## Infectious disease threat (pandemic) → Market recession

**World Business Report: The coronavirus hit to food supply chains**

15 May 2020 · Programmes · BBC World Service

Many **meat processing plants are closed** due to coronavirus outbreaks, and Minnesota pig farmer Mike Patterson tells us he has thousands of pigs ready for market, which may end up having to be destroyed.

Source : BBC (https://www.bbc.com/)

**The hunger crisis linked to coronavirus could kill more people than the disease itself, Oxfam warns**

By Francesca Giuliani-Hoffman, CNN

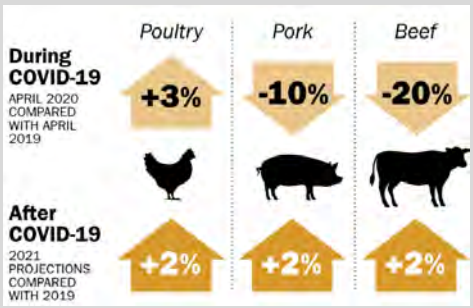
Updated 0407 GMT (1207 HKT) July 12, 2020

World Food Programme data cited by Oxfam estimates that in 2019, **821 million** people were **food insecure** and **149 million** of them suffered **"crisis-level hunger or worse."**

Source : CNN (https://edition.cnn.com)

The Coronavirus Pandemic Has Disrupted Big Agriculture. Here's What That Means for the Planet

The U.S. Department of Agriculture (USDA) estimates that **pork and beef production** in April was **down 10% and 20%**, respectively, compared with a year earlier.




Source: USDA (https://www.usda.gov)



# Current issues on animal farming

## Animal Infectious disease

**Bird flu spreads in Europe and Asia, putting poultry industry on alert**

Story by Reuters

Updated 0054 GMT (0854 HKT) November 16, 2021

**Several outbreaks of severe bird flu in Europe and Asia have been reported** in recent days to the World Organisation for Animal Health (OIE), in a sign the virus is spreading quickly again.

Source : CNN (https://edition.cnn.com)

SCIENCE

**Avian Flu Spread in the U.S. Worries Poultry Industry**

By Andrew Jacobs

Though the risk to humans is low, scientists warn that **outbreaks among farmed birds increase the potential for the virus to mutate and pose a threat to humans**.

Source : The New York Times (https://www.nytimes.com)

**Foot and mouth disease could kill Indonesia tourism**

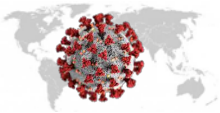
By JOHN MCBETH

JULY 22, 2022

**Outbreak has spread to 23 Indonesian provinces and has sparked calls for border closures with Australia and New Zealand**.

Source: Asia Times (https://asiatimes.com)

# Current issues on animal farming



## Animal Infectious disease

**Bird flu spreads in Europe and Asia, putting poultry industry on alert**

Story by Reuters
Updated 0054 GMT (0854 HKT) November 16, 2021

**Several outbreaks of severe bird flu in Europe and Asia have been reported** in recent days to the World Organisation for Animal Health (OIE), in a sign the virus is spreading quickly again.

Source : CNN (https://edition.cnn.com)

SCIENCE

**Avian Flu Spread in the U.S. Worries Poultry Industry**

By Andrew Jacobs

Though the risk to humans is low, scientists warn that **outbreaks among farmed birds increase the potential for the virus to mutate and pose a threat to humans**.

Source : The New York Times (https://www.nytimes.com)

Saima May Sidik

NEWS EXPLAINER | 21 October 2022

**Why is bird flu so bad right now?**

**The virus is running amok around the world. Possible explanations include an enhanced ability to replicate or infect more bird species.**

**France and the United Kingdom have announced new biosa aimed at curbing the swiftly spreading illness. Dozens of infe South Africa have died recently, and on Wednesday South K first case in six months. In the United States, the disease is d**

Source : Nature News



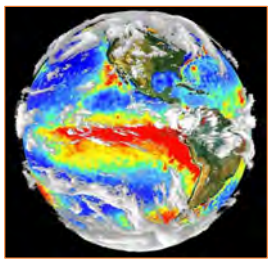
OUTLOOK | 26 October 2022

**Why climate change matters for pandemic preparedness**

**Computational ecologist Xavier Rodó explains how climate modelling might be used to offer an early warning of future disease outbreaks.**

**How does climate affect disease transmission?**

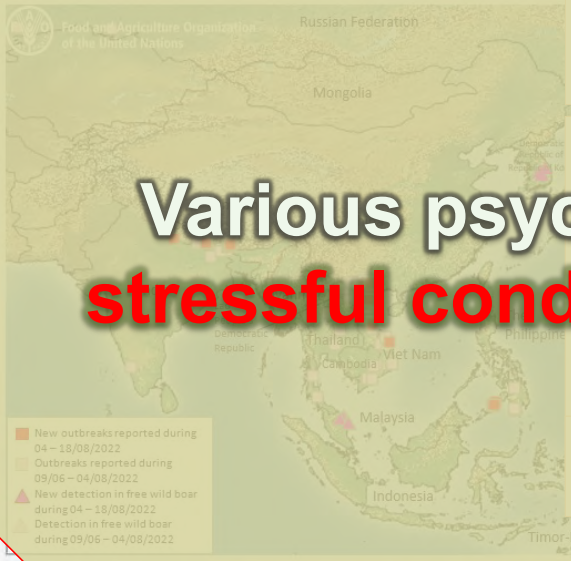
Climate impacts the emergence and spread of disease in myriad ways. Some are quite complex. Climatic conditions can have cascading effects on ecosystems that affect the likelihood of zoonotic spillovers, in which pathogens jump from an animal host to humans. We see, for example, that changes in temperature in the Brazilian Atlantic Forest drive waves of yellow fever in howler monkeys (*Alouatta* species) that precede human epidemics in a predictable manner.



# Current issues on animal farming

Animal Infectious disease

Map 1. *ASF situation in Asia (for the past 10 weeks)*




Source: Viet Nam: WAHIS & media information, Republic of Korea, the Philippines, Indonesia, Timor-Leste: WAHIS and government websites, Other: WAHIS.

**Germany reports first ASF case in farm pigs**

The first cases of African swine fever (ASF) have been confirmed in farm pigs in Germany, the country's federal agriculture ministry said on Friday 16 July.

16 July 2021 · 4 minute read · By: The Pig Site

**Lower Saxony, Germany announces 1st African**

**ASF virus spreads in South Africa, Zambia**

For the first time, African swine fever virus has been detected in South Africa's KwaZulu-Natal province.

**Various psychological and physical stressful conditions on animal farming**



# Stress and stressor

**What is STRESS?**

✓ A response to a stressor.

- A root of stress.
- An agent, condition, environments *etc.*

✓ Can be negative/positive motif to organisms.

✓ Have an impact on mental and physical well-being.

# Stress and stressor

## Positive impact

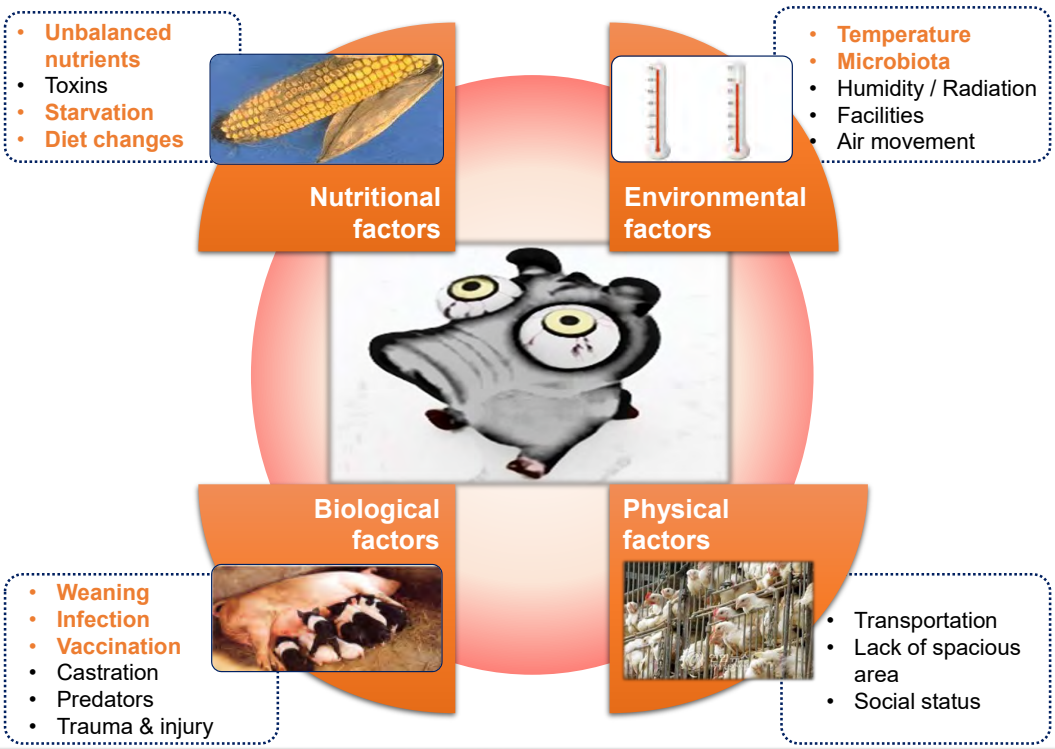
| Physical Improvement | Mental Improvement | Emotional Improvement |
|---|---|---|
| **Energy** | **Motivation** | **Relationships** |
| **Stamina** | Intellect | **Control of life** |
| **Body function** | Goal orientation | Experience emotions |
| Able to do anything | Creativity | Mood |

## Negative impact

| Physical effects | Emotional effects | Mental effects |
|---|---|---|
| **High blood pressure** | **Irritability** | **Poor memory** |
| **Heart disease** | **Mood swings** | **Unable to concentrate** |
| **Ulcers** | **Sleeping problem** | **Depression** |
| **Flushed face** | **Over(under)weight** | Low self esteem |
| **Rapid breathing** | Substance abuse | Unable to make decisions |
| **Dry mouth** | Ineffective use of time | |
| Migraines | | |

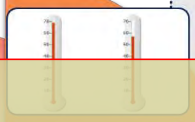


# Stressors in domestic animals



# Stressors and productivity

- Unbalanced nutrients
- **Toxins**
- **Starvation**
- Diet changes



- **Temperature**
- **Microbiota**
- Humidity / Radiation
- Facilities
- Air movement

Environmental factors

Biological factors

Physical factors

Immune reaction

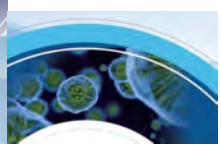
Productivity

- Weaning
- Infection
- Vaccination
- Castration
- Predators
- Trauma & injury

- Transportation
- Lack of spacious area
- Social status

**For better productivity, stressor-mediated microbial change and immune system should be carefully examined in domestic animals !**





The 1st IPB-SNU GreenBio Science Forum

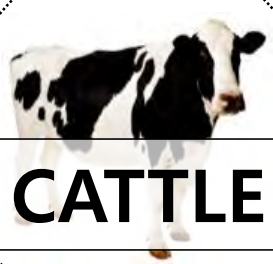
FEB 23, 2023
IPB University
Bogor, Indonesia

KOICA
Korea International Cooperation Agency

# Major issues in domestic animals

CHICKEN

PIG



CATTLE

# Major issues
# in domestic animal (industry)

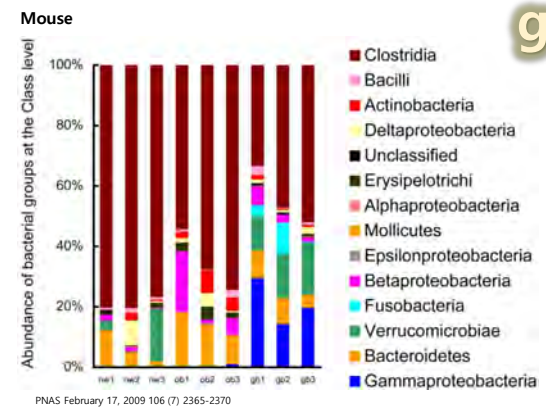
1. Gut microbiota and productivity
2. Antibiotics and antibiotics replacement
3. Anti-inflammatory reagents
4. Pro(pre, syn, post)biotics
5. Vaccine



## 1. Gut microbiota and productivity

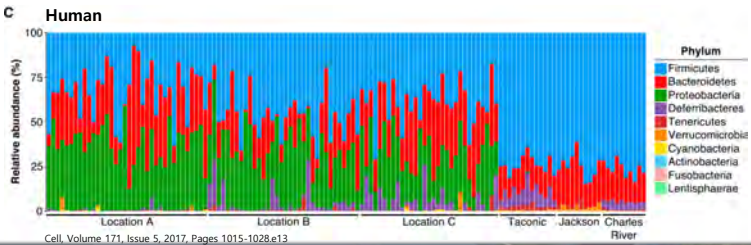
### What do we know?

Composition of gut microbiota

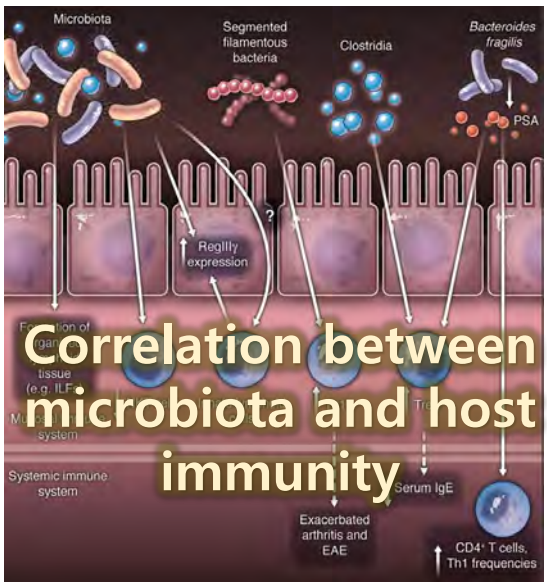



PNAS February 17, 2009 106 (7) 2365-2370

MOUSE /HUMAN

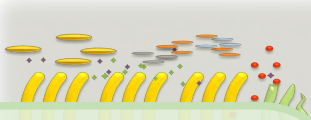



Cell, Volume 171, Issue 5, 2017, Pages 1015-1028.e13




Science. 2012 Jun 8;336(6086):1268-73

# 1. Gut microbiota and productivity



**Understanding on correlation between microbiota – metabolites – host immune system and its underlined mechanism is still lacking**


Scientific reports. 8, 5985 (2018)




# 2. Antibiotics and antibiotics replacement

## Current situation

Concern about **antibiotic use as feed additive**

Actively looking for **antibiotic replacement**

# 2-1. Alternatives to antibiotics for growth promotion

- In-feed enzymes
- Probiotics/Prebiotics/Synbiotics/postbiotics
- Antimicrobial peptides
- Organic acids
- Acidifiers
- Plant extracts
- Neutraceuticals

Further information: PEW
https://www.pewtrusts.org/en/topics/antibiotics
Mohamed E.Abd El-Hack *et al.*, Journal of Poultry Science (2022)



# 2-2. Alternatives to antibiotics for disease prevention

- Vaccines: **prevention** > treatment
- Immune modulators
- Bacteriophages, endolysins, hydrolases
- Other disease prevention alternatives
- **Sanitation**
  - ✓ Farm management
  - ✓ Biosecurity program

Further information:
https://www.pewtrusts.org/en/topics/antibiotics
https://www.healthforanimals.org/roadmap/

## Issues and prospecting

✓ Antibiotic residues

✓ Do we know why?

**In need of the study on:**

- Mode of action mechanism

**Relationship among Antibiotics - Nutrition - Microbiota - Immune responses**



## 3. Anti-inflammatory reagents

- **Human *vs.* domestic animals**
  - ✓ Not the same (cancer, autoimmune diseases *etc.*)
- Think when domestic animals get benefits from anti-inflammatory response?
  - ✓ Inflammatory-related cells and molecules *vs.* growth performance
- Remember, inflammatory responses are NOT ALWAYS bad: fighting against disease and after the vaccination !!

# 4. Pro(pre, syn, post)biotics

- About microbiota and host
  - ✓ Interaction between microbiota and host immune system
  - ✓ Diets and their metabolites
- Each (case) has different role
  - ✓ Diet effect *vs.* growth promoter *vs.* host protection
  - ✓ Microenvironmental milieu



# 4. Pro(pre, syn, post)biotics

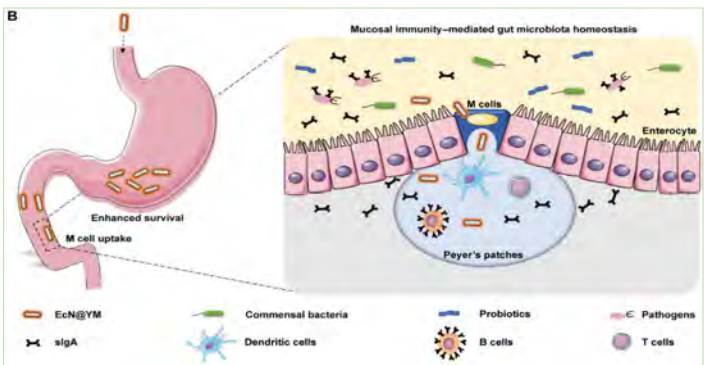
**Probiotics: known to boost intestinal immune responses**

ScienceAdvances

RESEARCH ARTICLE | LIFE SCIENCES

**Mucosal immunity–mediated modulation of the gut microbiome by oral delivery of probiotics into Peyer's patches**

SISI LIN, SUBHAJIT MUKHERJEE, JUANJUAN LI, WEILIANG HOU, CHAO PAN, AND JINYAO LIU Authors Info & Affiliations




[**SCIENCE ADVANCES** Vol 7, Issue 20, 12 May 2021]

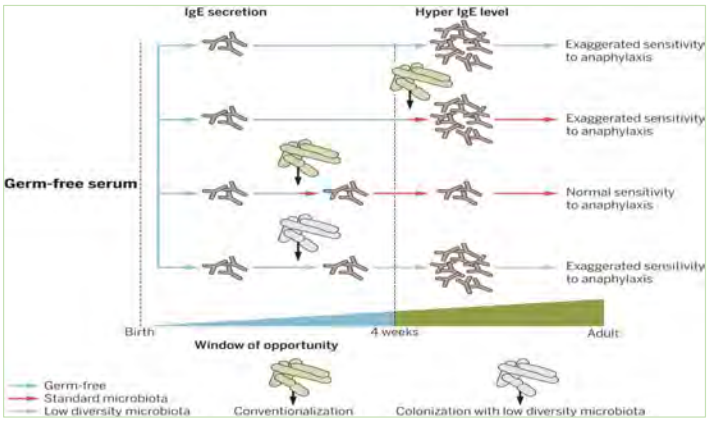
Science

SPECIAL ISSUE REVIEW

**How colonization by microbiota in early life shapes the immune system**

THOMAS GENSOLLEN, SHANKAR S. IYER, DENNIS L. KASPER, AND RICHARD S. BLUMBERG Authors Info & Affiliations

SCIENCE · 29 Apr 2016 · Vol 352, Issue 6285 · pp. 539-544 · DOI: 10.1126/science.aad9378




[**SCIENCE**, Vol 352, Issue 6285, 29 Apr 2016]

# 4. Pro(pre, syn, post)biotics

**Probiotics: known to boost intestinal immune responses**

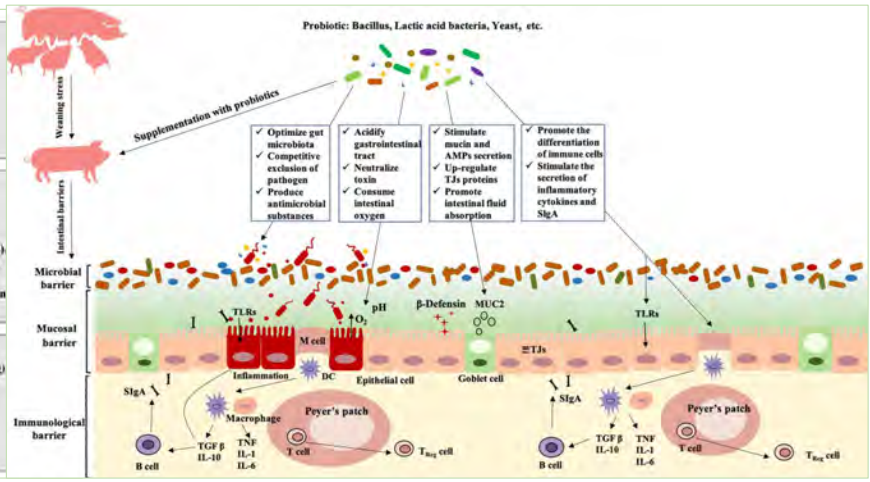
The role of probiotics, prebiotics and synbiotics in animal nutrition

Paulina Markowiak & Katarzyna Śliżewska

*Gut Pathogens* **10**, Article number: 21 (2018) | Cite this article

The Role of Probiotics in Alleviating Postweaning Diarrhea in Piglets From the Perspective of Intestinal Barriers

Weifa Su, Tao Gong, Zipeng Jiang, Zeqing Lu and Yizhen Wang


[Gut Pathogens, 10, 06 June 2018]

[Front. Cell. Infect. Microbiol., 30 May 2022]



# 5. Vaccine

- Traditional *vs.* modern
  - ✓ Whole microbes [attenuated] *vs.* nucleotide (DNA and mRNA), vector, sub-unit, conjugated, or synthetic, virus-like particles (VLP), recombinant nanoparticles
- Adjuvant evolution
  - ✓ New perspectives on its recognition and protective role
- Need for mucosal vaccines/adjuvants

# Domestic animal immunology: why?

## Immune system in human and animals is NOT the SAME

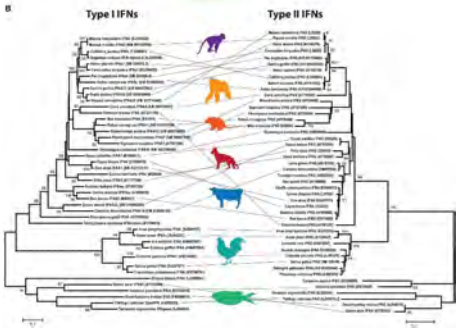
## So as among different animal species

Comparative Biology of γδ T Cell Function in Humans, Mice, and Domestic Animals

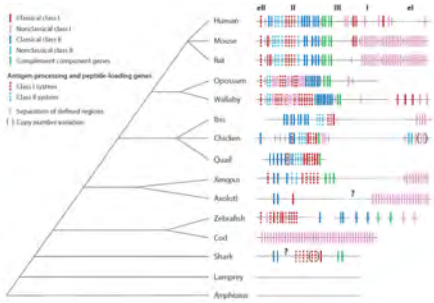
Jeff Holderness, Jodi F. Hedges, Andrew Ramstead, and Mark A. Jutila

| Segment | αβ TCR α chain | αβ TCR β chain | γδ TCR γ chain | γδ TCR δ chain |
|---|---|---|---|---|
| Human (12) | | | | |
| V | 50 | 57 | 14 | 5 |
| D | 0 | 2 | 0 | 3 |
| J | 70 | 13 | 5 | 3 |
| Chicken (5, 153, 154) | | | | |
| V | 20 | 3 | 26 | 20–30 |
| D | 0 | 1 | 0 | 2 |
| J | 1 | 4 | 3 | 2 |
| Bovine (13, 135–137) | | | | |
| V | 20 | 22 | 11 | 50 |
| D | 0 | 3 | 0 | 5 |
| J | 3 | 3 | 8 | 3 |

[Annu. Rev. Anim. Biosci. 2013. 1: 99-124]



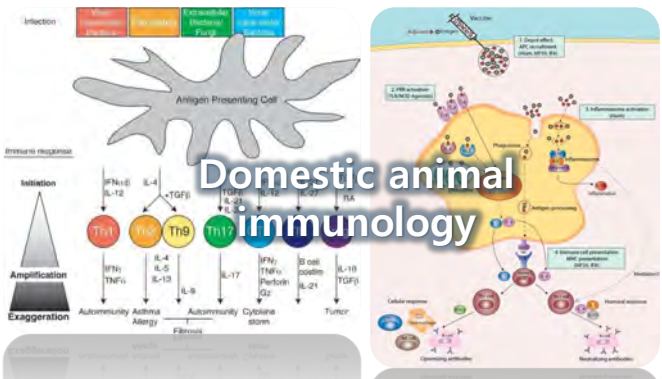

[Front Immunol. 2017. 8: 49]

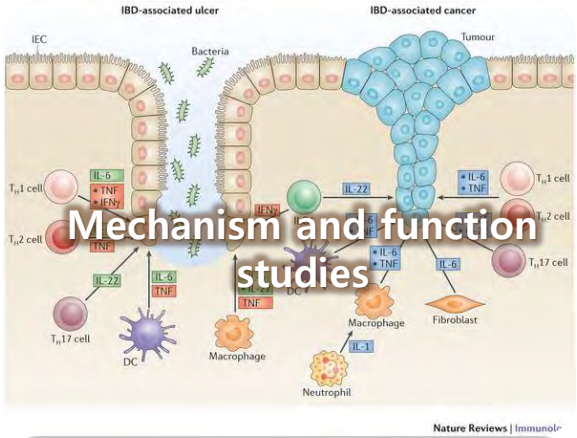


[Annu. Rev. Immunol. 2018. 36: 383-409]



# Domestic animal immunology: why?




- To improve our understanding on healthy status
- Discover the way to protect host and to prevent diseases
- Development of mechanism-based products including antibiotic replacement and vaccine

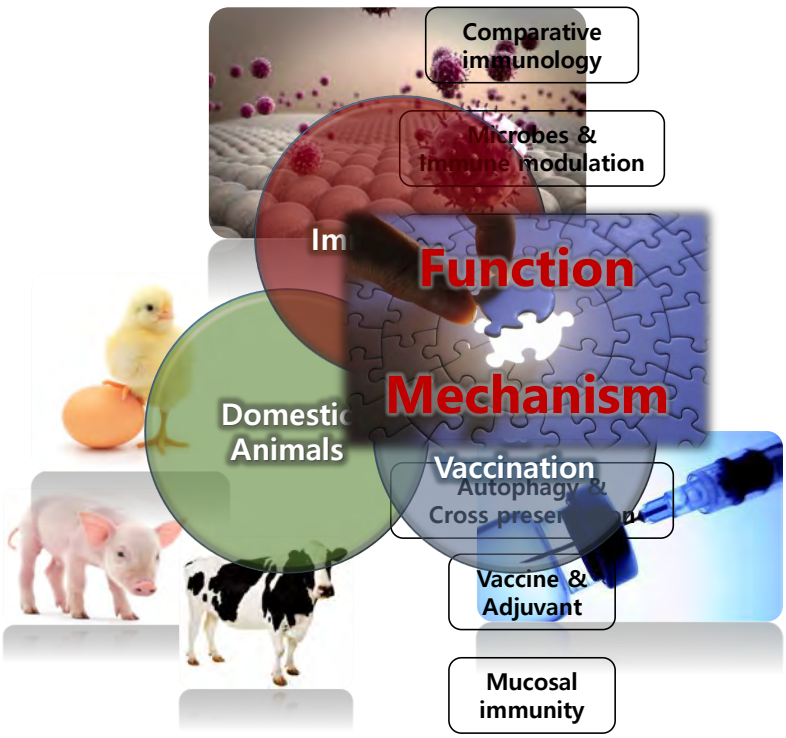
***Enhanced (high valued) productivity of domestic animals***

The 1st IPB-SNU GreenBio Science Forum

FEB 23, 2023
IPB University
Bogor, Indonesia

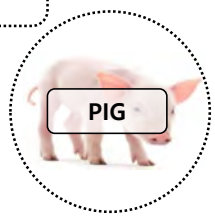
# How to achieve: strategic approaches

## At Lab of Animal Immunology (AI)

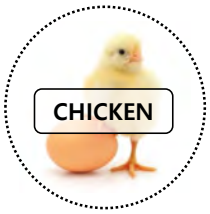


# What we have done and do ...

**Domestic Animals (since 2011)**




- Bacteriophages as an alternative to antibiotics for livestock (**Scientific Reports**, 2022)
- Immune privilege in uterus during pregnancy (**Biology of Reproduction**, 2020)
- New model for porcine intestinal epithelial cells (**Toxicology Letters**, 2019)
- Autophagy restricts PEDV (**Antiviral Research**, 2017)
- Barrier protection in intestinal epithelial cells (**Veterinary Research**, 2016)




- Immunomodulants for chicken industry (**Animal Bioscience**, 2021)
- *Bacillus subtilis* spore as adjuvant for H9N2 vaccination (**Vet Research**, 2020)
- Characteristics of splenic monocyte/macrophage (**Vet Research**, 2020)
- B cell development in bursa (**Scientific Reports**, 2018)
- Microbiota and Immune modulation (**Scientific Reports**, 2018)
- Vaccination efficacy (**Poultry Science**, 2016)


- Transportation stress (**Anim Sci J**, 2016)
- Stress and acute phase proteins (**Anim Prod Sci**, 2014)
- Stress regulation (**J Dairy Sci**, 2012; **Anim Sci J**, 2011)
- Weaning and vaccination (**Animal**, 2011; **J Vet Sci**, 2011)

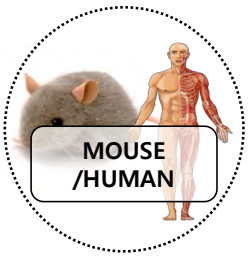


# What we have done and do ...

**Basic science (since 2011)**

**Immune regulation at cellular and molecular level**

- Type 1 interferon in the memory T cell development (**Nature Communications**, 2021)
- Role of STAT1 to maintain the naïve T cell quiescence (**Science Advances**, 2021)
- Role of KLF10 in IL-17 producing γδ T cells (**Frontiers in Immunology**, 2018)




**Vaccine, adjuvant, nutritional immunology**

- Essential cues of engineered polymeric materials regulating gene transfer pathways (**Progress in Materials Science**, 2022)
- Infection, short-term fasting, and immune modulation (**Immune Network**, 2022, 2021)
- Novel vaccine development: route, adjuvant, bioparticles (**Acta Biomaterialia**, 2019, 2014)
- Polymer-based drug delivery system (**Biomaterials**, 2016, 2014)

**Mucosal immunology**

- Probiotic mixture regulates galectin-9 to ameliorate atopic dermatitis (**Frontiers in Immunology**, 2020)
- Protective bioparticle against respiratory infection (**Frontiers in Microbiology**, 2019)
- Probiotic mixture regulates T cell balance (**Frontiers in Microbiology**, 2018)

# Key questions to ask .. .. ..

I. Basic researches on immune system
II. Gut barrier function and regulation
III. Host - microbiota interaction
IV. Infection and protective immunity



# I. Basic researches on immune system

*Why basic immunology research is so important ?*

**It is crucial to set the strategies when it comes to improve health status of animals and humans**

*Thus, we have carried out the experiments using various animal models ..*

- ✓ **Domestic animals**
- ✓ **Mouse**

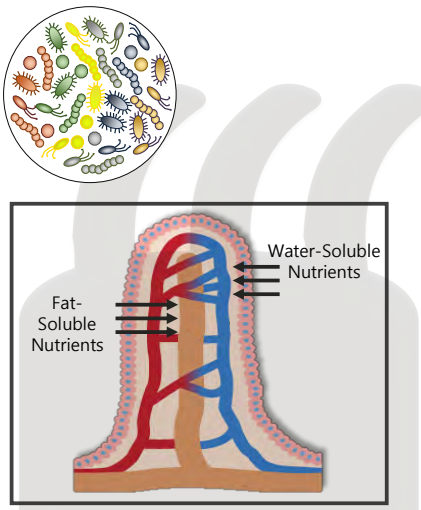
# I. Basic researches on immune system

1. Researches on function and mechanism of subset of immune cells, [rather than reporting simple change of phenomena], are still lacking in domestic animals.

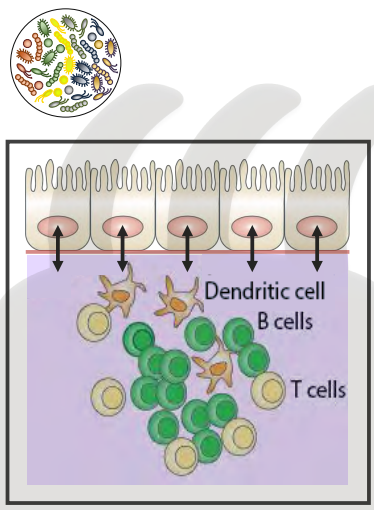
2. Functional differences on immune responses among animals (mouse and domestic animals) together with the application in the field should be considered.



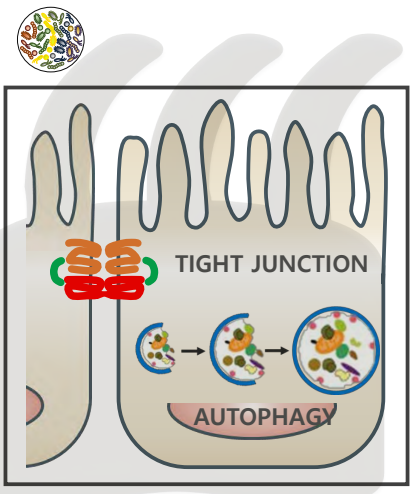
# II. Gut barrier function and regulation




Digestion and absorption of nutrients




Crosstalk between microbiota-epithelial cells; epithelium and immune cells




Protection against pathogen

# II. Gut barrier function and regulation

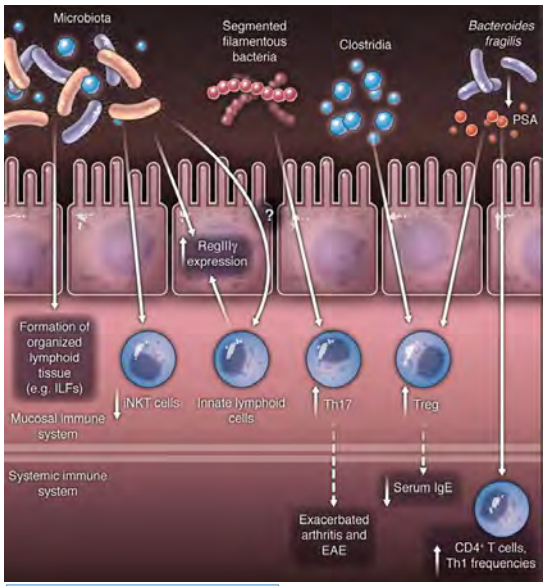
1. **Gut physiology and mucosal immunity** orchestrate to play an important role against **pathogen invasion and disease resistance** in domestic animals.

2. We are in need for **development of various sophisticate and biomimetic technologies** in domestic animals that comparable to mouse and human.

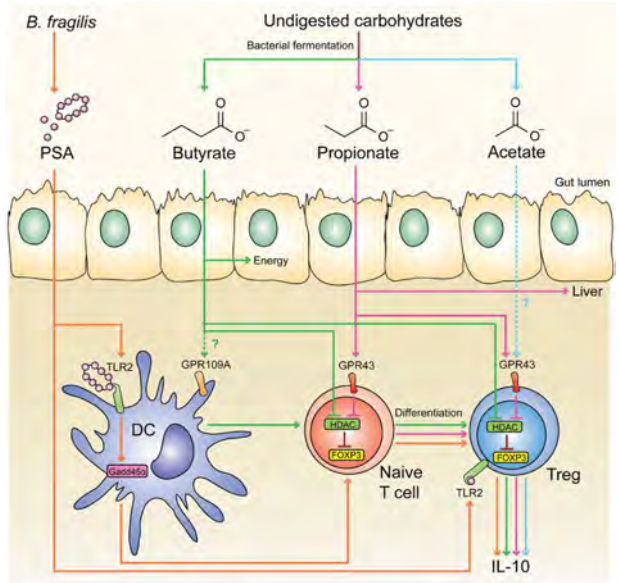


# III. Host - microbiota interaction

**Gut microbiota and microbial-derived molecules promote regulatory function of gut immunity**




Science. 2012 Jun 8;336(6086):1268-73




Front Immunol. 2015. 6: 61

## III. Host - microbiota interaction

1. The regulation of **nutrient-microbiota-metabolites** is seemingly important for **homeostasis of host immune responses**.

2. In need of further studies on relationship among **[nutrition - microbiota – metabolites - immune responses]** in domestic animals.



## IV. Infection and protective immunity

**Model: Chicken, Pig, Mouse**


- Salmonella vaccine and dysbiosis in chicken
- PRRSV infection in pig
- LCMV infection in mouse
- RSV vaccine and Pneumococcal vaccine [for human] in mouse

# IV. Infection and protective immunity

We need to do more researches on .. ..

1. the relationship between pathogens and immune cells in domestic animals.
2. the mechanism for protective immunity to fight against [newly emerging] infectious diseases.



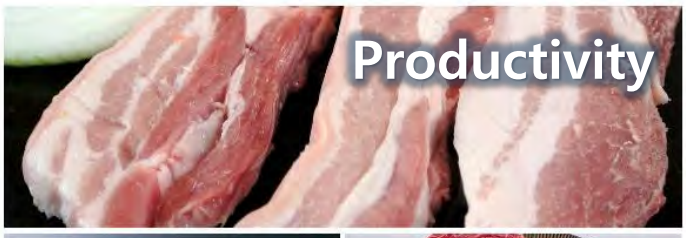
The 1st IPB-SNU GreenBio Science Forum

FEB 23, 2023
IPB University
Bogor, Indonesia

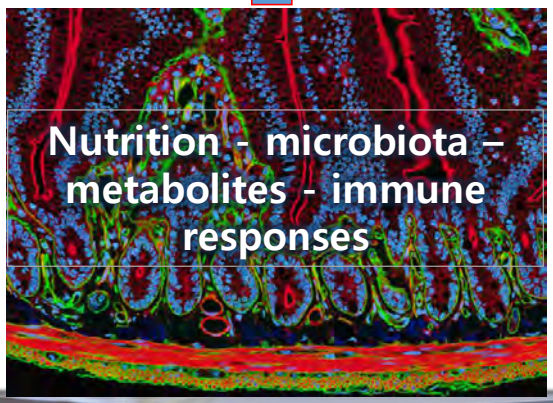
KOICA
Korea International Cooperation Agency

## Conclusion







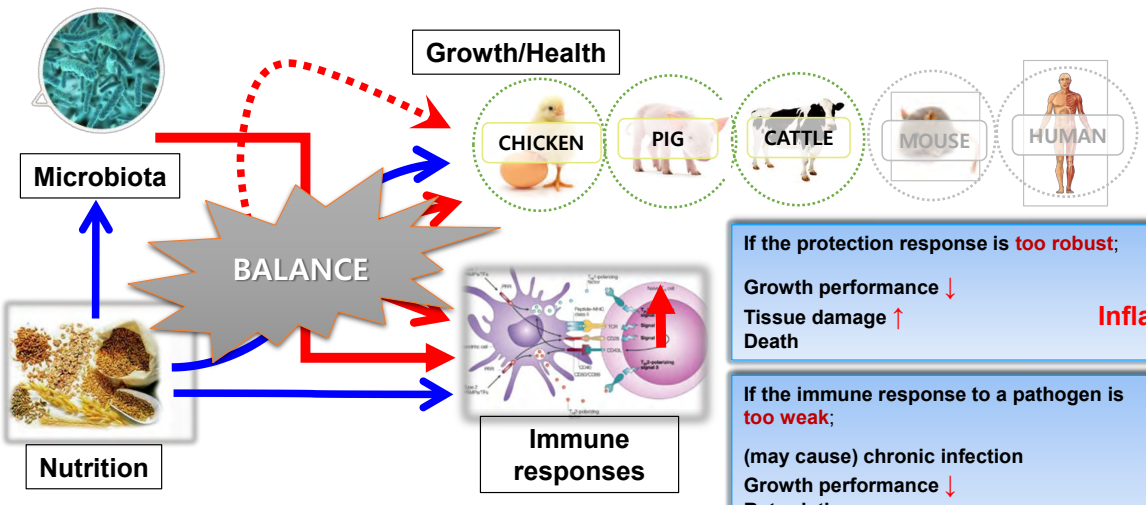



# Conclusion

**Immunosecurity:** how to strengthen the impact of productivity in domestic animals?

**BALANCE** is the key:

**Nutrition – Microbiota – Metabolites – Immune response**



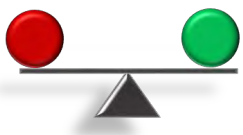

If the protection response is too robust;

Growth performance ↓
Tissue damage ↑
Death

Inflammation *VS.* Immune tolerance

If the immune response to a pathogen is too weak;

(may cause) chronic infection
Growth performance ↓
Retardation
Long-term economic loss



# What should we do : WORK together !

- Follow the regulation
- Sanitation
- Vaccination
- Animal welfare

Farm (field)

Company

National

TOGETHER

- Policy/regulation
- Long-term plan
- Monitoring
- Support

Univ. and Res

- Study and Resear focusing on mechanism and function (SCIENCE)

Collaboration

International



# Laboratory of Immunology and Vaccine Development


Prof. Seung Hyun HAN
Prof. Chong-Su CHO
Prof. Tae Sub PARK
Prof. Byung-Chul PARK

Prof. Hakhyun KA

Prof. Jaeho CHO

AARHUS UNIVERSITY Prof. Tina Dalgaard

Prof. Thomas Göbel
Prof. Bernd Kaspers

Prof. Benjamin Schusser

Prof. Diana Boraschi
Prof. Aldo Tagliabue

NC STATE UNIVERSITY Prof. Sung Woo KIM

TOHOKU UNIVERSITY Prof. Sang-gun ROH

**Sanofi Pasteur**
Dr. Jannatul Firdous
Dr. Mohammad Ariful Islam

**NIH**
Dr. Girak Kim

**Harvard Medical School**
Dr. Yoon-Chul Kye
Dr. Young-jun Ju

**IVI**
Dr. Byoung-Shik Shim

**CJ Bio**
Dr. Eileen Han
Dr. Han wool Kim
Dr. Minjeong Gu

**Chung-Ang Univ.**
Prof. Young Min Son

**The 1st IPB-SNU GreenBio Science Forum**

FEB 23, 2023
IPB University
Bogor, Indonesia

*"**Real integrity** is doing the right thing, knowing that nobody's going to know whether you did it or not." – Oprah Winfrey*


Thank YOU;

Cheol-Heui YUN, cyun@snu.ac.kr

# Veterinary Talent Cultivation in Seoul National University

**Prof. Kangmoon SEO**

College of Veterinary Medicine, SNU

# Prof. Kangmoon SEO

**BRIEF CURRICULUM VITAE**

Dr. Kangmoon Seo is a professor at the Seoul National University (SNU), a former dean of College of Veterinary Medicine-SNU, a former director of Veterinary Medical Teaching Hospital-SNU, a former president of Asian Society of Veterinary Ophthalmology (AiSVO)/Asian College of Veterinary Ophthalmologists (AiCVO), and a former president of International Society of Veterinary Ophthalmology (ISVO). Upon his graduation in 1986, he got MS in 1988 and PhD in 1995 in SNU and travelled to Royal Veterinary College, London University as a post-doc fellow for 6 months to learn advanced veterinary ophthalmology. He joined the faculty at the Kangwon National University in 1997 and returned to SNU in 2002 as an assistant professor in veterinary ophthalmology. He founded AiSVO in Asia with Drs Lin (Taiwan) and Saito (Japan) in 2011. He obtained a founder diplomate of AiCVO in 2011. He also travelled Iowa state university (2005) and university of Wisconsin (2009-2010) to extended his knowledge of veterinary ophthalmology as a visiting scholar. He developed interests in the tear staining syndrome, medial canthoplasty, glaucoma treatment, cataract surgery and the other practical therapy. He has been winners of numerous Teacher of the Year awards due to his deep interests for student education. He has published more than 200 peer-reviewed domestic and international papers including SCI(E)-indexed.

**EDUCATION & CAREER:**

**2002 - Current:** Professor at *Seoul National University (SNU), Korea*

**1997 - 2002:** Professor at *Kangwon National University, Korea*

**1992 - 1995:** Ph.D. at *Seoul National University* (Major: *Veterinary Ophthalmology)*

**1982 - 1988:** B.S./M.S. at *Seoul National University* (Major: *Veterinary Medicine)*

**EDITORIAL & ACADEMIC APPOINTMENTS:**

**2022 - Current:** President of *Korean Council for Veterinary Education*

**2022 - Current:** President of *Korean Association of Veterinary Clinical Education*

**2017 - 2019:** President of *International Society of Veterinary Ophthalmology*

**2011 - 2015:** President of *Asian Society of Veterinary Ophthalmology*

**2013 - 2017:** Director of *Veterinary Medical Teaching Hospital, SNU*

**2019 - 2021:** Dean of *College of Veterinary Medicine, SNU*

# Veterinary Talent Cultivation in Seoul National University


Kangmoon Seo
DVM, MS, PhD, Dipl AiCVO
College of Veterianry Medicine
Seoul National University

## Contents

Present — Veterinary Medical Education in SNU-CVM

Future — Curriculum Reform: Challenges and Progress

Research — Veterianry Ophthalmolgy Research

# Mission

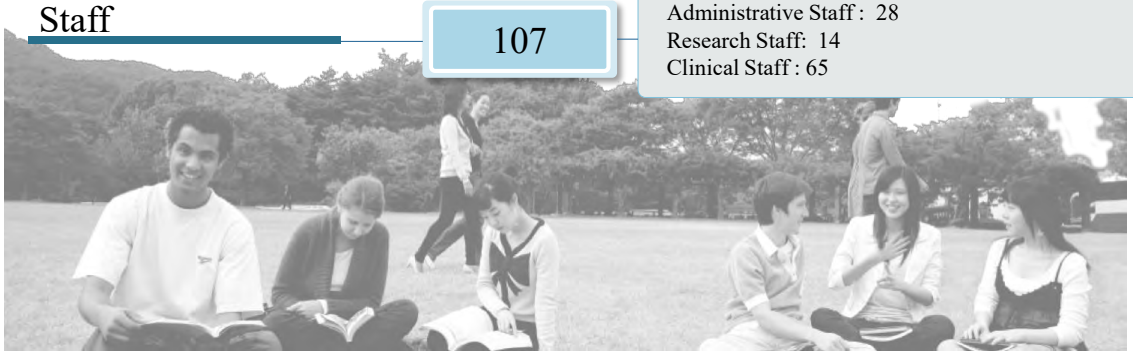
- To promote and protect animal and human health
- To conserve the environment
- To improve the animal and human welfare

# Brief History

| | |
|---|---|
| 1947.09.10 | Established Veterinary Program in SNU, Yeon-gun campus, Seoul |
| 1954.02.10 | Opened SNU CVM Veterinary Medical Teaching Hospital |
| 1962.03.01 | Relocated to Suwon campus |
| 1998.03.01 | Restarted 6-year DVM program |
| 2003.02.12 | Relocated to Gwanak-campus, Seoul |
| 2014.05.31 | AVMA COE Consultative Site Visit |
| 2017.09.15 | The 70th year anniversary |
| 2019.04.15 | Accredited by AVMA COE |

# Organization

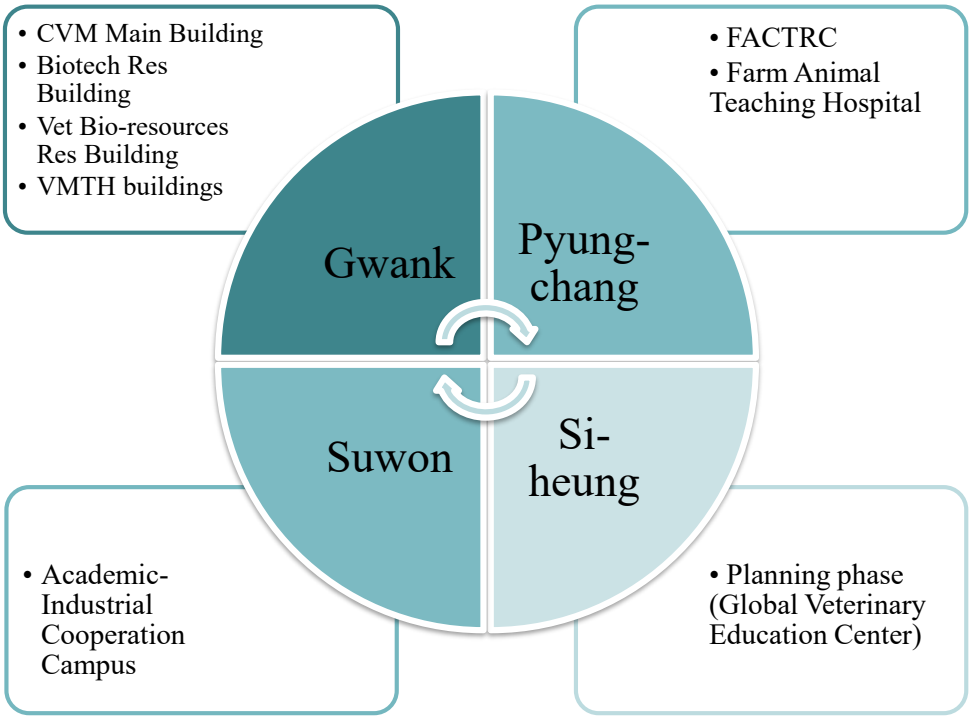
| | | |
|---|---|---|
| Students | 463 | Undergraduate 283 (2-year pre-vet 106)<br>(4- year DVM 177)<br>Graduate 180 (Master Course 129)<br>(Ph. D. Course 51) |
| Faculty | 66 | Full Professors: 32<br>Associate Professors: 11<br>Assistant Professors : 2<br>Non-tenure track faculty: 21 |
| Staff | 107 | Administrative Staff : 28<br>Research Staff: 14<br>Clinical Staff : 65 |



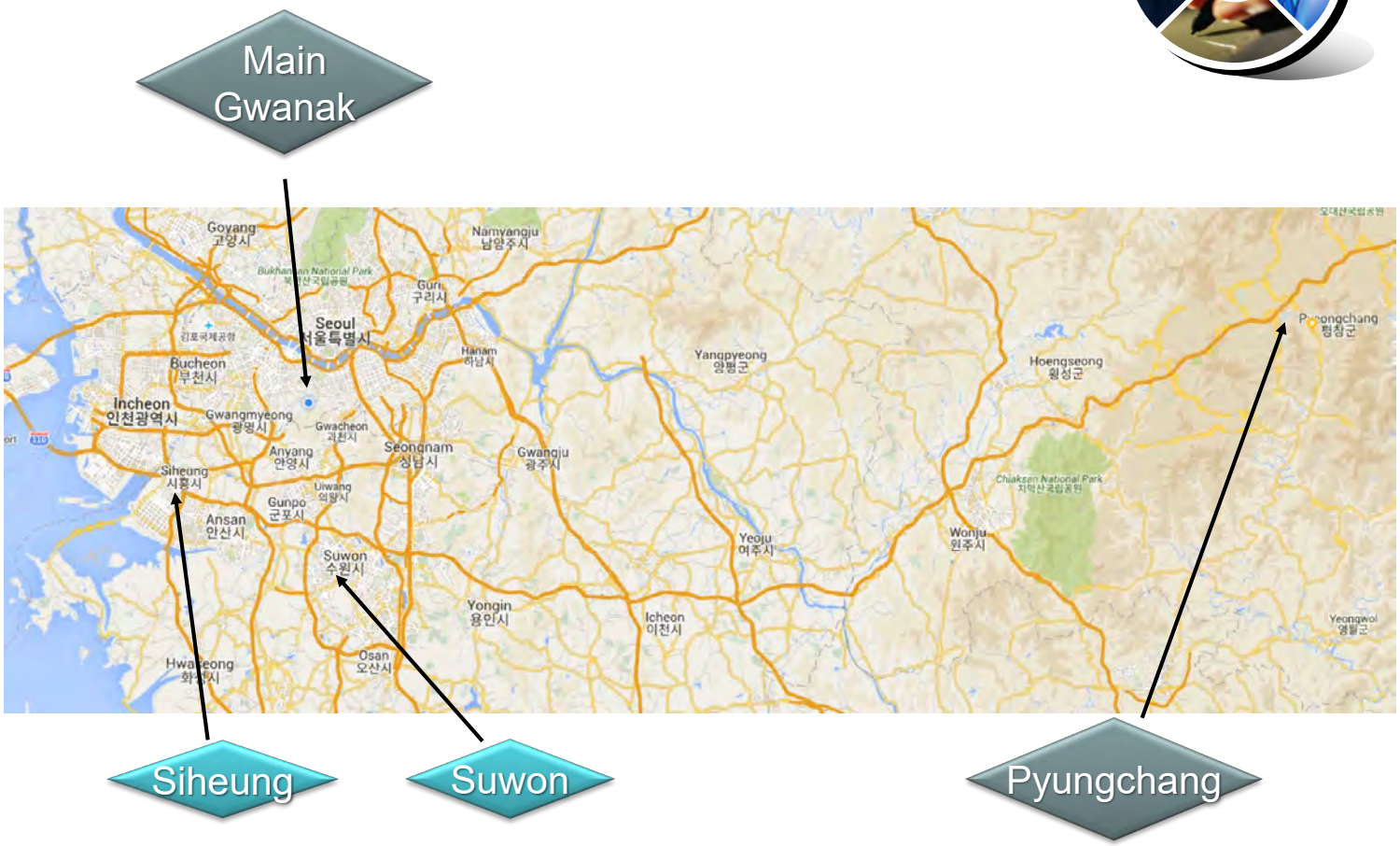
# Graduates: DVM program

| Year | Male | Female | Accumulation | | Total |
|---|---|---|---|---|---|
| | | | Male | Female | |
| 2008 | 22 | 23 | 2,587 | 196 | 2,783 |
| 2009 | 36 | 33 | 2,623 | 229 | 2,852 |
| 2010 | 38 | 15 | 2,661 | 244 | 2,905 |
| 2011 | 34 | 11 | 2,695 | 255 | 2,950 |
| 2012 | 21 | 11 | 2,716 | 267 | 2,982 |
| 2013 | 26 | 20 | 2,742 | 287 | 3,028 |
| 2014 | 29 | 20 | 2,771 | 307 | 3,077 |
| 2015 | 22 | 30 | 2,793 | 337 | 3,130 |
| 2016 | 28 | 18 | 2,821 | 355 | 3,176 |
| 2017 | 28 | 23 | 2,849 | 378 | 3,227 |
| 2018 | 30 | 23 | 2,879 | 401 | 3,280 |
| 2019 | 23 | 22 | 2,902 | 423 | 3,325 |
| 2020 | 29 | 23 | 2,931 | 446 | 3,377 |
| **2021** | **26** | **29** | **2,957** | **475** | **3,432** |

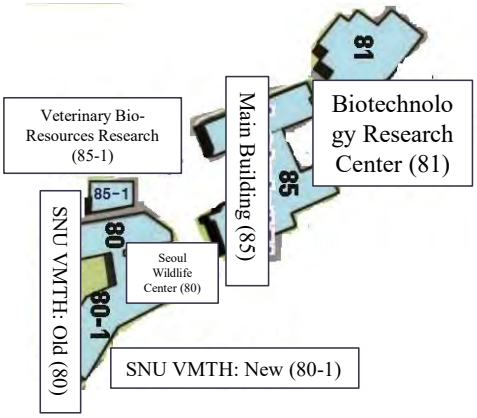
# Campuses and Facility




# Location



# Gwanak Campus




- Main Building (85)
- Biotechnology Research Center (81)
- SNU VMTH: New (80-1)
- SNU VMTH: Old (80)
- Seoul Wildlife Center /Emergency Center (80)
- Veterinary Bio-Resources Research (85-1)



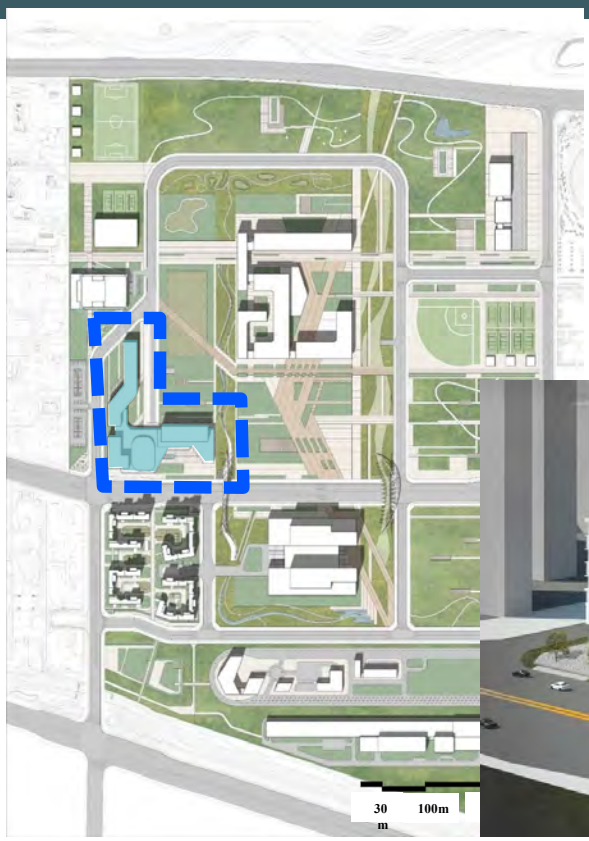
# Pyungchang Campus

- **Farm Animal Clinical Training & Research Center**
- **Farm Animal Teaching Hospital**

# Suwon Campus

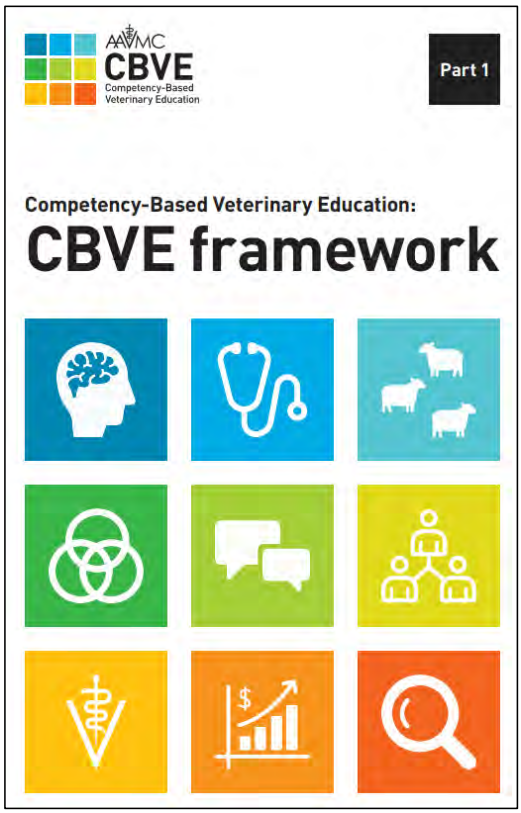
- **Academia-Industry Cooperative Campus**
  - 4 Veterinary-related bio-venture companies


# Global Education Center in SNU Siheung



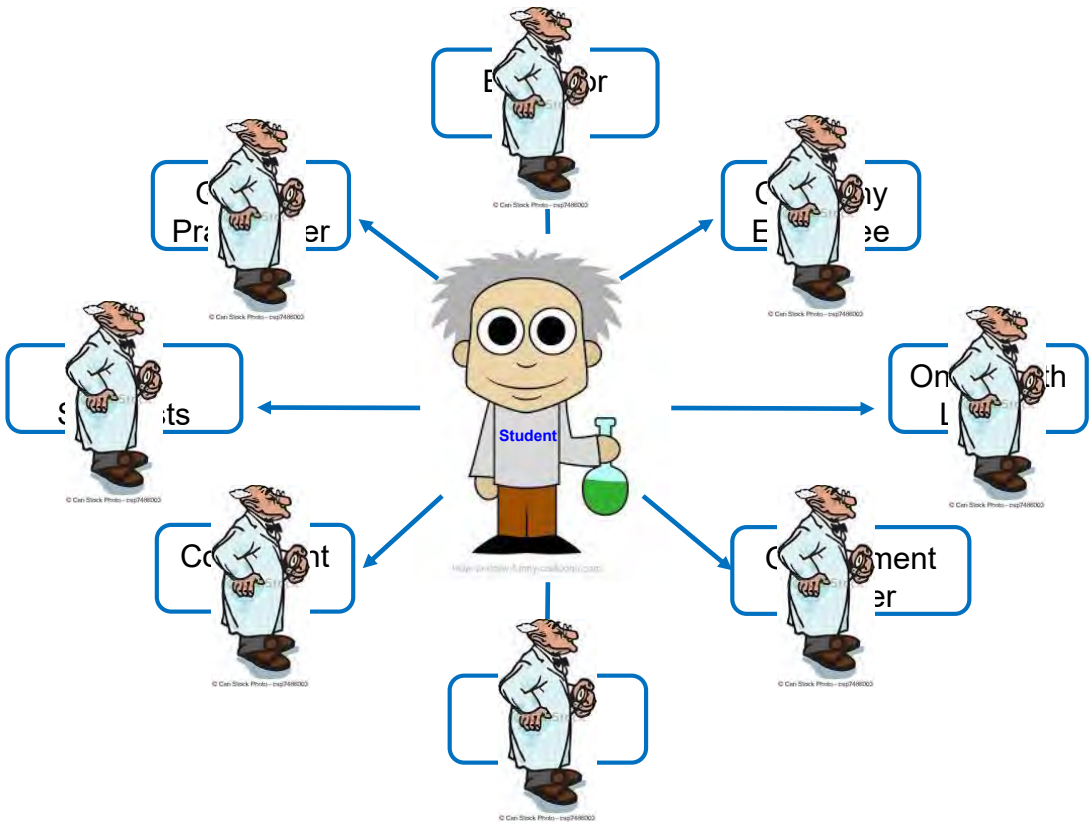

## Location and Bird's-eye View

# Competency-Based Vet Education

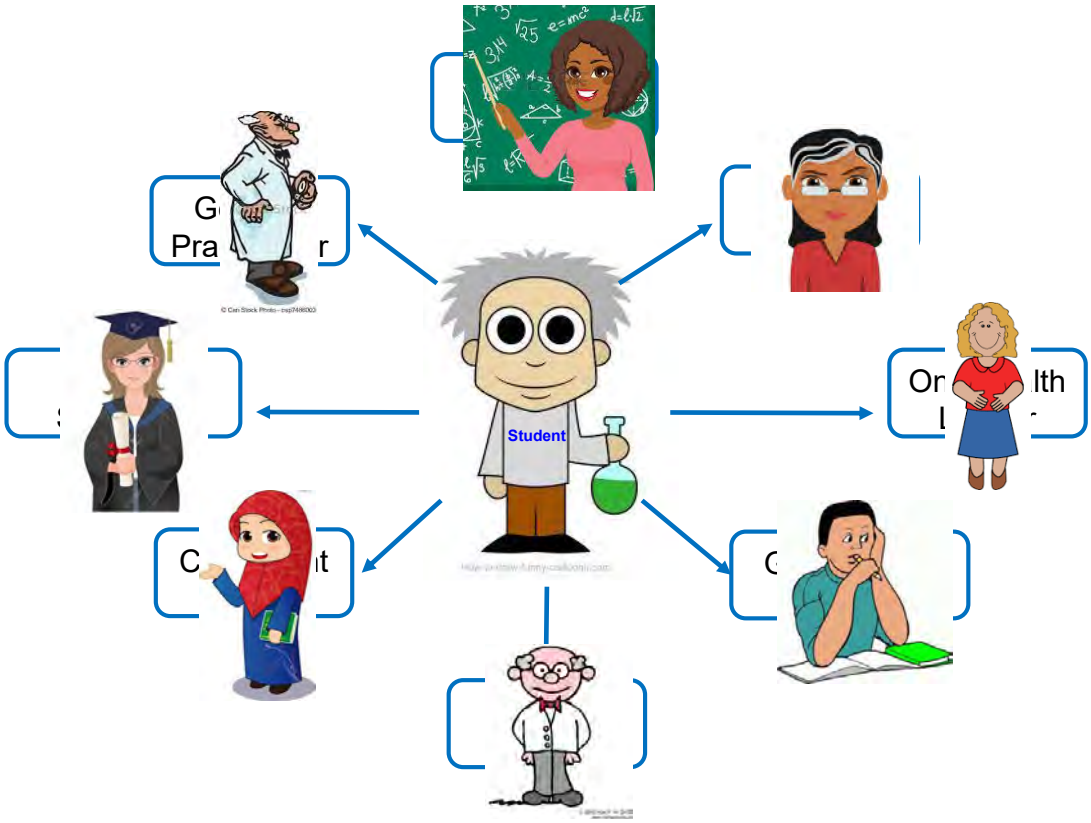



| | |
|---|---|
| 1 | Clinical Reasoning and Decision-making |
| 2 | Individual Animal Care and Management |
| 3 | Animal Population Care and Management |
| 4 | Public Health |
| 5 | Communication |
| 6 | Collaboration |
| 7 | Professionalism and Professional Identity |
| 8 | Financial and Practice Management |
| 9 | Scholarship |

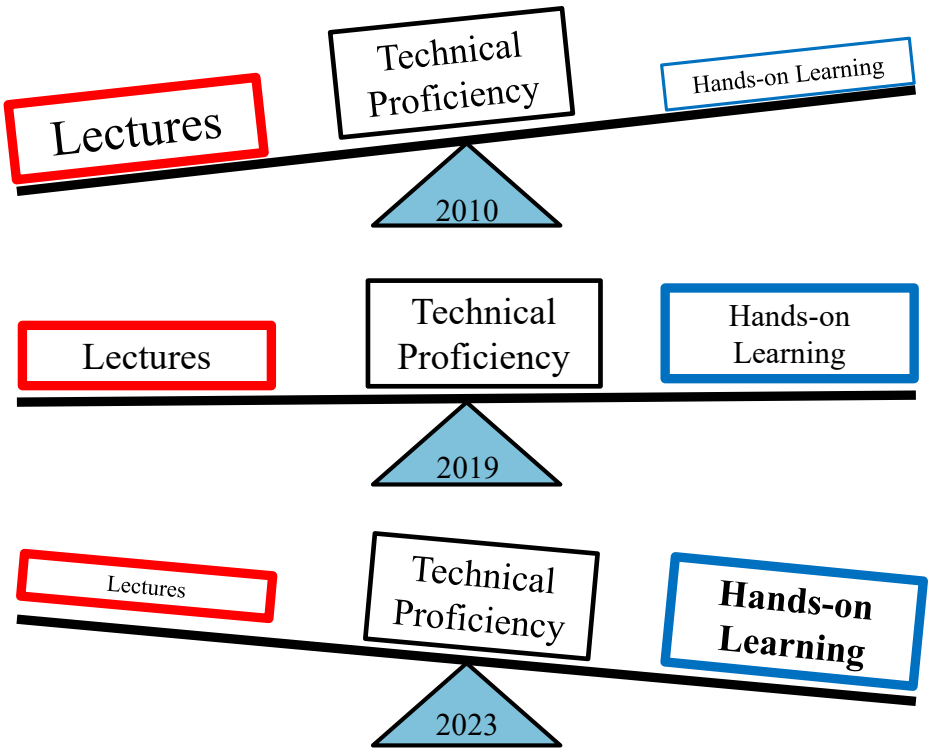
# How to Educate



# How to Educate




# Balance



# Top 10 Transferable Skills


# What is a professor ?


Teacher?


Disciplinarian?


Coach?


Friend?


Critic?


Cheerleader?

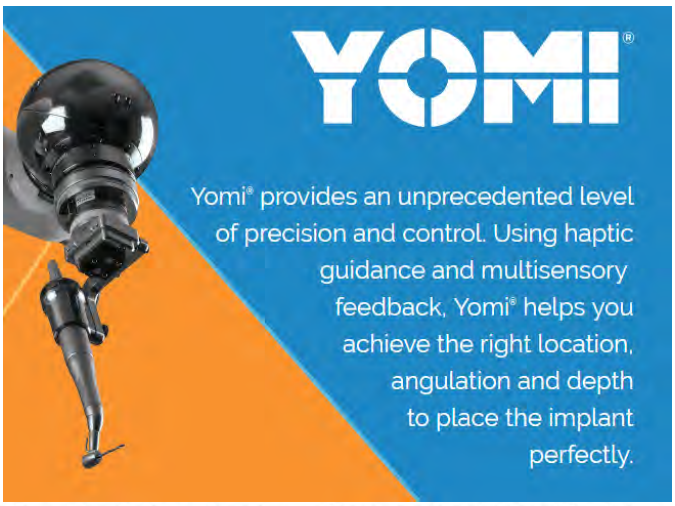

Therapist?

# Professor for Success

## Who are professors ?

- Advisor
- Coach
- Mentor
- Assistant
- Cheerleader
- Teacher

# The Future of Healthcare



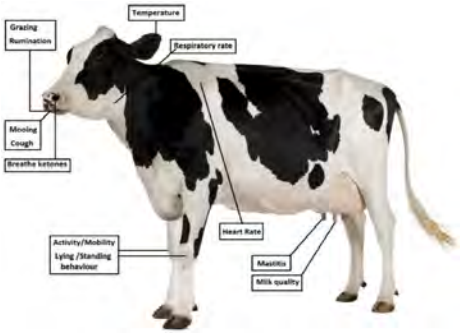

**A robot implants 3D-printed teeth in a Chinese patient**

A new age of autonomous robotic surgery is on the way, at least for some routine procedures

By Greg Nichols, for Robotics | September 25, 2017 -- 09:25 GMT (02:25 PDT) | Topic: Robotics

The da Vinci Surgical System

# The Future of Healthcare


## Telehealth & Telemedicine in Veterinary Practice

Telehealth has arisen as one of the greatest opportunities and challenges facing medicine in this digital age. Using telemedicine in the delivery of veterinary medical services offers benefits for animal owners, patients and the profession. However, veterinary services must be provided with professionalism and adhering to the same standard of care, whether delivered in person or through electronic means.

The AVMA is committed to ensuring access to the convenience and benefits afforded by telemedicine, while promoting the responsible provision of high-quality veterinary medical care.

### Telehealth Basics

What is telehealth? How is it different from telemedicine? Know these and other definitions, and get answers to frequently asked questions about all aspects of veterinary telehealth.

### Telehealth and the VCPR

Delivery of veterinary medical care requires the existence of a Veterinarian-Client-Patient Relationship (VCPR). Learn what compliance with the VCPR requirement looks like in the context of telehealth.

### Steps to Implement Telemedicine

When deployed properly to support communication and care coordination, telemedicine may improve patient triage and clinical outcomes, and benefit patients, animal owners, and the veterinary practice. Follow these steps to implement telemedicine programs successfully in your practice.

### Service Models for Veterinary Telemedicine

Telemedicine is not a one-size-fits-all proposition. You can customize your program and services to fit the needs of your veterinary patients, clients and practice. Here, we outline and compare a variety of existing service models.

### Case Study

Learn from your colleagues' experience. Here's how one veterinary team increased client compliance with post-surgical and hospice care recommendations by augmenting in-hospital care with telemedicine services.

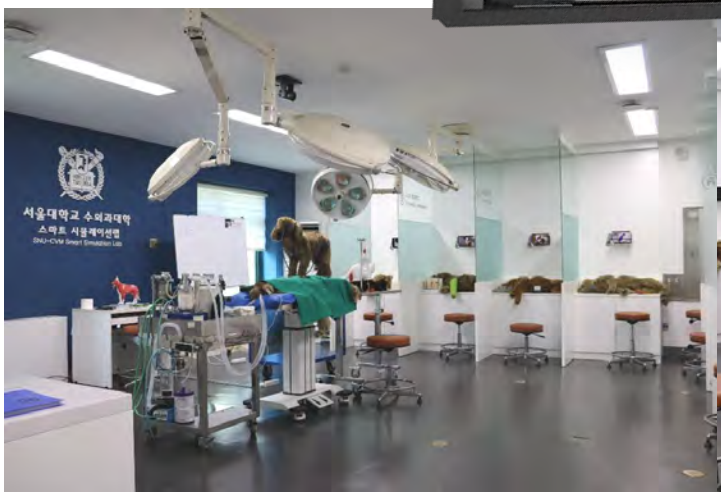
# The Future of Teaching

# Media Room

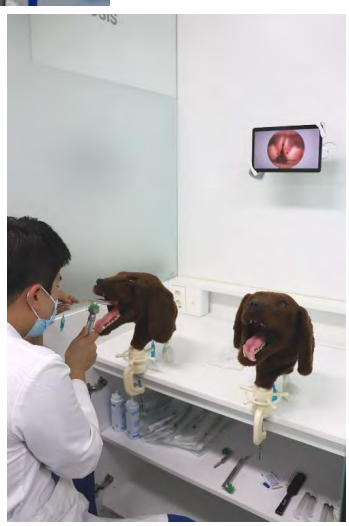


# Creative Idea Room for Students

# Simulation Lab for Students




# Simulation Lab for Students

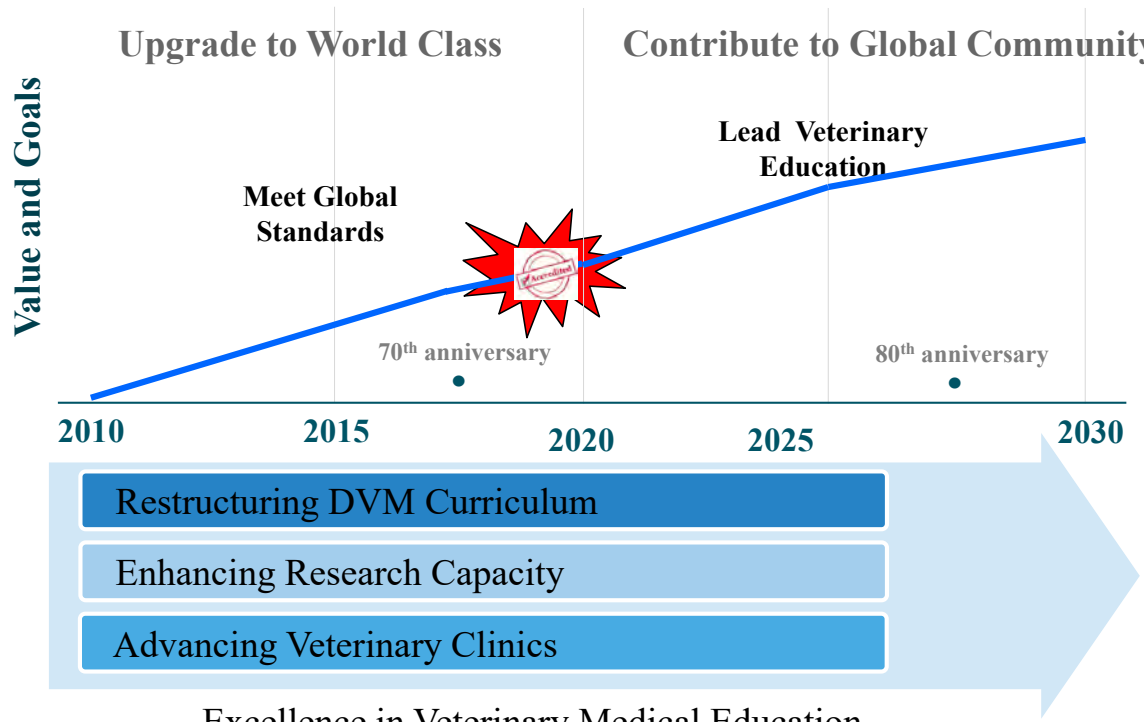
# Simulation Lab for Students

# Counseling Office (Healing Vet)

Professional counselors help to create a healthy educational environment through academic, career, interpersonal and emotional counseling.

# Veterinary Library


# AVMA Accreditation in April 2019




Excellence in Veterinary Medical Education

# Purpose of AVMA COE Accreditation

- **Assure the quality of education**
- **Promote continuous quality improvement**


*Who Benefits?*

•Students – investment in education

•Schools – ongoing process improvement

•Society – quality of veterinary services

•Profession – competencies of graduates

# SNU-CVM Veterinary Medical Education

- **Curriculum Committee**
  - A part of Academic Affairs and Admission committee
  - Members
    - Associate deans (academic (chair) & students)
    - Dean, Pre-vet department head
    - 5 faculty members from 4 graduate programs
    - Student representatives (observer)
  - Function
    - Review and propose curriculum reform
- **Office of Veterinary Medical Education**
  - Manage externship programs
  - Development of tools for evaluation of course outcomes
  - Support the curriculum committee

# Vet Medical Education: SNU-CVM

- To foster competent veterinarians
  - Veterinary expertise
  - Leadership in “One Health” area
  - Creative research capacity
  - Professionalism
- Pre-Veterinary curriculum (2 years)
  - Liberal art courses by SNU Faculty of Liberal Education
  - Veterinary courses by SNU-CVM faculty
- DVM curriculum (4 years)
  - Veterinary courses by SNU-CVM
  - Externships at SNU-CVM and Off-campus institutions

# Exemplary Courses in SNU-CVM

- **Self Improvement for Pre-vet Students**
  - Team based project development for future veterinary medicine
  - Identify topics, perform surveys, and propose solutions
- **Flipped learning combined with video tutorials**
  - Veterinary anesthesiology, Clinical pathology, Surgery, Radiology
  - Funded by SNU Alumni Association
  - Video tutorials on-line managed by eTL, SNU
- **Course of service learning**
  - Veterinary surgery: Provide opportunity to participate in the TNR program for cats, hands on experience on neutering procedure
  - Funded by SNU Institute for Global Social Responsibility

# Curriculum Reform

- **SNU-CVM by-law**
  - Every 5 years, committee should review the curriculum and propose a reform plan.
- **Major reforms in last 10 years**
  - 2008, introducing quarter system
  - 2012, pre-vet program was assigned under CVM
  - 2013, reorganized the clinical rotations into a year-long program
- **Evaluation of the current curriculum (2016)**
  - Redundancy in lectures and wet-labs between courses
  - Heavy coursework load to DVM students with no diversity
  - Deficits for the future fields of veterinary medicine
- **Reforming the current curriculum (2021)**
  - Shortening the lectures and combining similar wet-labs
  - Extending wet-labs and elective courses for students' desire

# Curriculum Reform: Goals

- **Bench-marking programs**
  - Medical schools in Korea
  - Vet schools of foreign countries
- **Specific Objectives**
  - Covering all school years with integrated curriculum
    - System-based course integration & team teaching
  - Systemic planning for continuous and repeated exposure of students to core concepts
    - Basic science, pathobiology, clinical practice, professional development)
  - Student-oriented and competency-based curriculum
  - Overcome the administrative challenges about credits and support required

# My Recent Research (2021-2022)

The Journal of Veterinary Medical Science

FULL PAPER
Wildlife Science

## Efficacy of topical rocuronium bromide as a mydriatic agent in domestic pigeons (*Columba livia*)

Lina SUSANTI[1)], Seonmi KANG[1)], Eunji LEE[1)], Dajeong JEONG[1)], Youngseok JEONG[1)], Sanghyun PARK[1)] and Kangmoon SEO[1)]*

[1)]Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, 08826, Korea

**ABSTRACT.** This study was conducted to investigate the efficacy of rocuronium bromide as mydriatic agent in domestic pigeons (*Columba livia*). This study was done in two phases. In the first phase, rocuronium bromide (0.20 mg/20 µl) was topically instilled to the right eye (OD) of eight domestic pigeons. Pupil diameter was measured before instillation (T0), and at 5 (T05) and 10 (T10) min after instillation, and every 10 min thereafter until 160 (T160) min. Pupillary light reflex (PLR) was assessed using a scoring system at the same time points. In the second phase, the same dosage was instilled twice in the span of 10 min into both eyes (OU) of four pigeons (eight eyes). Measurements were done accordingly. The iris color in the first phase were: gravel, pearl and bull eye. All irises in the second phase were bull eye. Mydriasis were observed in 6/8 (75%) pigeons in the first phase. Maximal mydriasis was observed at T30 (mean pupil diameter=4.62 ± 0.13 mm). Pupil diameter in the treated eye was significantly different from contralateral eye and from T0 since T05 ($P$=0.017 and $P$=0.006, respectively)–T120 ($P$=0.043 and $P$=0.044, respectively). PLR was disappeared from T10 ($P$=0.034) to T90 ($P$=0.041). In the second phase, mydriasis was only observed in 2/8 eyes. This study suggested that rocuronium bromide was able to produce mydriasis in pigeons other than bull eye iris.

KEY WORDS: *Columba livia*, iris color, mydriasis, pigeon, rocuronium bromide

*J. Vet. Med. Sci.*
83(3): 501–506, 2021
doi: 10.1292/jvms.20-0668

Received: 25 November 2020
Accepted: 14 January 2021
Advanced Epub:
22 February 2021

The Journal of Veterinary Medical Science

FULL PAPER
Wildlife Science

## Effect of mydriasis with topical rocuronium bromide on electroretinography in domestic pigeons (*Columba livia*)

Lina SUSANTI[1)], Seonmi KANG[1)], Sunhyo KIM[1)], Sanghyun PARK[1)], Songhui LEE[1)], Su An KIM[1)] and Kangmoon SEO[1)]*

[1)]Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Korea

**ABSTRACT.** This study aimed to investigate the effect of mydriasis using topical rocuronium bromide on electroretinography (ERG) in domestic pigeons (*Columba livia*). Scotopic mixed rod and cone, photopic cone, and photopic flicker ERG were performed on nine eyes of nine healthy adult pigeons under sedation. Each pigeon underwent two sets of ERG recordings. First, without the induction of mydriasis (control) and the second time with the induction of mydriasis using topical rocuronium bromide (treatment). The results were compared using either the Student's *t*-test or Wilcoxon rank-sum test, where a *P*-value of <0.05 was considered statistically significant. No significant differences were observed in the a- and b-wave implicit times and amplitudes during scotopic ERG between the two groups. The a- and b-wave amplitudes in the photopic cone were significantly higher in the treatment group (63.83 ± 32.33 and 191.75 ± 94.46 µV) compared to the control group (46.15 ± 27.60 and 116.76 ± 70.65 µV; $P$=0.045 and $P$=0.032, respectively). The photopic flicker amplitude was also significantly higher in the treatment group (76.23 ± 48.56 µV) than in the control group (42.18 ± 31.18 µV; $P$=0.044). No statistically significant differences were observed in the photopic cone and flicker implicit times between both groups. In conclusions, mydriasis induced by rocuronium bromide in pigeon resulting in higher amplitudes during the photopic ERG but not scotopic ERG.

KEY WORDS: avian, electroretinography, mydriasis, pigeon, rocuronium bromide

*J. Vet. Med. Sci.*
83(9): 1395–1400, 2021
doi: 10.1292/jvms.21-0224

Received: 13 April 2021
Accepted: 30 June 2021
Advanced Epub:
13 July 2021

J Vet Sci. 2021 Sep;22(5):e65
https://doi.org/10.4142/jvs.2021.22.e65
pISSN 1229-845X-eISSN 1976-555X

Journal of Veterinary Science JVS

Original Article
Ophthalmology

Check for updates

# Assessment of the pigeon (*Columba livia*) retina with spectral domain optical coherence tomography

**Sunhyo Kim, Seonmi Kang, Lina Susanti, Kangmoon Seo***

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul 08826, Korea

OPEN ACCESS

**Received:** Mar 23, 2021
**Revised:** Jul 5, 2021
**Accepted:** Jul 8, 2021
Published online: Jul 30, 2021

***Corresponding author:**
**Kangmoon Seo**
Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Korea.
E-mail: kmseo@snu.ac.kr

© 2021 The Korean Society of Veterinary Science
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (https://creativecommons.org/licenses/by-nc/4.0) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** To assess the normal retina of the pigeon eye using spectral domain optical coherence tomography (SD-OCT) and establish a normative reference.
**Methods:** Twelve eyes of six ophthalmologically normal pigeons (*Columba livia*) were included. SD-OCT images were taken with dilated pupils under sedation. Four meridians, including the fovea, optic disc, red field, and yellow field, were obtained in each eye. The layers, including full thickness (FT), ganglion cell complex (GCC), thickness from the retinal pigmented epithelium to the outer nuclear layer (RPE-ONL), and from the retinal pigmented epithelium to the inner nuclear layer (RPE-INL), were manually measured.
**Results:** The average FT values were significantly different among the four meridians ($p < 0.05$), with the optic disc meridian being the thickest (294.0 ± 13.9 μm). The average GCC was thickest in the optic disc (105.3 ± 27.1 μm) and thinnest in the fovea meridian (42.8 ± 15.3 μm). The average RPE-INL of the fovea meridian (165.5 ± 18.3 μm) was significantly thicker than that of the other meridians ($p < 0.05$). The average RPE-ONL of the fovea, optic disc, yellow field, and red field were 91.2 ± 5.2 μm, 87.7 ± 5.3 μm, 87.6 ± 6.5 μm, and 91.4 ± 3.9 μm, respectively. RPE-INL and RPE-ONL thickness of the red field meridian did not change significantly with measurement location ($p > 0.05$).
**Conclusions:** Measured data could be used as normative references for diagnosing pigeon retinopathies and further research on avian fundus structure.

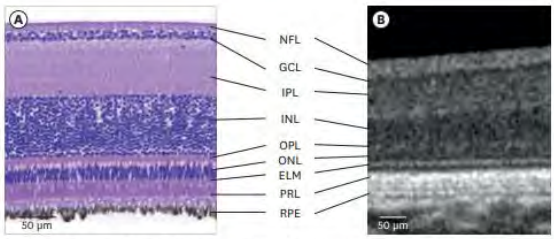



**Fig. 2.** Histologic segmentation of the pigeon retina (A) and a corresponding image obtained with an optical coherence tomography device (B).
NFL, nerve fiber layer; GCL, ganglion cell layer; IPL, inner plexiform layer; INL, inner nuclear layer; OPL, outer plexiform layer; ONL, outer nuclear layer; ELM, external limiting membrane; PRL, photoreceptor layer; RPE, retinal pigmented epithelium.

Received: 4 November 2020 | Revised: 30 July 2021 | Accepted: 1 August 2021
DOI: 10.1111/vop.12926

ORIGINAL REPORT

WILEY

# The association of topical flurbiprofen with the incidence of postoperative glaucoma after phacoemulsification in dogs

**Seonmi Kang | Jaeho Shim | Kangmoon Seo**

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

**Correspondence**
Kangmoon Seo, Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, 08826, Korea.
Email: kmseo@snu.ac.kr

**Abstract**

**Objective:** To investigate the relationship between topical administration of flurbiprofen plus corticosteroids versus corticosteroids alone following phacoemulsification and the development of postoperative glaucoma in dogs.
**Animal studied:** Thirty-eight/eighty-three (45.8%) eyes were prescribed topical flurbiprofen plus corticosteroids immediately postop while 45/83 (54.2%) eyes received topical corticosteroids alone.
**Procedures:** Logistic regression models were performed to analyze the relationship between topical flurbiprofen and development of glaucoma and to predict potential risk factors for postoperative glaucoma occurrence.

Received: 14 July 2020 | Revised: 2 September 2021 | Accepted: 6 September 2021

DOI: 10.1111/vop.12937

ORIGINAL ARTICLE

WILEY

# Proteomic analysis of aqueous humor in canine primary angle-closure glaucoma in American Cocker Spaniel dogs

Seongjin Yun[1,2] | Dabin Lee[3] | Seonmi Kang[1] | Dong Wook Kim[3] | Youngsam Kim[1] | Je-Yoel Cho[3] | Kangmoon Seo[1]

[1]Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

[2]Irion animal hospital, Seoul, Korea

**Abstract**

**Objective:** To analyze proteomic profiles of the aqueous humor (AH) of canines with primary angle-closure glaucoma (PACG) and identify associated protein alterations.

J Vet Sci. 2022 May;23(3):e43
https://doi.org/10.4142/jvs.21275
pISSN 1229-845X·eISSN 1976-555X

Journal of Veterinary Science JVS

Original Article
Ophthalmology

Check for updates

# Effect of oral antioxidants on the progression of canine senile cataracts: a retrospective study

Sanghyun Park [1], Seonmi Kang [1], Sukjong Yoo [2], Youngwoo Park [3], Kangmoon Seo [1,*]

[1]Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul 08826, Korea
[2]Yoolim Animal Eye Clinic, Seoul 06524, Korea
[3]Daegu Animal Medical Center, Daegu 42185, Korea

OPEN ACCESS

**Received:** Nov 14, 2021
**Revised:** Feb 16, 2022
**Accepted:** Feb 28, 2022
Published online: Mar 17, 2022

***Corresponding author:**
**Kangmoon Seo**
Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research

## ABSTRACT

**Background:** Cataracts are the leading cause of impaired vision or blindness in dogs. There are many antioxidants that can prevent cataract progression, but whether they are clinically effective in dogs has not been established.
**Objectives:** To analyze the delaying or preventing effect of oral antioxidants on canine senile cataracts through retrospective analysis.

Received: 23 November 2020 | Revised: 13 October 2021 | Accepted: 19 October 2021
DOI: 10.1111/vop.12950

ORIGINAL REPORT

WILEY

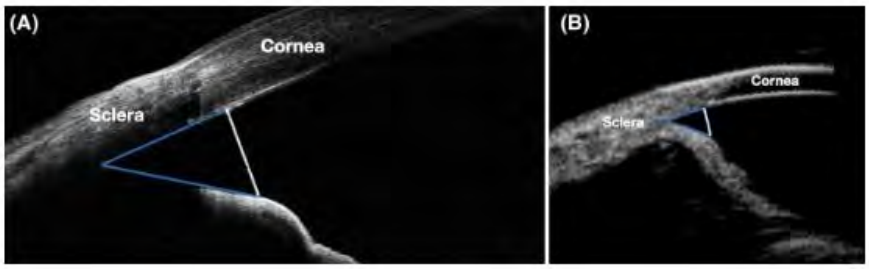
# Comparison of iridocorneal angle parameters measured by spectral domain optical coherence tomography and ultrasound biomicroscopy in dogs

Jaeho Shim | Seonmi Kang | Youngseok Jeong | Eunji Lee | Dajeong Jeong | Kangmoon Seo

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

**Abstract**

**Objective:** To compare the measurements of iridocorneal angle parameters between spectral domain optical coherence tomography (SD-OCT) and ultrasound biomicroscopy (UBM) in dogs.




Received: 25 January 2021 | Revised: 5 November 2021 | Accepted: 5 November 2021
DOI: 10.1111/vop.12955

ORIGINAL REPORT

WILEY

# The feasibility of clinical evaluation for anterior uveitis through spectral-domain optical coherence tomography in dogs

Youngseok Jeong | Seonmi Kang | Jaeho Shim | Eunji Lee | Dajeong Jeong | Sanghyun Park | Songhui Lee | Su An Kim | Kangmoon Seo

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

**Abstract**

**Objective:** To evaluate the clinical application of spectral-domain optical coherence tomography (SD-OCT) for anterior uveitis in dogs.

Received: 22 June 2021 | Revised: 3 November 2021 | Accepted: 4 November 2021
DOI: 10.1111/vop.12954

ORIGINAL ARTICLE

WILEY

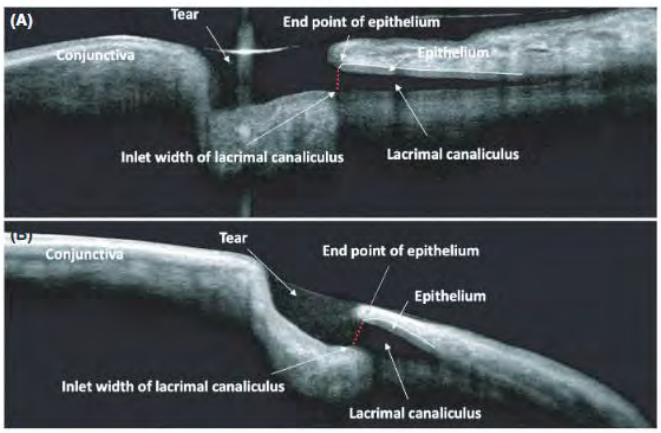
# Evaluation of the upper and lower proximal lacrimal canaliculi using spectral-domain optical coherence tomography in normal Beagle dogs

Jaeho Shim | Seonmi Kang | Eunji Lee | Sol Kim | Jisoo Park | Hyelin Kim | Kangmoon Seo

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Republic of Korea

**Abstract**

**Objective:** To confirm the feasibility of visualizing upper and lower proximal lacrimal canaliculi (LC) using spectral-domain optical coherence tomography (SD-OCT).




Received: 29 June 2021 | Revised: 14 March 2022 | Accepted: 29 March 2022
DOI: 10.1002/vetr.1682

Vet Record

ORIGINAL RESEARCH

# Evaluation of ocular surface parameters in dogs with and without meibomian gland dysfunction

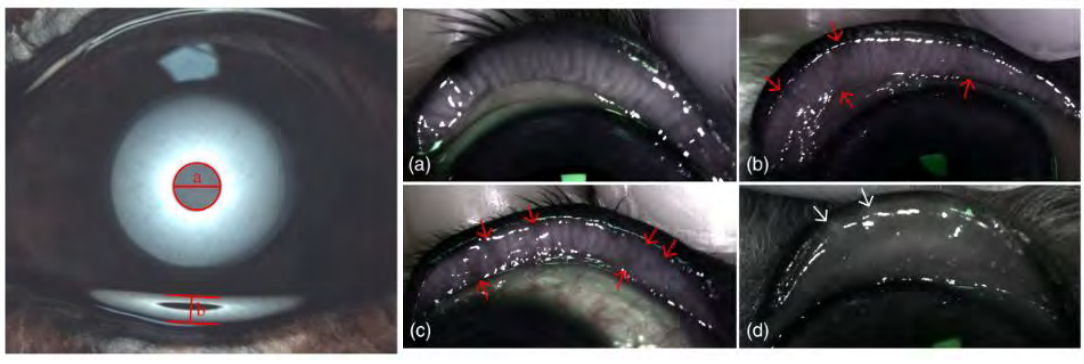
Dajeong Jeong | Seonmi Kang | Jaeho Shim | Eunji Lee | Youngseok Jeong | Kangmoon Seo

Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

**Correspondence**
Kangmoon Seo, Department of Veterinary

**Abstract**

**Background:** Interest in meibomian gland dysfunction (MGD) is growing in veterinary medicine. However, research on MGD in dogs is lacking. The aims of this study were to compare the interferometry grades, tear meniscus height (TMH) and non-invasive tear break-up time (NIBUT) grades between dogs with and without MGD.




# 감사합니다.

Thank you.

Gamsahamnida.

# Result of Satisfaction Survey

# Satisfaction Survey

Thank you for taking your time for 2023 1st IPB-SNU Green-Bio Science Forum.

Please rate your satisfaction level with each of the following questions.

1. Please rate your overall satisfaction with the forum.

   ① Very satisfied ② Satisfied ③ Neutral ④ Dissatisfied ⑤ Very dissatisfied

☞ At which point do you think the workshop is satisfying/dissatisfying? *Please write down your opinion*

2. Was the forum help you to increase new learnings and academic knowledge?

   ① Totally Agree ② Agree ③ Neutral ④ Disagree ⑤ Totally Disagree

3. Were lectures delivered in an easy and efficient way?

   ① Totally Agree ② Agree ③ Neutral ④ Disagree ⑤ Totally Disagree

4. Were the materials of lectures made comprehensibly?

   ① Totally Agree ② Agree ③ Neutral ④ Disagree ⑤ Totally Disagree

5. Did the forum help you to increase your academic interests?

   ① Totally Agree ② Agree ③ Neutral ④ Disagree ⑤ Totally Disagree

6. Was the programme of the forum well-planned? *(Theme of lecture, length, timeline, etc.)*

   ① Very well-planned ② Well-planned ③ Neutral ④ Poorly-planned ⑤ Very Poorly-planned

7. Would you like to attend the forum next time?

   ① Strongly like ② Like ③ Neutral ④ Dislike ⑤ Strongly dislike

8. What topics would you like to discuss at future events?

   ☞

9. Please write down any suggestions toward the forum.

   ☞

10. Have you heard about the KOICA or project “Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia”

    ① Yes ② No

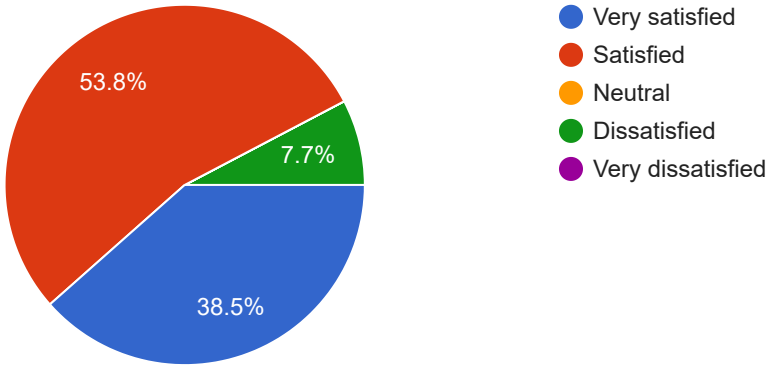
    If so, How did you get to know the information?

    ☞

복사

1. Please rate your overall satisfaction with the forum.

응답 13개




1-1. At which point do you think the workshop is satisfying/dissatisfying? *Please write down your opinion*

응답 9개

the topic and the speakers

Discuss with prof yun

Sharing Information

interesting topic

All of the point is interesting, but most of al the Immunosecurity in Domestic Animals topic got my attention

The topic of presentation relevant to invited audiences

The workshop is satisfying because can help me to increase academic interest

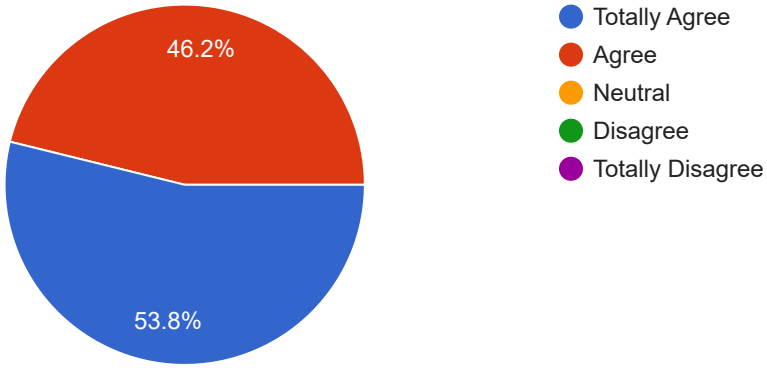
Presentation from prof. cheol-heui Yun

up to date agriculture issues facing by the farmers and industries and consumer.
well presentation.

2. Was the forum help you to increase new learnings and academic knowledge?

복사

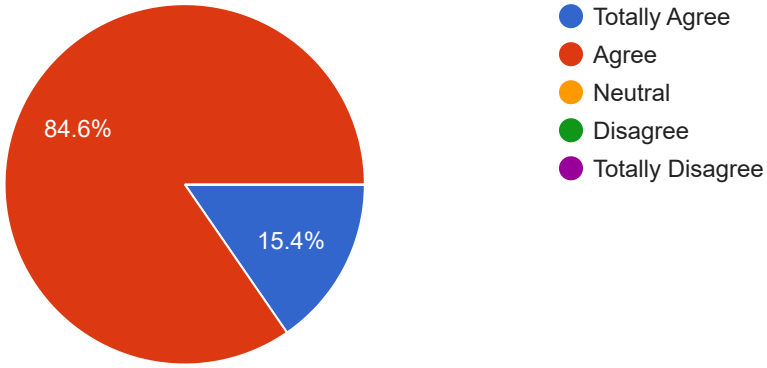
응답 13개




복사

3. Were lectures delivered in an easy and efficient way?

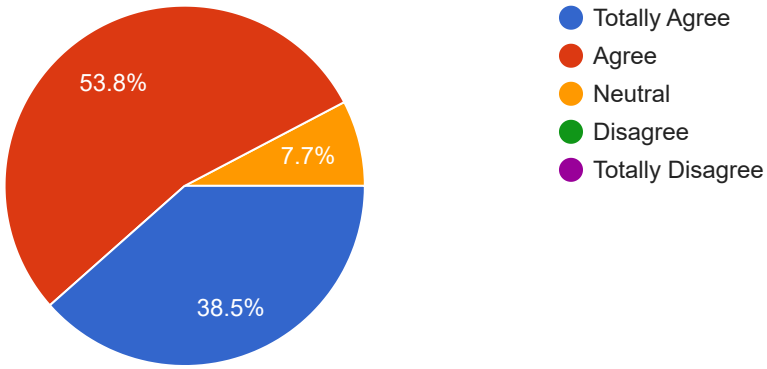
응답 13개




복사

4. Were the materials of lectures made comprehensibly?

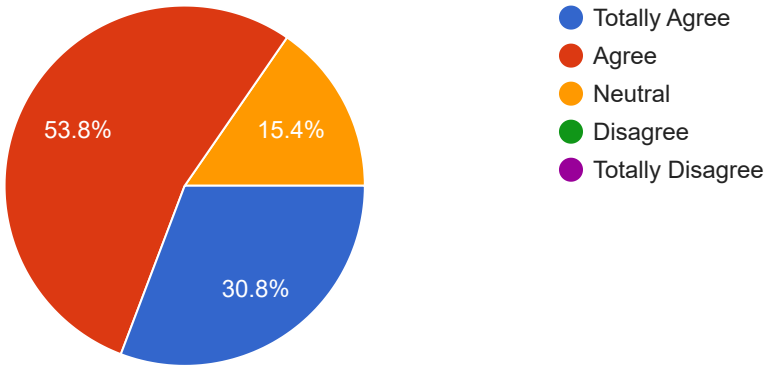
응답 13개



복사

5. Did the forum help you to increase your academic interests?

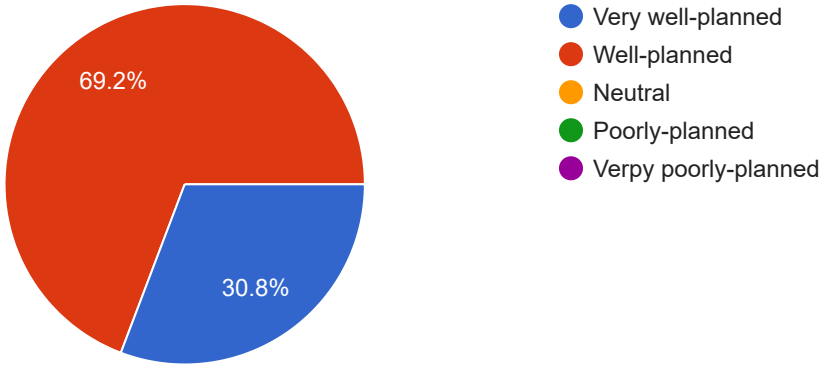
응답 13개




복사

6. Was the programme of the forum well-planned? *(Theme of lecture, length, timeline, etc.)*

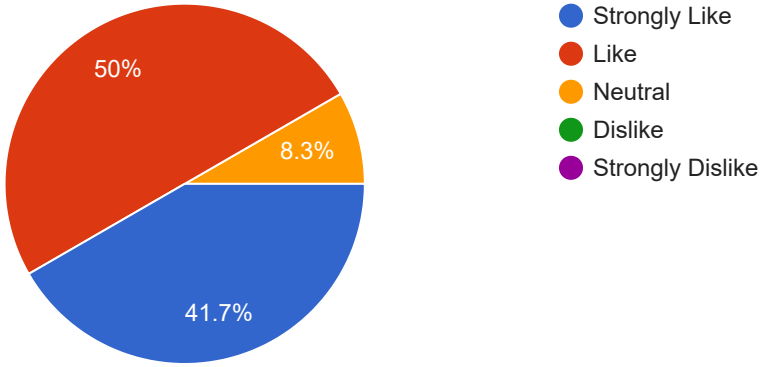
응답 13개




복사

7. Would you like to attend the forum next time?

응답 12개



8. What topics would you like to discuss at future events?

응답 11개

Farming management which involved small farmers

Animal nutrition with imunonutrition

Point of collaboration using indonesian natural product

nanotechnology for agroindustrial

Animal Product and Technology

Animal Science

remote sensing & land management

Pharmaceutical Sciences

chemical diversity

about probiotics, dysbiosis, gutmicrobiota

Animal Sciences topics

9. Please write down any suggestions toward the forum.

응답 6개

Please invite students for this forum

on time

Please invite broader audiences of IPB faculties

Forum can be held for all civitas (a wider audience)

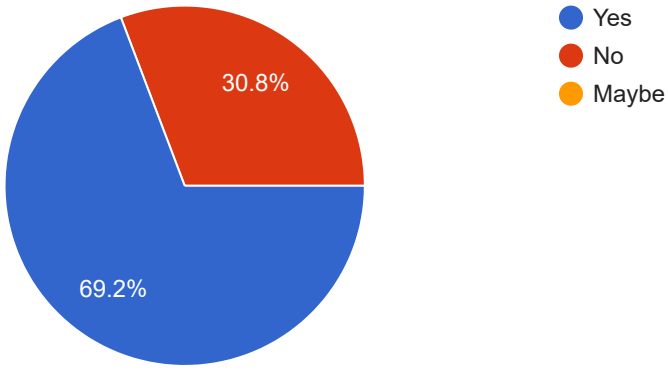
opportunity for collaboration

I-CAB project need to intensify similar forum so at the end of project knowledge and ability/compentence I-CAB members increased

10. Have you heard about the KOICA or project “Capacity Building for the Center for Agriculture and Bioscience of IPB University in Indonesia”

복사

응답 13개




10-1. If so,  How did you get to know the information?

응답 8개

International KOICA Office

When I attended the launching program IPB-KOICA yesterday

from the IPB letter

IPB Information Channel

Form today's presentation

I know the information about the KOICA from invitation 1st IPB-SNU green-bio science forum

I have been invited from the UNI

I heard it first form since 2020

KOICA
Korea International
Cooperation Agency