



NACF's Commitment to Sustainable Agriculture: Focusing on Young Farmers and Smart Agriculture

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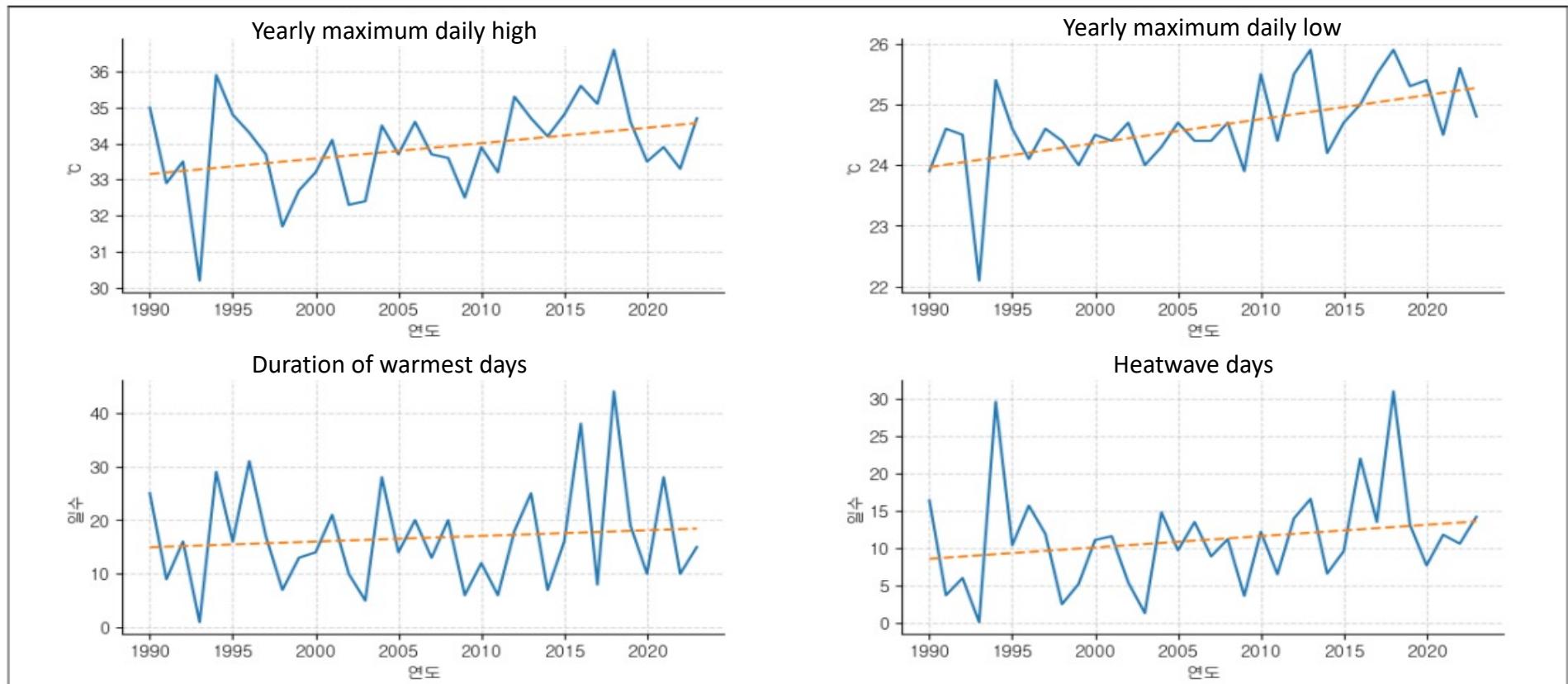
IV. Transition to Smart and Digital Agriculture

The crisis facing global agriculture

- ▶ Climate change, carbon neutrality, and other agricultural challenges
- ▶ Aging farmers and lack of successor farmers threaten rural extinction
 - Aging rate of Korean farmers : ('23) 52.6%, 3 times the national average (18.2%)
 - Young farmers under the age of 40 make up only 0.5% of all farmers in South Korea
- ▶ Crisis of farmer business as production costs rise and farm incomes fall
 - Rising prices of raw materials needed for production, such as fertilizers, pesticides, etc.
 - Unstable agricultural supply and demand destabilizes farmer's business

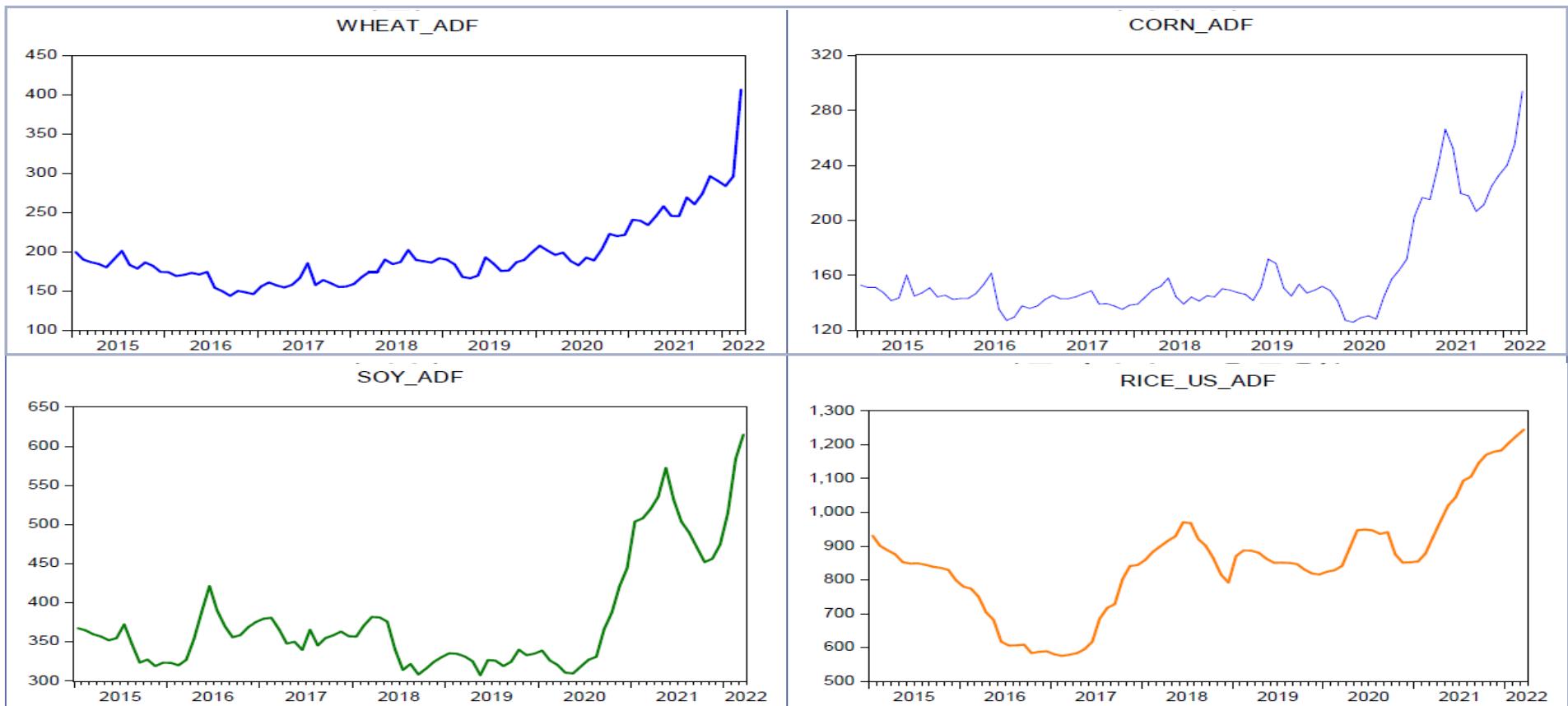
Agriculture is an industry that is directly exposed to environmental change, including climate, and recent climate change and extreme weather events are becoming more frequent and intense than in the past.

< South Korea's Extreme Climate Index trend by year >



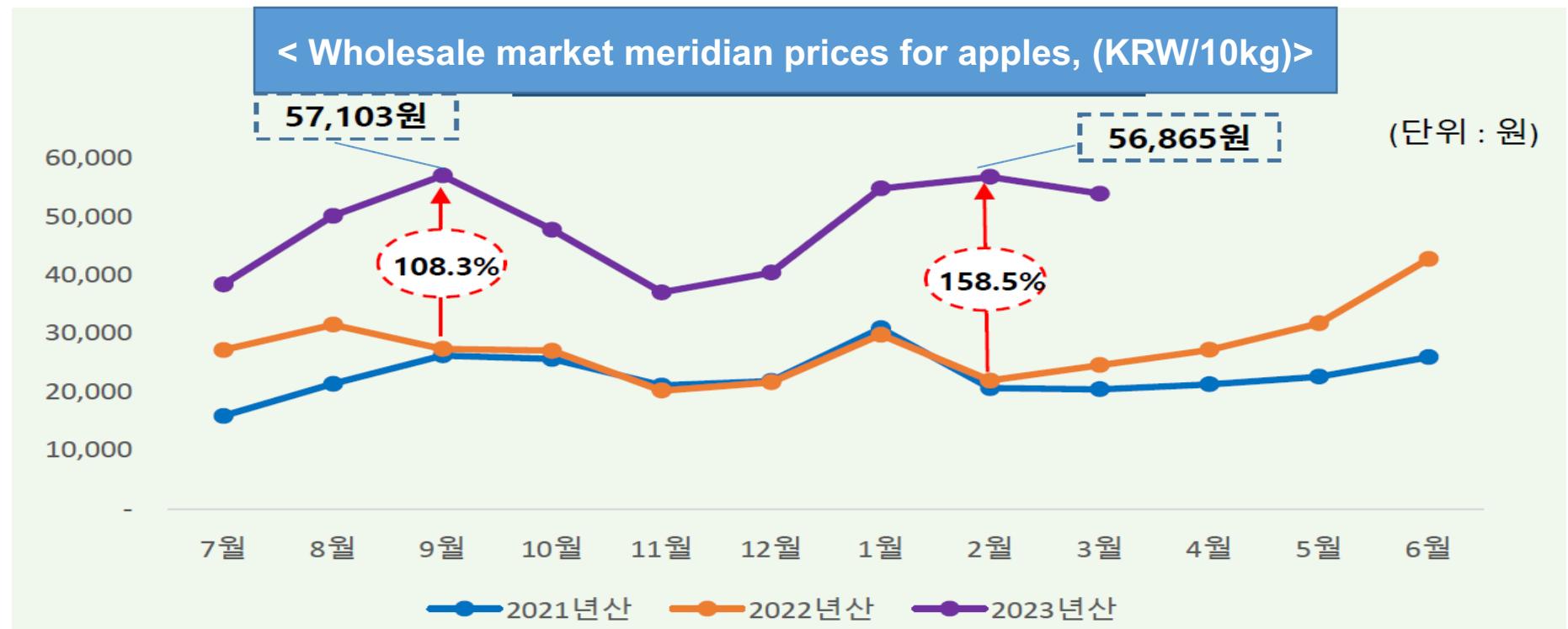
Climate change, the Russia-Ukraine war, and other factors have contributed to recent agricultural supply and price instability.

< World price trend of major grains (USD/ton) (2015.1-2022.3) >



'Gold Apple' Controversy in Korea

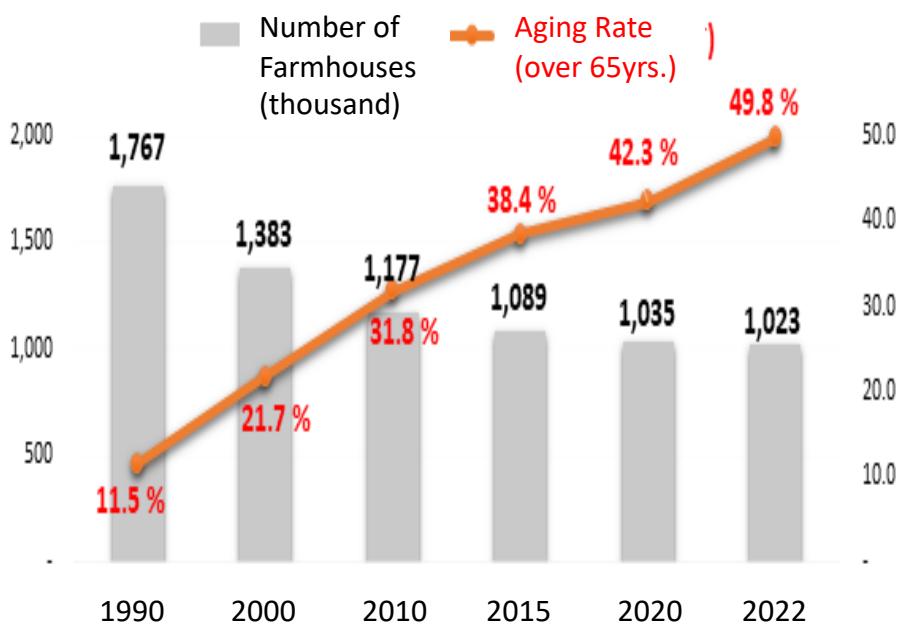
- The wholesale market meridian price of 10 kg of apples produced in 2023 is 57,103 KRW (\$41), up 108.3% from 2022 → 'Gold Apple' Controversy
- Cause: Chilling damage caused by abnormally low temperatures in late March and early April, resulting in a 30.3% YoY decline in apple production



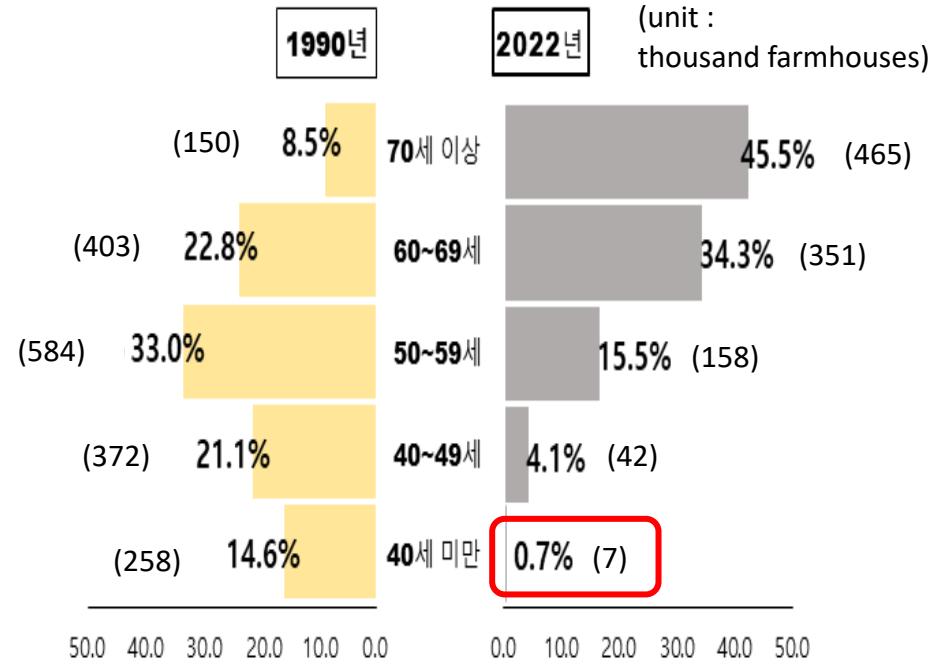
Aging farmers and lack of successor farmers are contributing to the rural extinction crisis

- Aging rate of Korean farmers : ('23) 52.6%, 3 times the national average (18.2%)
- Young farmers under the age of 40 make up only 0.5% of all farmers in South Korea

Number of Farmers and Aging Rate



Age Structure of Farmers



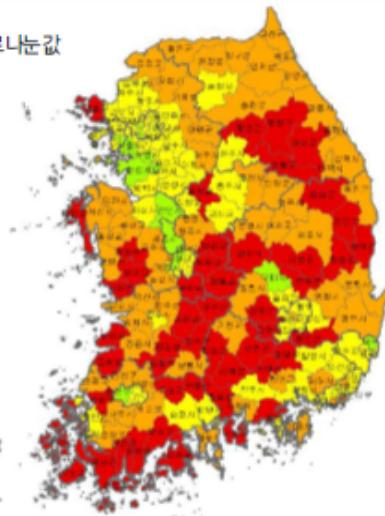
The agricultural base is threatened by a declining rural population due to low birthrate, aging population, and migration of young people to metropolitan areas.

- The number of rural areas at risk of extinction has increased every year, accounting for 51.8% of the country in February 2023
- The agricultural population is steadily declining and aging due to the migration of young people to metropolitan areas, increasing the risk of rural extinction.

Local Extinction Risk Index Status

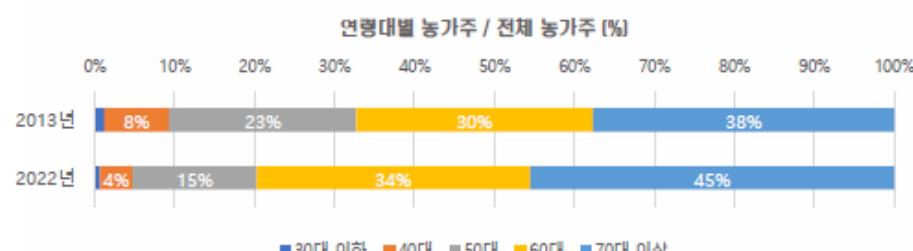
*지역 소멸위험지수:
20~39세 가입기 여성인구를 만65세이상인구수로나눈 값

지역소멸위험분류	지수	색상
매우낮음	1.5 이상	dark green
보통	1.0~1.5미만	light green
주의	0.5~1.0미만	yellow
소멸 위험	위험진입	orange
	고위험	red



(자료 출처: 한국고용정보원)

Farm population and ratio of farmer age groups



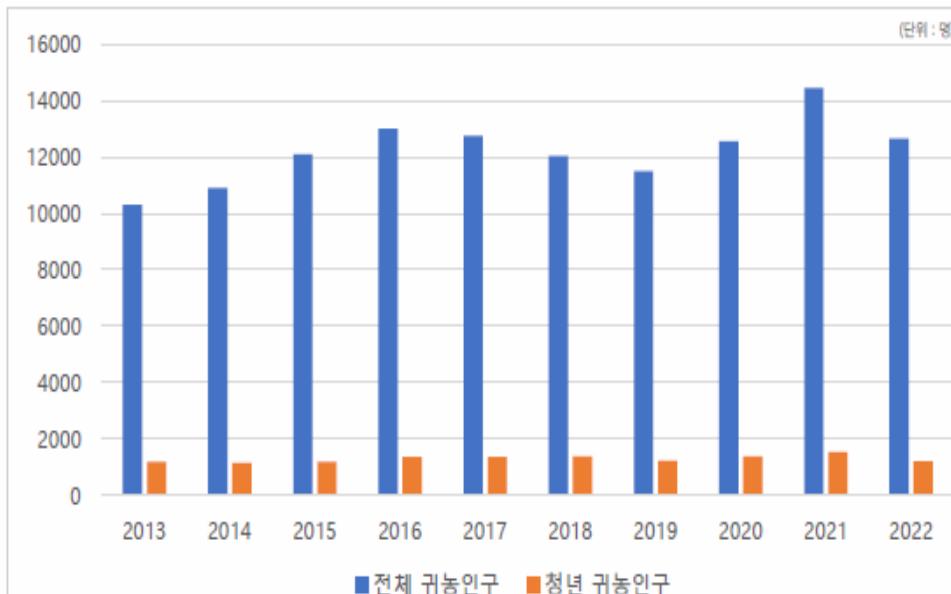
(자료 출처: 통계청)

I . The Crisis of Sustainable Agriculture

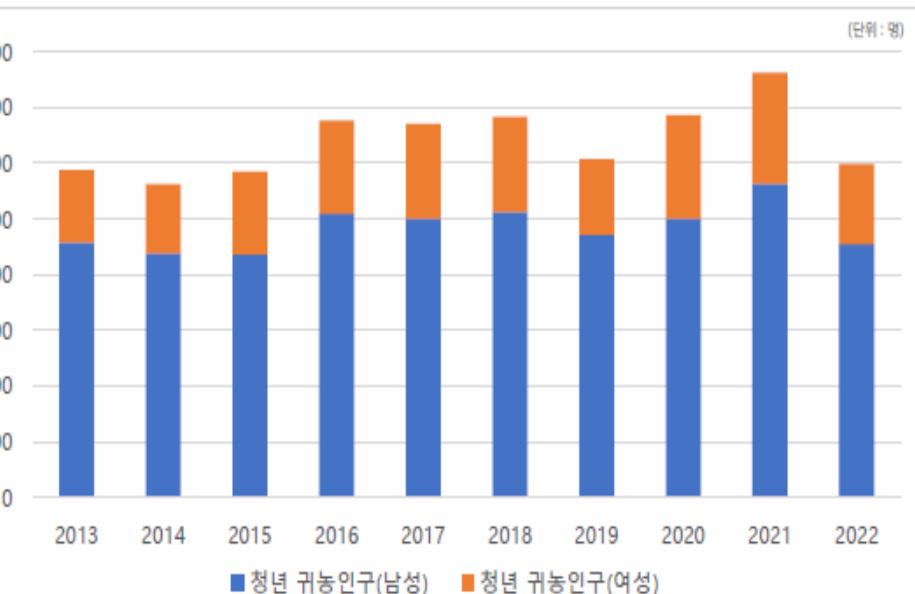
The number of people returning to rural areas was 12,660 in '22, a level of 10,000 in the last 10 years, of which only 10% were young people under the age of 30.

- From 2013-2020, the largest number of people moving rural areas were in their 50s, but starting in 2021, the 60s will be the predominant age group.
- Male new farmers are more heavily represented, with an average of 3.1 times more male young farmers than female youth farmers over the past decade.

New farmers trend (total vs. youth)

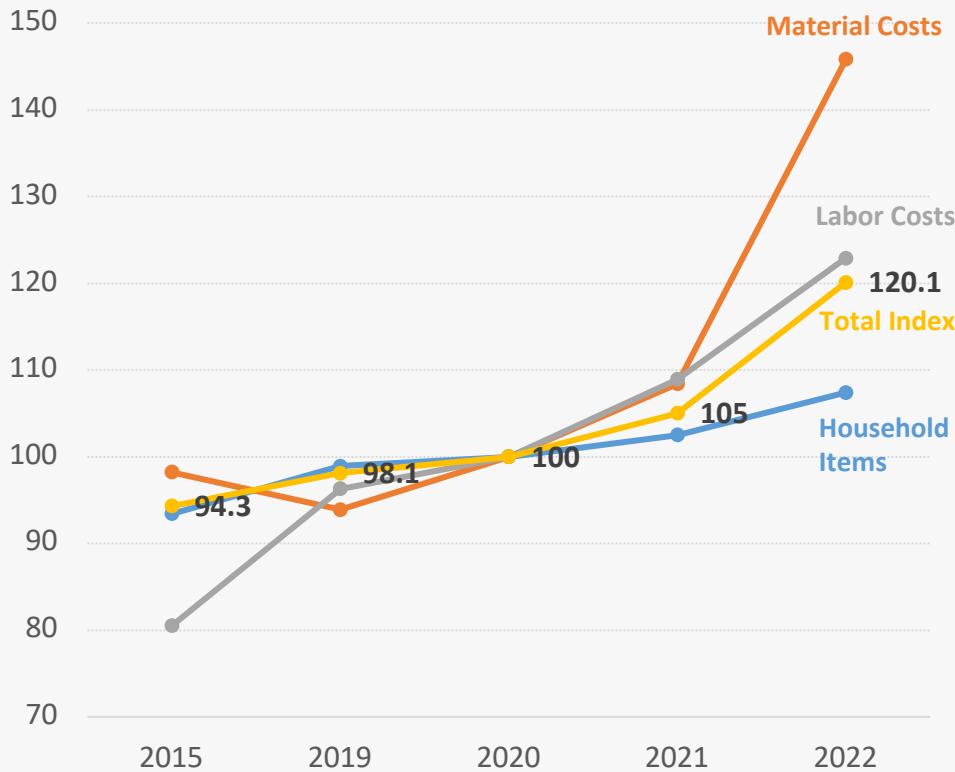


Gender ratio of young new farmers

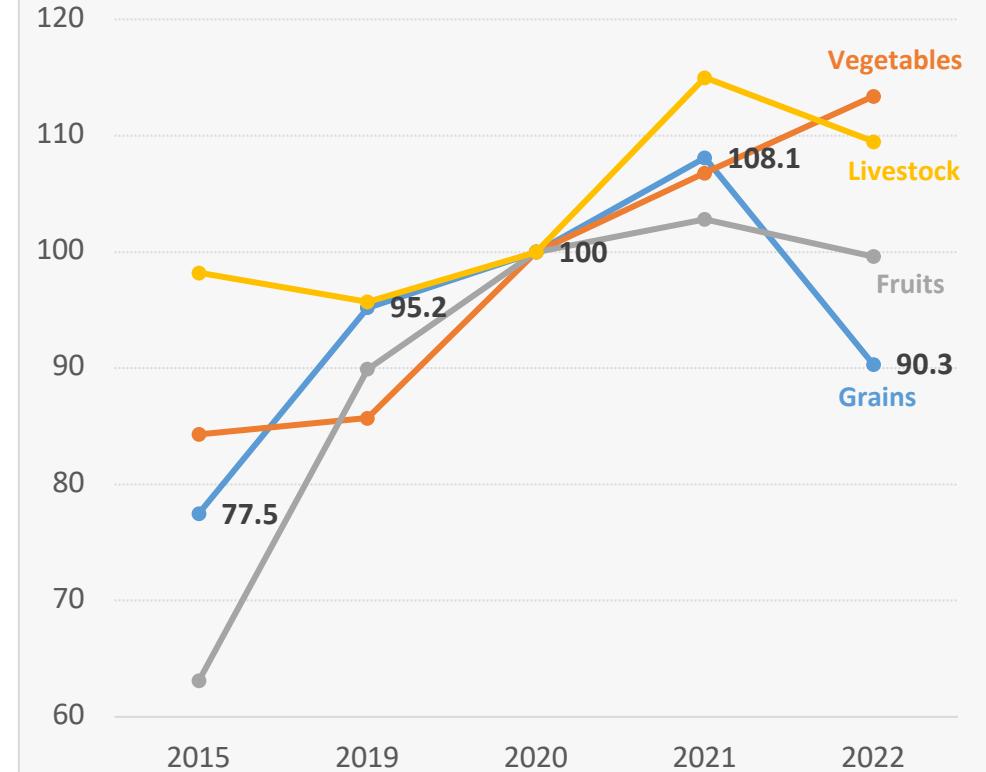


Increasing production costs and declining agricultural incomes are exacerbating farmer's business crisis

<Agricultural Input Price Index>

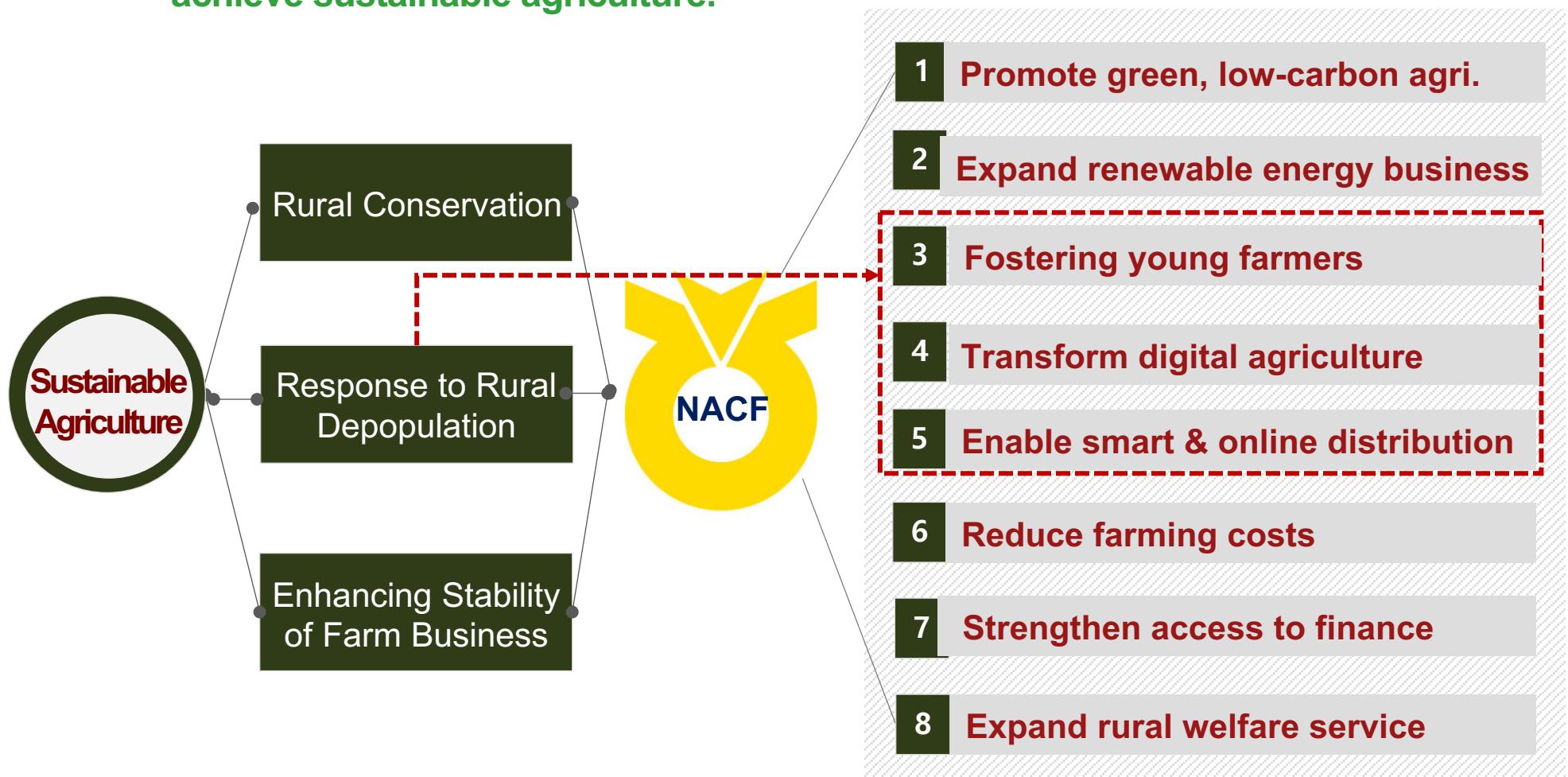


<Farm Selling Price Index>



II. NACF's Commitment to Sustainable Agriculture

NACF is implementing various projects and support activities to address the issues of climate change, rural decline, and farmer's business crisis, and to achieve sustainable agriculture.



In 2017, the Korean government established the "Youth Entrepreneurship Farming Plan" with the goal of fostering 10,000 young farmers, and in 2018, the government provided farming settlement support to young entrepreneurs.

- Youth under the age of 40 are selected as young entrepreneurial farmers by screening their 5-year farming plans.
- Each year, 1,200 young entrepreneurial farmers under the age of 40 who meet the application requirements are selected and receive farming settlement support of up to KRW 1.1 million (\$800) per month for up to 3 years

In October 2022, the government announced the "Basic Plan for Fostering Successor Young Farmers" to foster 30,000 young farmers by 2027.

- Establishing a customized support system and expanding financial support from the preparation stage to the growth stage of farming
- Establishing a four-pronged strategy for each stage of 'youth farmer inflow, foundation, growth support, and settlement conditions,' and establishing a promotion system by operating a policy council and establishing an integrated information platform.
- Reorganizing the farming settlement support project
- Expanding the scale of fostering successor farmers and expanding tax support to revitalize farm inheritance (Increase the amount of inheritance tax deduction: KRW 2 bil. → 3 bil.)
- Reducing the difficulty of securing farmland and funds for young farmers

Farming settlement support for young farmers

Purpose

- To attract young farmers to rural areas and help them grow into healthy farming businesses

Description

- Provide up to KRW 1.1 million (\$800) per month for up to three years to young farmers with unstable income in the early stages of farming.

Eligibility

- 18 to 39 years old
- Evaluate the farming plans of young farmers to select support recipients

Criteria

- Differential payment according to the farming experience of young farmers
- KRW 1.1 million (\$800) per month for the first year of independent agricultural management, 1 mil. won (\$720) per month for the second year, and 0.9 mil. won (\$650) per month for the third year

Farmland Assistance Program for Young Farmers

Description

- Supporting young farmers with farmland owned by retired/transition farmers
- Helping young farmers build a stable farming foundation

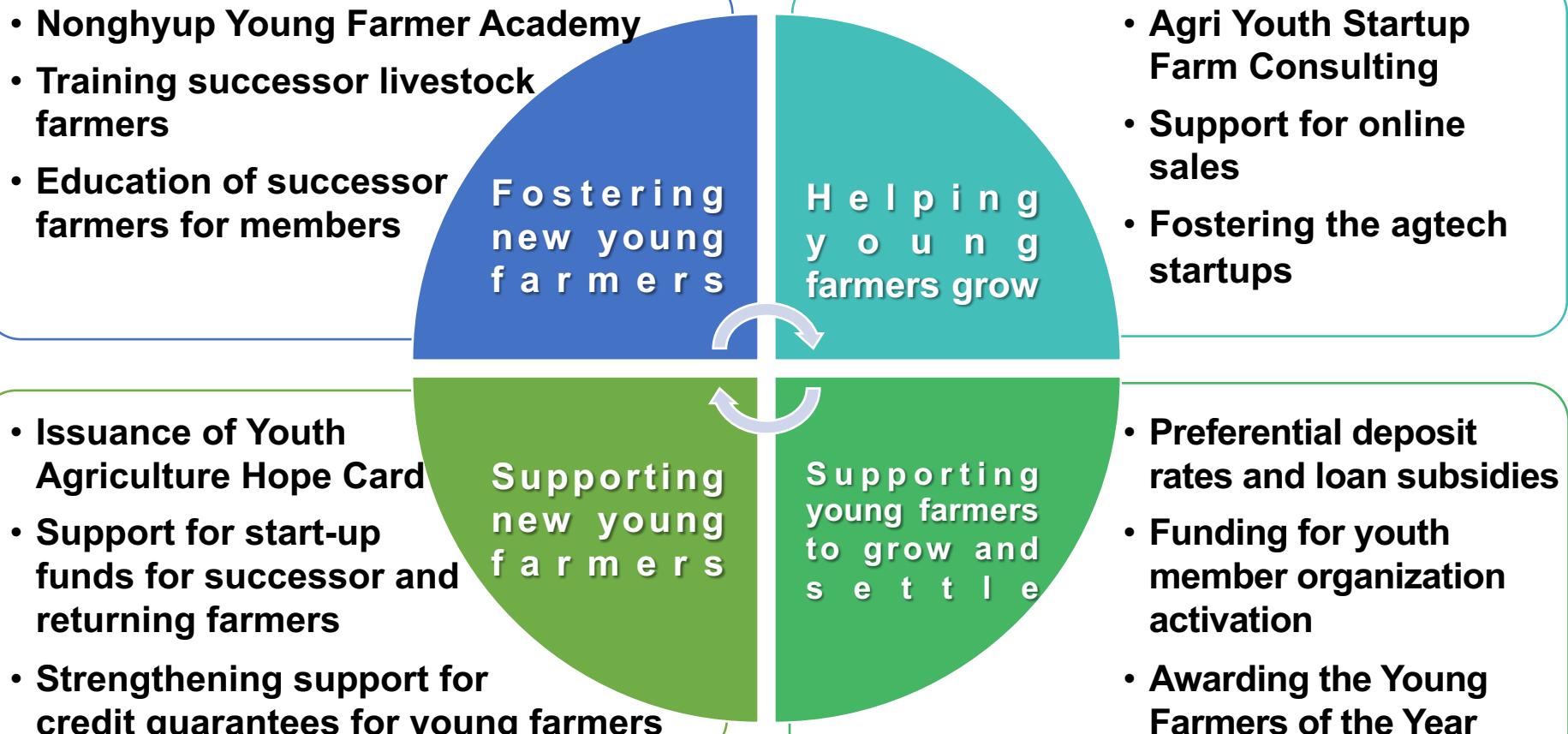
Eligibility

- 18 to 39 years old
- Selected by local governments

Support

- Farmland Sale: Government purchases non-farmers' farmland and sells it to young farmers at long-term low interest rates (1% per year, repayable in equal installments for up to 30 years)
- Purchase of farmland for public lease: The government purchases farmland and leases it to young farmers on a long-term basis
 - Rent negotiated at 50-100% of the standard rent, lease period of 5 years
- Pre-leasing and selling: Young farmers cultivate farmland on a long-term lease for up to 30 years, subject to purchase, and receive ownership of the land upon full payment of the land purchase price during the lease period
 - Annual interest rate of 1%, repayment of principal in equal installments

NACF conducts various programs and support to foster young farmers and successor farmers



Training elite young farmers

- Operating the 'Young Farmer Academy' to foster competitive and elite young farmers who will lead the future of agriculture
- We select 100 young farmers under the age of 40 and support the stable settlement of young farmers through a systematic and differentiated education curriculum including theoretical education and field practice.
- Major training contents: basic agricultural education, farm field training, business plan training, etc.
- Supporting successful rural settlement by providing customized comprehensive consulting and sales for graduates



Graduates of the Young Farmers Academy



554명

Farming Settlement Rate

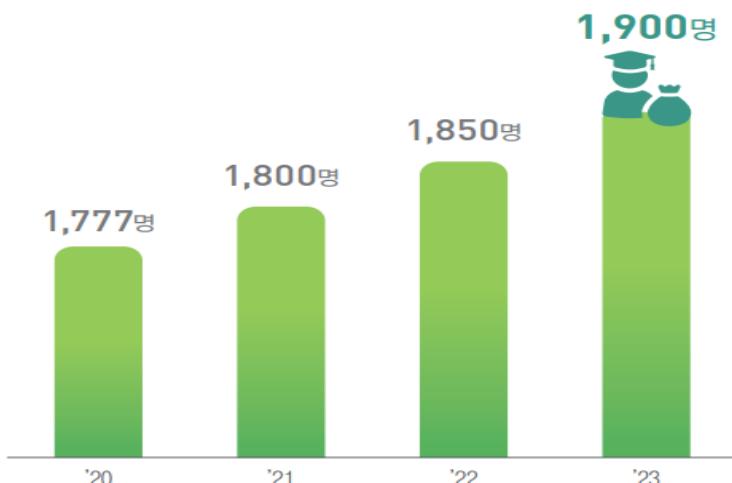


56.9%

Fostering livestock successors

- The aging of livestock farmers and the deterioration of livestock management conditions due to the strengthening of environmental regulations on livestock farming have led to a growing problem of the number of livestock farmers.
- In response, NACF opened and operated the 'NH Korean Beef Specialized Training Course', the only long-stay training program in Korea, to foster young and successor livestock farmers.
- Establishing a foundation for a sustainable livestock industry by systematically fostering new professionals in the industry

Support organize successor livestock producers



NH Korean Beef Specialized Training Course



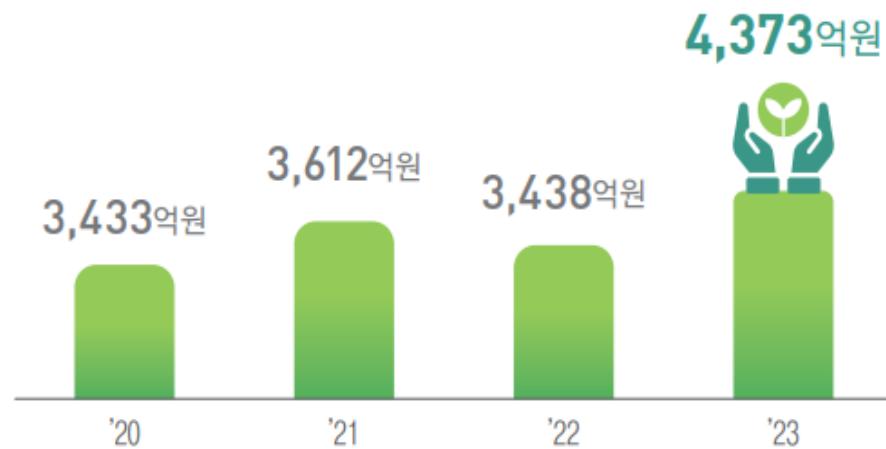
Supporting agriculture and rural youth entrepreneurship

- Financing is the most difficult issue faced by young farmers in the process of starting a farm business.
- NACF is supporting the stable settlement of young farmers by expanding credit guarantee support for young farmers and farm start-ups through continuous consultations and proposals with the government and related organizations.
- Developing credit guarantee products that can support young farmers to stabilize their agricultural management.
- Expanded credit guarantee limit for young farmers: KRW 300 mil. (\$216,000) → KRW 500 mil. (\$360,000) per person

Expanded credit guarantee limit for young farmers

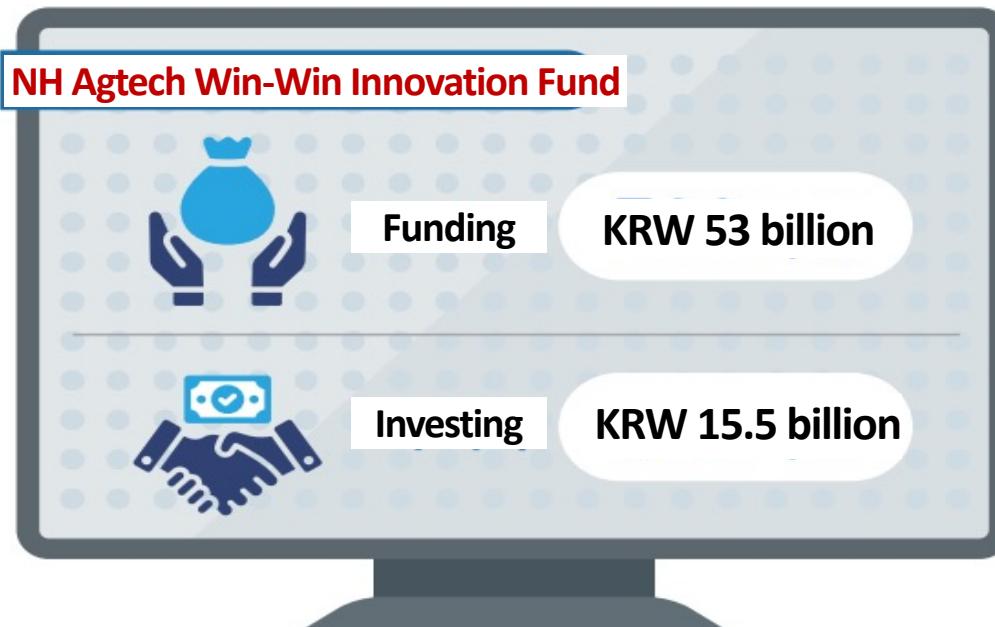


Guaranteed loan support for young start-up farmers



Boosting agtech investment to attract young farmers

- Supporting the development of agri-food convergence startups: investment, customized startup education, and mentoring
- To promote the influx of young people with creative ideas in agri-food-related industries, the 'NH Agtech Win-Win Innovation Fund' was established to invest in promising agtech innovators.
- Operate the "Agtech Youth Startup Campus" to provide startup education and consulting for startups in the agricultural industry.

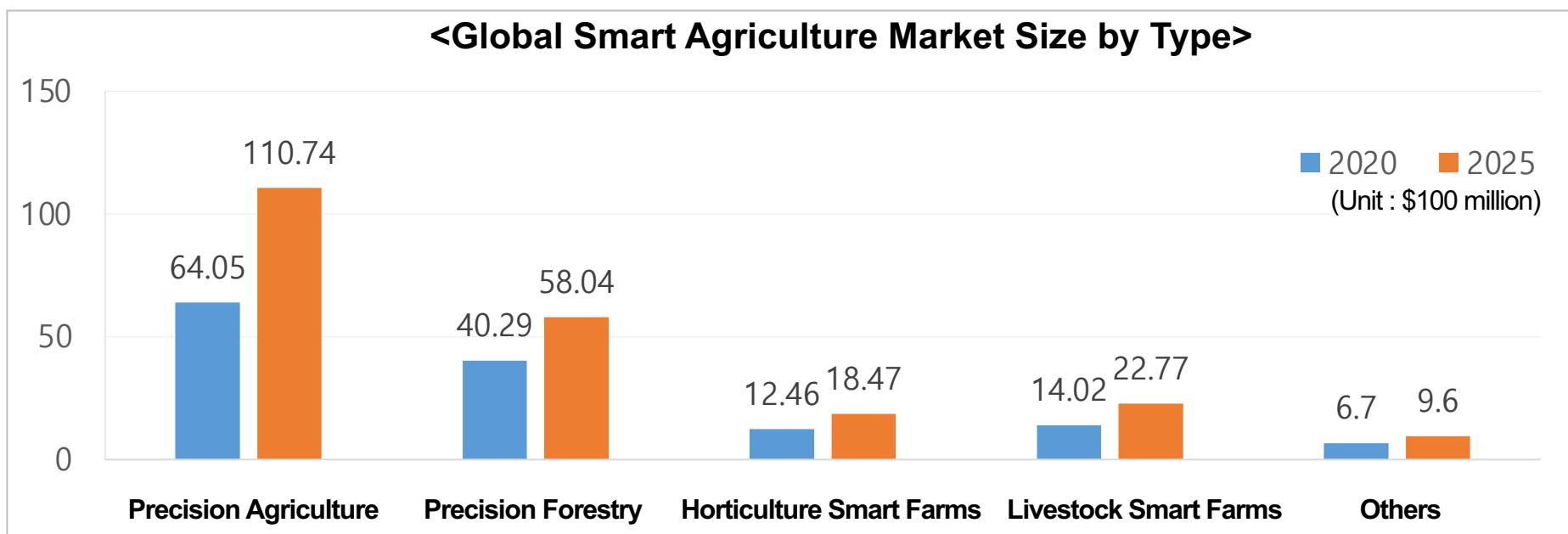


According to the survey of young farmers, the main difficulty in engaging in agriculture is lack of funds, followed by difficulty in securing farmland and agricultural facilities, difficulty in acquiring farming skills, lack of on-the-job training, and difficulty in securing sales

- Lack of initial funds is the biggest burden for young farmers, especially for those who bought farmland and started their own business rather than renting farmland.
- Even with the government's farming settlement support, most young farmers struggle with insufficient living expenses and lack of operating funds.
- When it comes to establishing agricultural infrastructure, it is very difficult to find farmland, and rising land prices and limited access to financing for facilities are also obstacles.
- Young farmers' acquisition of farming skills is mainly dependent on leading farmers in rural areas, and the government's mandatory training courses for farming settlement support programs are not realistic.
- In a situation where it is difficult to establish the foundation for agricultural production and production activities alone, young farmers feel a lot of difficulty in securing sales channels by themselves.
- Young farmers suggested system improvements such as 'Expanding farm settlement subsidies,' 'Establishing a loan support system for initial operating funds for start-up farms,' 'Providing specialized counseling and guidelines on loans for successor farms,' 'Expanding the supply of farmland to young farmers,' 'Easing restrictions on off-farm work,' and 'Expanding mentoring with leading farmers in the region to support practice'

Advancing smart agriculture

- Global smart agriculture market continues to grow as countries respond to population growth, climate crisis, and more
- The global smart agriculture market is expected to grow at a CAGR of 9.8% to reach \$22 billion by 2025, from \$13.8 billion in 2020, according to market research platform MarketsandMarkets.
- By type of smart agriculture, precision agriculture is expected to grow at a CAGR of 11.6% to reach \$11 billion by 2025 from \$6.4 billion in 2020, and facility horticulture smart farms are expected to grow at a CAGR of 8.2% from \$1.2 billion in 2020 to \$1.8 billion by 2025.



Smart agriculture in Korea

- Korea has been promoting smart farming since 2014, focusing on facility horticulture.
- Since 2018, the Ministry of Agriculture, Food and Rural Affairs has been actively promoting the development, spread and dissemination of smart farm models.
 - In 2018, the Ministry announced the 'Smart Farm Spread Plan' aimed at spreading 7,000 facility horticulture smart farms.
 - In 2021, it announced the 'Comprehensive Plan for Spreading Smart Agriculture Based on Big Data and Artificial Intelligence' and set a goal of spreading 8,000 facility horticulture smart farms by 2025.
 - In 2022, the 'Plan for Agricultural Innovation through the Spread of Smart Agriculture' was announced, with the goal of smartizing 30% of total agricultural production by 2027.
- The area of facility horticulture smart farms in Korea is estimated to be 6,485 hectares in 2021, which is 11% of the total facility horticulture area in Korea.
 - The average smart farm area per farmer is 0.51 hectares, which is very low compared to other leading agricultural countries such as the Netherlands (4 hectares).
- Currently, 84.2% of smart farms in Korea are first-generation smart farm models that can control facilities remotely but have relatively low technology levels.
 - Only 15.8% of the second-generation models, which collect and analyze various agricultural data in real time to enable precise growth management, are widespread, and the third-generation models with full-scale unmanned automation technology are still in the development stage.

NACF set up a digital innovation office at its headquarters in 2021 to actively promote digital transformation of its business, incl. member cooperatives

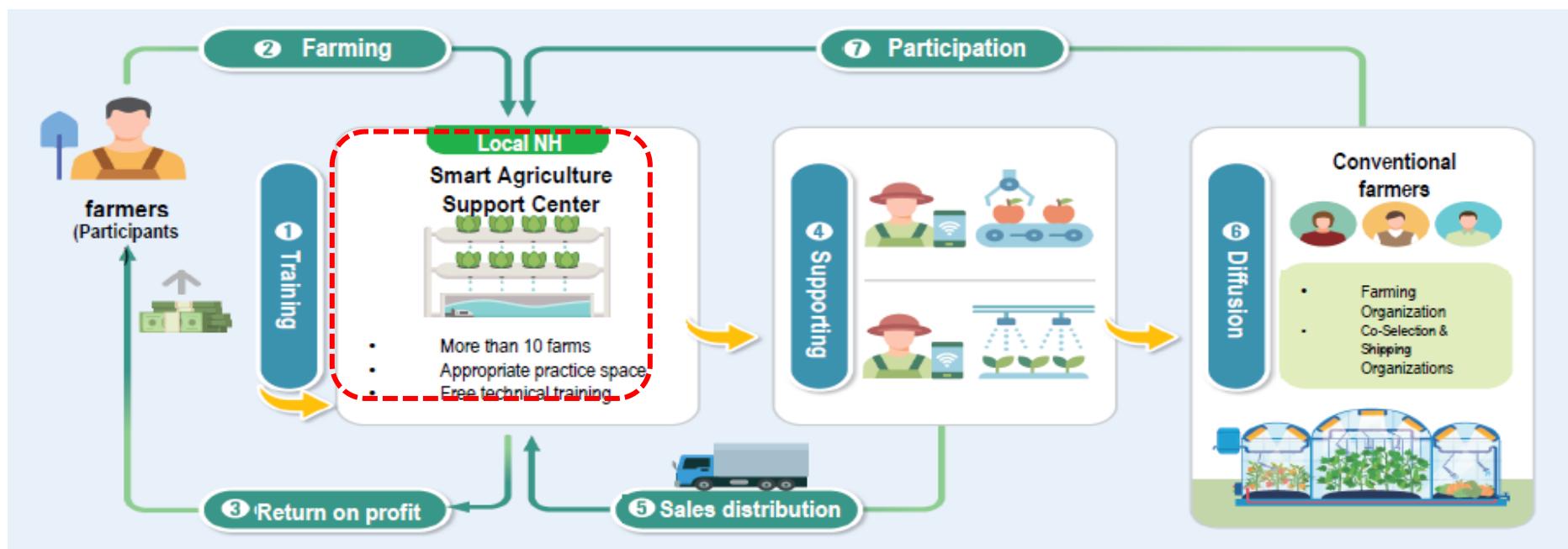
- Digital Innovation Office serves as the digital innovation control tower of NACF.
- It establishes and implements the "Comprehensive Promotion Plan for Digital Innovation of NACF" and operates the "Digital Innovation Committee" for smooth promotion of NACF's digital innovation plan and smooth linkage and coordination by business area.

In particular, we are promoting the cooperative smart farm and entry-level smart farm business to build and spread the foundation for facility horticulture smart agriculture.

- NACF has established a strategy for "NH OCTO," a cooperative smart farm, and promoted the spread of smart farms at the entire orgarnisation level and the development of customized services based on big data to spread smart agriculture.
- In addition, to build a foundation for smart agriculture, NACF has established its own big data platform N-Hub, which links data from all cooperatives, to provide data-based farming services to producer farmers.
- Establishing the "NH Smart Agriculture Support Center" to help small and medium-sized farmers and young farmers who want to introduce smart farms to easily receive smart farm education and practice within their immediate living area without direct investment.

Establishment of NH Smart Agriculture Support Center

- Establishment of smart farming support centers where farmers preparing to introduce smart farms can receive smart farming technology training and practice (4 locations nationwide)
- Organizing a 'Smart Farm Consulting Support Group' to provide step-by-step consulting to farmers introducing smart farms, discovering smart farm ICT equipment, and promoting the supply of farm grids.
- The Smart Agriculture Support Center provides comprehensive support for farmers' practical training in smart agriculture, as well as start-up support, commercialization and sales and distribution of agricultural products produced.



Expansion of NH Smart Agriculture Support Center

- In the future, the Smart Agriculture Support Center will be expanded from the method of establishing the center by the agricultural cooperatives themselves to the method of linking with local governments or cooperating with private companies with advanced smart farm technologies.
- By continuously expanding the center to establish a total of 16 centers by 2024, we will provide opportunities for small and medium-sized farmers, young farmers, and prospective farmers to easily acquire smart agriculture technologies within their living areas.



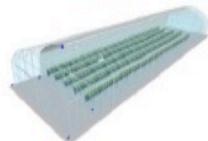
Developing and disseminating an affordable smart farm model for SME farmers

- NACF is actively promoting the development and dissemination of smart farm models that can minimize the investment cost burden on SME farmers and make it easier for them to adopt.
- Developed 11 types of entry-level smart farms that can minimize the burden of initial investment costs and provided consulting support to farmers to help them adopt smart farms. (2 Semi-smart, 2 for Single Span, 6 for Multi Span, and 1 Plant Factory)

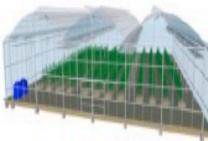
Semi-smart model 2 types



for Single Span 2 types



For Multi Span 6 types



Plant Factory 1 type



Installation in existing greenhouses or field farms



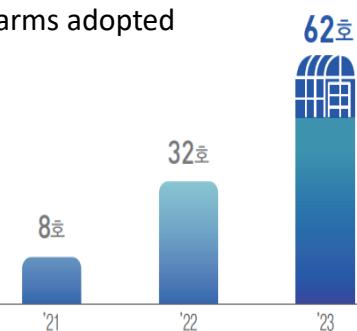
Standardized Smart farm of 0.2 to 0.5 hectares



Warehouse- & Container-type Smart farm



Entry-level smart farms adopted (cumulative)



Providing consulting support



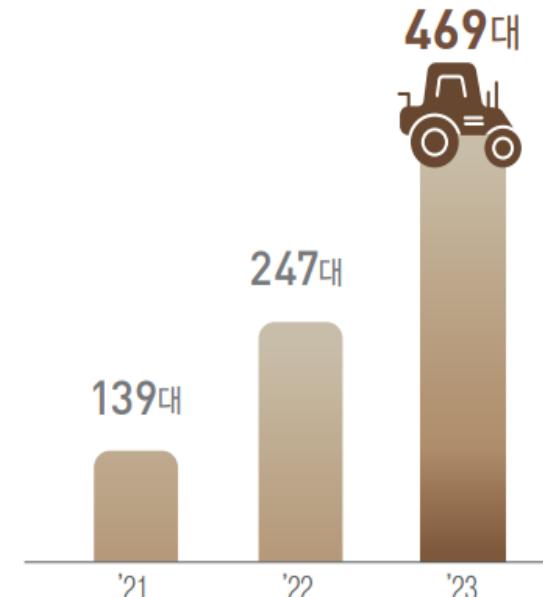
53농가

Expanding access to smart farming equipment and inputs

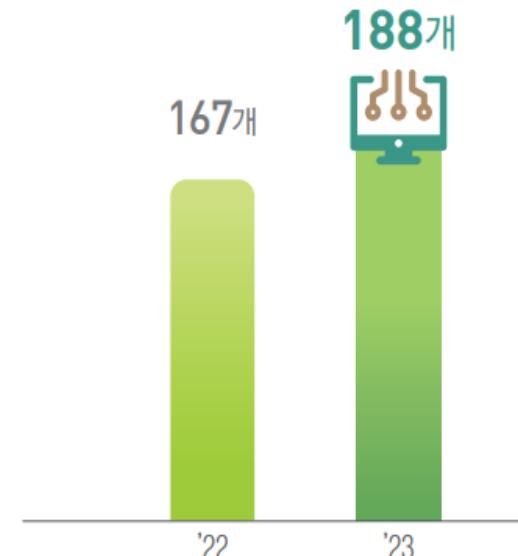
- NACF is promoting the distribution of smart farming equipment to alleviate the shortage of farm labors, an inherent problem in rural areas.
- In addition, it has expanded the supply of smart farm ICT equipment to make it easier for farmers to adopt smart farms.



Smart Farming Equipment Adoption



Grid supply items of ICT equipment



Build a digital farm map platform

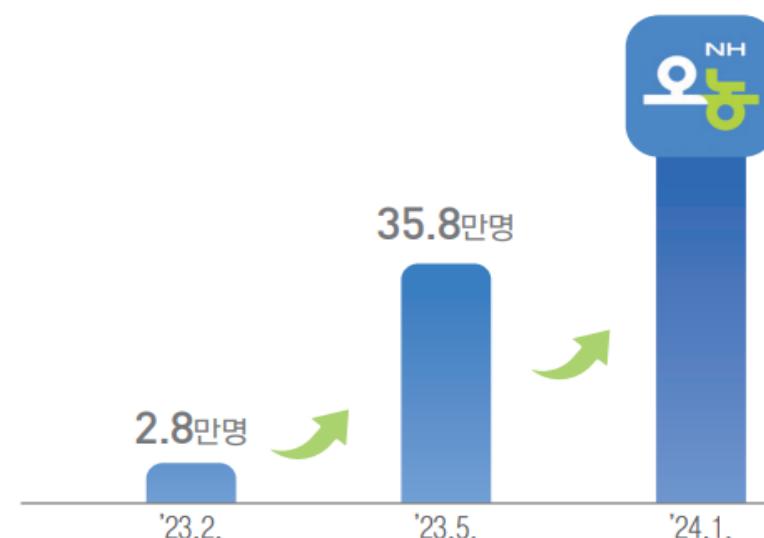
- NACF developed and distributed the "NH Today Farming" app, a comprehensive farming information portal, to provide one-stop farming services to farmers.
- Farmers receive customized information on farming techniques, farm work management, meridian prices, pest outbreak information, and farm diary creation through a convenient smartphone app and utilize it for farming.



'NH Farming Today' subscribers

'23.2.14. 신규오픈'

60만명

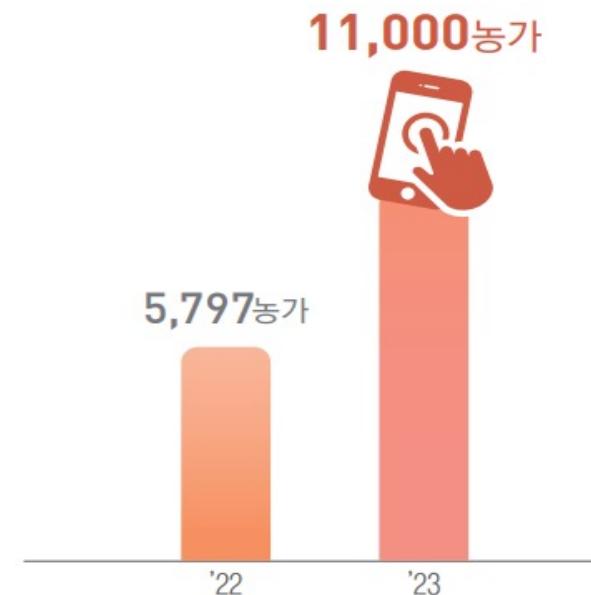


Expanding digital farming support for livestock

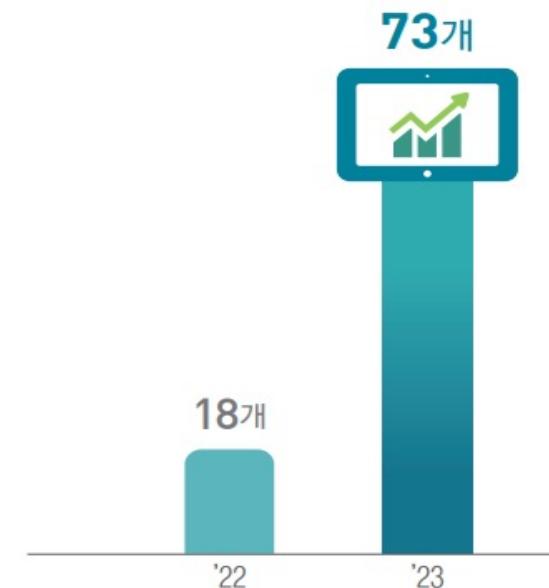
- NACF developed a data-based farm management app, 'NH Hanaro Ranch,' to reduce labor and improve farming convenience for livestock farmers and distributed it to Korean beef farmers.
- In addition, NACF developed the 'NH Livestock Market' platform to handle all livestock market tasks using smart devices and distributed it to livestock cooperative markets nationwide.



'NH Hanaro Ranch' members

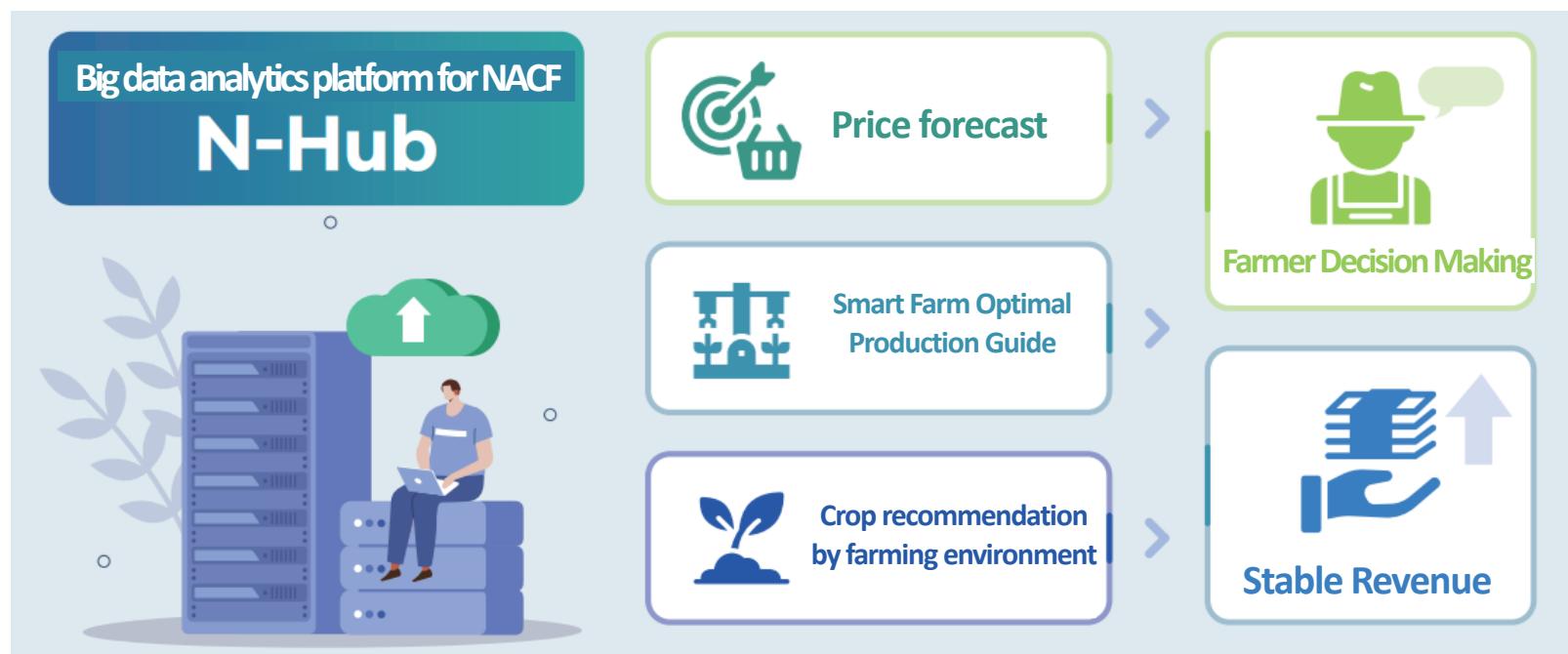


'NH Livestock Market' penetration trend



Establishing a big data analytics platform for NACF

- NACF has built the N-Hub big data platform, which links internal data with external public data from government and agriculture-related organizations, to support farmers' businesses through big data analysis.
- The N-Hub big data platform provides data such as agricultural product price forecasts, crop recommendations by farming environment, and Hanaro Mart customer analysis to help farmers make decisions and generate stable profits.



Build a Smart Agricultural Product Processing Center (APC)

- NACF is promoting the smartization of the entire facility from receiving, sorting, packaging, and shipping at APC facilities, which are the core facilities for the distribution of agricultural products in the production field.
- Smart APC models targeting 10 agricultural products have been developed and distributed, and 7 smart APCs based on informationization automation facilities have been built as of 2023.
- The introduction of smart APCs has streamlined work procedures, resulting in a 50% increase in work efficiency compared to the previous system.



Process of Smart APC (Agricultural Products Processing Center)

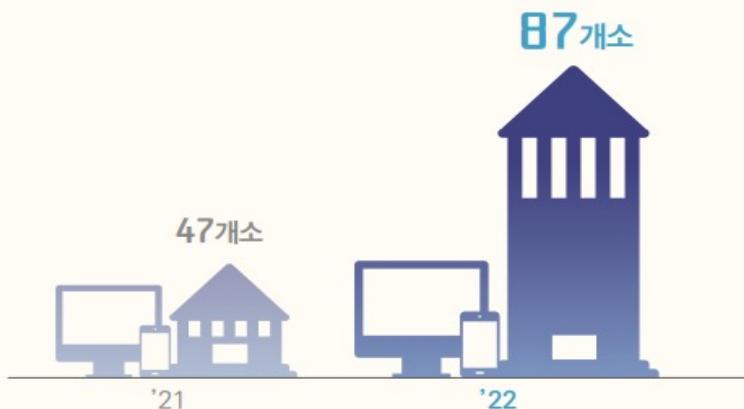


⇒ Large packaging machine ⇒ Automated taping machine ⇒ Small packaging machine ⇒ Robotic palletizer

Build a Smart Rice Processing Complex (RPC)

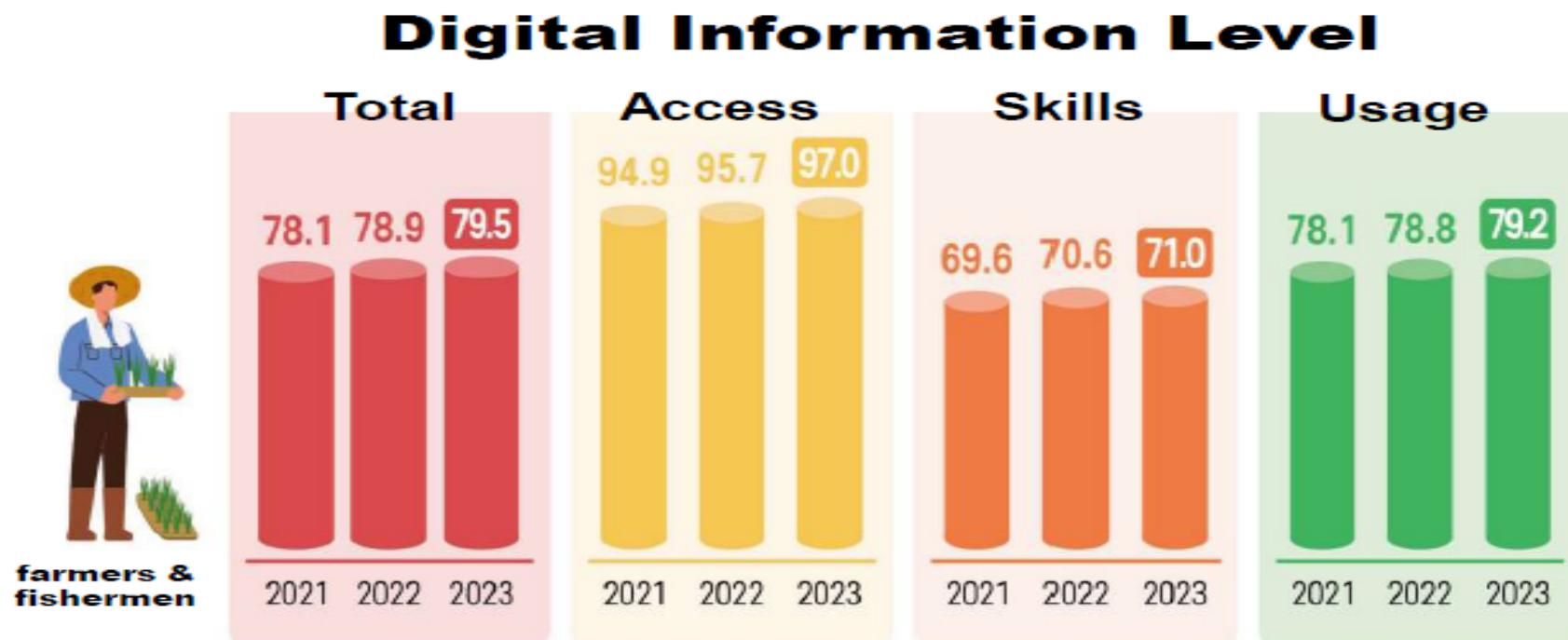
- NACF is promoting the smartization of its rice processing center (RPC) facilities to improve automation and inventory management efficiency of the grain processing process.
- In 2021, NACF completed the development of the first phase of the smart system that connects the RPC input process with the internal computer system, and as of 2022, it has deployed 87 NH RPCs.
- In addition, in October 2022, we completed the development of the second stage of the system that connects the RPC processing process with the internal computer system of NACF, and promoted the pilot deploy to two NH RPCs, and plan to actively expand the supply in the future.

Phase 1 Smart RPC System Deployment



Smart and digital agriculture in rural areas is hampered by information gaps

- Farmers' information levels in all areas of access, skills, and use of digital information have improved each year, but are still below average.
- Farmers' digital literacy is only 79.5 on an average digital literacy scale of 100, and is even lower than the general average, especially for technical literacy and use of information.



*The digital information level of the general public is set to 100

3 Challenges ahead

Excessive costs, technical challenges, and difficulty collecting and analyzing data during actual smart and digital agriculture adoption

- A survey of farmers with smart farms found that only 51.5% of horticulture farmers, 26.9% of fruit farmers, 23.5% of field crop farmers, and 61.8% of livestock farmers collect data.
- A survey of farmers with smart farms found that only 51.5% of horticulture, 26.9% of fruit, 23.5% of field crop, and 61.8% of livestock farmers collect data.

The most difficult thing in the process of adopting smart farms
(unit : %)

	Costs	Skills	Fac.	Infra.	Corp.	others
Horticulture	32.2	26.9	14.2	13.7	11.4	1.6
Orchard	19.1	45.7	9.6	17.7	8.0	-
Field farm	5.8	35.9	4.3	16.3	37.7	-
Livestock	65.6	19.4	4.3	-	4.1	6.5

Source: 2022 Smart Agriculture Survey(EPIS, 2023)

Data collection
(unit : %)

	collected	no collected	(if collected) who collects?	
			By oneself	agency
Horticulture	51.5	48.5	78.5	21.5
Orchard	26.9	73.1	56.3	43.7
Field farm	23.5	76.5	96.0	4.0
Livestock	61.8	38.2	72.7	27.9

Data analysis
(unit : %)

	analyzed	no analyzed	(if analyzed) who analyzes?	
			By oneself	agency
Horticulture	38.2	61.8	73.2	26.0
Orchard	20.4	79.6	54.2	45.8
Field farm	9.9	90.1	90.5	9.5
Livestock	38.4	61.6	64.6	36.3

Quality data is key to enabling smart agriculture

- In leading agricultural countries, data is collected in real time through various IoT sensors, and the spread of smart farm systems connected to cloud-based big data platforms is expanding.
- Therefore, it is important to secure various types of agricultural data as the development of big data and AI technology expands the scope of data analysis and utilization.

Need for S/W development, an important factor that determines the technical level of smart agricultural systems

- In early smart farms, development of H/W technology that monitors the growing environment of cultivated crops using various sensors and enables remote control was emphasized.
- Currently, it is important to develop S/W necessary for automatic control and management of smart farms by managing and analyzing various data, controlling the cultivation environment, and monitoring the growth status of crops.

Need to develop different models to lower the barrier to entry for smart farm adoption

- According to a related survey, the main obstacles to the introduction of smart farms in 2021 are installation costs (38.3%) and low understanding of smart farm technology and equipment (28.8%).
- It is necessary to actively develop a system with low barriers to entry by applying appropriate technologies that take into account the agricultural and rural environment of each country.

Thank you for listening