



Industry-Academia Collaboration: Development, Dissemination, and Application of Localized Pig Husbandry Welfare Farming Technologies

Company/Organization

Heilongjiang Dong Nong Animal Husbandry Technology Co., Ltd.

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Abstract

Founded in 2014, Heilongjiang Dong Nong San Hua Pig Husbandry and Food Co., Ltd. is a modern animal husbandry company built on industry-academia collaboration, which integrates R&D, breeding, rearing, value-added processing and marketing of San Hua Pig^[1]. The company has adapted the international welfare farming principles into localized farming technologies for application. In 2017, Northeast Agricultural University established Heilongjiang Dong Nong Animal Husbandry Technology Co., Ltd. which further advanced these technologies, conducted extensive industry-wide technical dissemination and science communication. In doing so, it facilitates broader access to these technological achievements among companies, paving the new way for relevant enterprises towards welfare farming practices.

Keywords

San Hua Pig, localized welfare farming, low-stress farming, industry-academia collaboration, technology dissemination

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Case Introduction

Background

Since the late 1980s, China has gradually become the world's leading pork producer and consumer. In 2017, China's hog inventory accounted for more than 50% of the world's total inventory^[2]. Over the last decade or so, China has been advancing rapidly in terms of large-scale and intensive pig farming. The statistics in 2022 indicate that about 58% of China's hogs are raised in large-scale farms. The ratio is expected to further increase to more than 65% in 2025^[3].

Generally speaking, intensive farming and welfare farming that aligns with animals' natural instincts are two opposing concepts. In many phases of intensive farming, animals are under stress. Given that China's pig production is going through an industrial transformation of intensive and large-scale farming, it is not easy to go off the beaten path in search for welfare farming. For

the vast majority of animal farmers who emphasize practicality, the idea of animal welfare farming seems no more than a benevolent slogan. Without supporting guidance on animal farming technologies, these concepts will find it difficult to be directly translated into economic benefits.

However, the welfare farming practice is highly promising. With better care and living conditions, Dong Nong San Hua Pig products are healthy and safe for consumption. Each branded pig generates at least a profit of RMB 500 (approx. USD 68.50)^[4]. Over the last decade, Northeast Agricultural University being a highly established agricultural research institute has been promoting the innovation and improvement of farming technology and on-going localization of welfare farming.

Case story

The company's R&D background

Northeast Agricultural University presents significant scientific research advantages in breeding and rearing the "Dong Nong San Hua Pig". Since the 1970s, researchers in Northeast Agricultural University have been working on the farming and germplasm conservation of Northeast Min Pig. After more than 8 years of crossbreeding with foreign swine since 2000, researchers successfully developed Dong Nong San Hua Pig, a new breed that features juicy and tender meat and improved growth performance. Dong Nong San Hua Pig inherits the advantages of cold-resistance, disease-resistance and high rate of reproduction

from Northeast Min Pig, together with fast growth rate and high weight increasing rate from foreign breeds.

Since 2009, researchers in Northeast Agricultural University have been researching into pig welfare farming technologies. In the initial phase of laboratory research, the team followed the footsteps of the United Kingdom. Although valuable knowledge (e.g. measures to improve disease resistance and raise healthier pigs) was gained through the process, the team recognized the fact that foreign farming models - being labor intensive and inefficient - do not suit China's reality. A notable example is that in foreign

countries, sows are predominantly raised in large groups. However, there remains a significant gap in domestic breeding techniques and management standards (such as estrus detection and biosecurity management levels) compared to those abroad, making it incompatible with the large-group housing model. To address this issue, the team switched to a small-group model with less than 20 sow in one group, which not only reduced the cost, but also guaranteed living conditions and the health level of sows.

The reason that Professor Liu Honggui and his team in Northeast Agricultural University established the welfare farming company was to develop heathier products for their family and friends at the same cost. In 2014, sticking to the aspiration of providing quality-assured, safe and delicious meat products, Northeast Agricultural University and Harbin Qiulin Yunyan Group jointly set up a joint-stock enterprise called Heilongjiang Dong Nong San Hua Pig Husbandry and Food Co., Ltd. (hereinafter referred to as Dong Nong San Hua Pig Company) dedicated to the healthy farming of Dong Nong San Hua Pig and its derived meat products.

The welfare farming method of Dong Nong San Hua Pig Company can be summarized in the table below ^[5]:

Sow-stall free farming	- Designed a farming system that improves pigs' living condition and enables their natural behaviors. - Collaborated with Longjiang Forest Industry Group to design and apply a farming system that is completely free of sow stalls. No farrowing crates or sow stalls are used during all stages of reproductive management from mating, observation, gestation to farrow.
Reduce aggression	During the gestation phase, reduce the number of sows in each mixed

	group. During mixing, straw is provided once a day to each pen to provide comfortable bedding and improve sense of satiety. - Provide sows with manipulable materials like straw, and adequate space (3.5 m²/pig). - The farms are equipped with innovative farrowing pens, with a piglet creep area (2 m x 1.5 m) between every two pens. Before weaning, piglets from both pens will enter the creep area for 1-2 hours at specific time slots to reduce post-weaning aggression when these piglets are mixed into groups.
Group housing method	- Adopting group housing methods instead of stall confinement rearing does not affect production performance. - Equip the farms with Electronic Sow Feeder (ESF) systems that allow a specific amount of feed to be allocated to each sow in accordance with its weight, leading to improved health condition of the sows and reduced workload for the staff.
Reduce stress levels	- Group housing allows a larger space. - Replace farrowing crates with non-confinement farrowing pens.
Almost antibiotics free	Antibiotics used seldomly. Instead, they are replaced with herbs and herbal products that are easy to digest. The industrial average cost of veterinary medicine is about RMB 80 (approx. USD 11) per pig, whilst the cost for Dong Nong San Hua Pig Company is merely RMB 20 (approx. USD 2.80).
No tail docking or teeth clipping	Tail biting can be triggered by more than 20 factors, mostly as responses to stress. Hence under intensive pig farming, tail docking is commonly adopted to avoid tail biting. By improving housing environment, increasing the supply of straws, ensuring appropriate ventilation and

	clean bedding, Dong Nong San Hua Pig Company successfully reduced tail biting induced by environmental factors and managed to gradually end tail docking. To avoid fighting-associated injuries by piglets in suckling contests, teeth clipping is commonly adopted in intensive pig farms despite that it may increase stress levels of piglets. In order to improve the living conditions of piglets, Dong Nong San Hua Pig Company has gradually abandoned teeth clipping by providing straws to distract piglets from fighting. Results show that avoiding teeth clipping has not affected the piglets' milk consumption nor their daily weight gain. The estimated injury to sow breasts is approximately 1% whilst injuries caused to piglets and farm staff are minimum.
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Establishing “Dong Nong Animal Husbandry Company” for welfare farming technologies dissemination

In 2017, Northeast Agricultural University ceased collaboration with Dong Nong San Hua Pig Company and organized a team of professors, lecturers and doctoral researchers to found Heilongjiang Dong Nong Animal Husbandry Co., Ltd. (hereinafter referred to as Dong Nong Animal Husbandry Company). To facilitate wider adoption of localized welfare farming techniques, Dong Nong Animal Husbandry Company has been promoting localized low-stress animal farming technologies to other enterprises in order to provide them with technological assistance as well as effective advice on business operations and corporate branding.

However, it was not an easy process. Be it owners of large-scale industrial farms or small-scale free-range farms, pig farmers tend to be skeptical of new concepts and technologies when they are first

introduced. As the saying goes, "A single move can affect the overall situation." The livestock farming industry itself is inherently high-risk, with relatively limited room for profit growth. When pig farmers cannot ensure business survival, they would hardly consider improving pigs' living conditions. Meanwhile, for improvement in growth performance and health conditions, the adoption of new concepts and technologies do not necessarily yield immediate results; rather, they require a certain period to take effect.

Intensive farming models are adopted by all large-scale pig farming enterprises in China. The larger the enterprise is, the longer and harder for it to complete the transformation process. Therefore, Dong Nong Animal Husbandry Company decided to kick start the promotion process with small and medium-sized pig farming enterprises and cooperatives. The project team will need to describe clear transition pathways, provide technical support, feasible guidance as well as assistance in service and operation, so as to help pig farmers to strike a balance between animal welfare and its own profit margin. Only by doing so will the concept of animal welfare farming be put into practice, be standardized within an individual enterprise and for further technology dissemination be possible.

In order to dispel the concerns of the collaborative enterprises, Dong Nong Animal Husbandry Company decided to provide free technical support. As supporting data is required for any strategic decision, the team tried to first convince the enterprises to try their welfare farming methods on a small number of sows, and then apply it on a large scale after seeing positive results. The team finds their collaboration with Heilongjiang Jingzhe Forest Foods Group Co. Ltd (hereinafter referred to as Jingzhe) to be the most successful example. Before the collaboration, Jingzhe was also experimenting with welfare

farming methods, but encountered many technological and operational deficiencies. Professor Liu Honggui recalls the welfare farming model that Jingzhe was initially adopting was more or less a foreign model. Unsurprisingly, it was associated with high input cost and low efficiency. Dong Nong Animal Husbandry Company provided technical support to tackle these issues, easing the burden on the start-up pig farmer. For instance, located in the sub-frigid zone with clear seasonal differences and major temperature variability, Jingzhe's pig pens were equipped with fixed-speed fans which did not meet local ventilation requirements. By utilizing the programmable variable-speed fans recommended by Dong Nong Animal Husbandry, air can be preheated before ventilation during the cold season, thereby ensuring a consistent indoor temperature, reducing the pigs' stress reaction to cold air and

improving the pigs' living conditions.

During the promotion process, the team differentiated farming methods for different regions. In Southern China where the bedding is prone to wet damage due to the humid climate, other measures are taken to provide effective environmental enrichment to pigs. For example, dynamic and random white noises (such as birdsong, wind chimes, and flowing water) are played to enhance pigs' curiosity about the natural environment and to familiarize them with different physical environments, thus easing potential stress reactions to thunderstorms. In addition, the team takes measures like providing the pigs with a variety of toys, significantly reducing aggressive behaviors among pigs and improving animal welfare conditions.

Results and Impacts

- In 2015, Dong Nong San Hua Pig Company was awarded the 5 Star Good Pig Production Award by Compassion in World Farming for meeting the following criteria:
 - Group housing of gestating sows with a suitable environment (including temperature control and hygiene), and required specific food safety requirements – Achieved
 - No sow stalls or farrowing crates – Achieved
 - Provision of appropriate bedding and manipulable material throughout life – Achieved
 - No tail docking – Achieved
 - No teeth clipping – Achieved
- Since 2017, Dong Nong Animal Husbandry Company has adopted a production mode that features an alliance of leading enterprise and small-scale farmers, together with a sales mode that integrates direct-to-customer stores for chilled and cured meat product with hotel chain and online sales. A breeding stock farm located in Qiqihar city became the first partner farm. The first franchised breeding farm has been established at Qiqihar Farm, covering a vast area of 15,000 m² and capable of housing 500 sows.
- Since 2017, Dong Nong Animal Husbandry Company has provided technology and management

training to more than 50,000 people, including technical extension workers at all levels, poverty reduction officers, university teachers and students.

- At present, the company owns 500 Dong Nong San Hua sows, with an annual slaughtering scale of 10,000 pigs. Welfare farming methods supplemented by intelligent and automated equipment are adopted throughout the whole production process.
- The company's pork products have gained the attention of citizens in Harbin and the endorsement of local middle to high income households, becoming one of the most significant high-end pork brands in Heilongjiang province. Relevant government agencies in Harbin Municipal People's Government, Heilongjiang Province highly recognized Dong Nong Animal Husbandry Company's welfare farming methods, advanced scientific research achievements, high-quality products, and the industry-academia collaboration model. Mr. Zhang Wanping, vice mayor of Harbin praised Dong Nong San Hua Pig for its broad development prospects. He also encouraged the company to provide more antibiotic-free, safe, healthy and high-quality pork, develop Dong Nong San Hua Pig to the No.1 pork brand in Harbin, and strive for a distinctive path of development.

Future prospect

The pig farming industry was heavily affected by the Covid-19 pandemic, so did the production and technology promotion activities of Dong Nong Animal Husbandry Company. Looking toward the future, the company wishes to collaborate with more pig farms and help existing partners to stick to welfare farming methods. Next, the team will attach greater importance to marketing, with the hope to increase consumers' awareness and recognition to promote welfare farming marketing. They plan to act in two phases:

- Firstly, the company will establish sales channels and promote their products in Beijing. Collaborating with local companies, the company aims to expand to mid-range and high-end markets, such as high-end restaurants and gourmet grocers.
- Secondly, the company will develop and sell derived meat products catering to regional target groups. Focusing on young consumers in developed southern regions such as Shanghai and Guangzhou, the company will develop products such as sausages, bacon and dumplings.

Discussion

Welfare farming method will not only benefit farm animals but also farmers and consumers. Improved animal health leads to reduced drug expenses and better product quality, which yields higher profits for farmers. Consumers will also enjoy healthier meat products—a win-win-win situation for all. The success of Dong Nong Animal Husbandry Company does not only lie in its advanced research, but more importantly, in its comprehensive consideration of human and animal health, which serves as a valuable role model for today's animal farming industry.

Case Analysis

Dimensional analysis: levers of change employed in the case

Food production and supply	Production	Through learning instead of following the steps of foreign welfare farming, the company has successfully realized a series of localized small-group rearing methods that leads to higher efficiency. Different rearing methods are adopted in different regions to minimize operation costs.
	Technology dissemination	Dong Nong Animal Husbandry Company provides free technical training to enterprises. In collaborative projects, it first implements welfare farming practices on a small scale to demonstrate tangible results and then encourage large-scale adoption, ensuring the farming method's practical application. The company also differentiates breeding solutions for different regions to minimize operational costs.
	Conservation	By cutting overuse of veterinary antibiotics, the company has successfully protected the soil and waterbody in the animal farming environment from the pollution of antimicrobials and antimicrobial resistant bacteria.
	Livelihood	Through welfare farming, the added value of animal products can be enhanced, leading to increased income of animal farmers.
Food environment	Accessibility	The sales mode that integrates direct-to-customer stores for chilled and cured meat product with hotel chain and online sales has successfully enhanced the accessibility of welfare farming products.
Food demand	Financial capacity	Well positioned as a higher-end pork brand, Dong Nong's products have earned recognition and endorsement among middle-to-high income households.
	Information and education	Through active promotion of the visualization, standardization and branding of welfare products in China, the company has not

		only benefited other pig farmers, but also raised consumer (especially in the Northeast) awareness of welfare models, as well as the consumer acceptance and recognition of the products.
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Addressing the pillars of sustainable development

PEOPLE Nourishing everyone for health and wellbeing	By minimizing antibiotics usage, not only has the company eliminated potential antibiotic resistance, but it also safeguarded consumer health in ensuring zero residues of antibiotics and antimicrobial resistant bacteria. San Hua Pigs under welfare farming enjoy excellent living conditions and low stress levels, leading to high-quality and delicious pork products.
PLANET Producing in harmony with nature	By fighting against the misuse of veterinary antibiotics, the company has successfully reduced pollution of antimicrobials and antimicrobial resistant bacteria.
PROSPERITY Inclusive, transformative and equitable recovery for the 2030 Agenda	Localized welfare farming methods have managed to strike a balance from 3 aspects: producers' profit margin, animals' living conditions and affordable product prices.

References

- [1] Gao Wei. 2017. Dong Nong "San Hua Pig" in Heilongjiang Province Leads the Development of Modern Livestock. https://www.sohu.com/a/193878692_195907 [in Chinese]
- [2] Wang Defu, Huang Huinan, Zhang Hongjian, Liu Jianyu, Dong Xin. 2018. Analysis of Research Status and Development on Engineering Technology of Swine Farming Facilities. http://www.jcsam.org/jcsam/ch/reader/view_abstract.aspx?file_no=20181101&flag=1 [in Chinese]
- [3] Shao Haipeng. 2022. There are Three Drivers for the Scale Enhancement of Pig Farming Industry; Experts: Leading Pig Enterprises Cannot Expand Infinitely. Link: <https://www.yicai.com/news/101452207.html>
- [4] Northeast Agricultural University. 2017. Dong Nong San Hua Pig Livestock and Food Co., Ltd. in Heilongjiang Province. Link: <http://gjdxkjy.neau.edu.cn/info/1046/1152.htm> [in Chinese]
- [5] Compassion in World Farming. Excellent Case: Group Rearing of Sows – Dong Nong San hua Pig. Link: <https://www.ciwf.cn/upload/news/d7e778a7f088997df5c7db3209e3bee7.pdf> [in Chinese]