



# Starting from Scratch: Low-cost, Locally-based Laying Hen Welfare Farming

## Company/Organization

Tangshan City Fengrun District Free Eggs Farmers' Cooperative

## Author of this report

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## Abstract

Tangshan City Fengrun District Free Eggs Farmers' Cooperative is committed to raising high-quality free-range laying hens while maintaining ecological sustainability. Although having no professional experience in animal welfare farming, the cooperative studied the principles, independently developed a fully automated farming management technology, localized international welfare farming systems, and achieved automated chicken coop management at an extremely low cost. The practices, being innovative, replicable, and scalable, are valuable references for small farm owners.

## Keywords

free-range chicken, localized innovation, low-cost facility, automatic management, ecosystem restoration

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# Case Introduction

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## Background

Eggs are one of the most common ingredients on Chinese dining tables. Due to their low cost and great taste, eggs are widely accepted protein sources. According to the National Bureau of Statistics, China has the largest egg market in the world in 2021, with annual consumption reaching around 400 billion eggs—an average of 0.9 eggs per capita daily, which is double the global average.

In industrialized egg farming, laying hens are raised in wire cages for their whole lives, with movement space no more than an A4 sheet. While this farming strategy can significantly increase the egg production efficiency of the hens, in the meantime, the overly high stock densities, monotonous feeding patterns, and the strict control of animal medicine usage also potentially bring about negative impacts to the laying hens both psychologically and physiologically. Conversely, free-range farming is more suitable for the animal nature of laying hens, and elevates the qualities and nutritional values of the eggs. Research shows that compared to industrialized eggs, free-range eggs on average contain  $\frac{1}{4}$  to  $\frac{1}{3}$  less cholesterol,  $\frac{1}{4}$  less saturated fat, but  $\frac{2}{3}$  more Vitamin A, three times more Vitamin E, seven times more  $\beta$ -carotene, two times more  $\omega$ -3 fatty acids, and significantly higher levels of Vitamin D and Vitamin B<sup>[1]</sup>.

Currently, free-range farming still faces several technical challenges to overcome, it has demanding requirements for animal feed, and the environment, and demands greater effort from farmers, while resulting in a relatively low

egg production rate. Thus, from solely the perspective of productivity, it is not the best choice. In China, over 90% of eggs are still produced through caged farming system and only a small proportion of eggs are produced from crude free-range farming approach. In 2015, Mr. Wu Yao, the current head of Tangshan City Fengrun District Free Eggs Farmers' Cooperative (hereafter abbreviated as “the Cooperative”), started to purchase free-range eggs from individual egg farmers in his hometown in his spare time, and then sold them online. Nevertheless, he soon discovered that there were two major problems in the free range egg market. First, the market mechanisms were chaotic, with many so-called “free-range eggs” originating from cheap cage-produced eggs purchased by individual farmers. This led to the prevalence of counterfeit products. Second, it was hard to ensure egg quality as many farmers lacked scientific rearing knowledge. If the free-range farming processes are not properly managed, laying hens are prone to ingest more contagions and bacteria in the crude free-range environment, leading to potential health risks in eggs.

At the end of 2016, Wu Yao returned to his hometown Tangshan and established the Cooperative, officially starting his exploration of farming strategies for free range laying hens welfare farming. Yet at that time, there was very limited information regarding the systematic management of free range farming in China. As a Cooperative starting from scratch, how to take the first step?

## Case story

### Arduous attempts in the beginning

Wu Yao grew up in the countryside where his parents raised caged chickens. From an early age, he could proficiently patrol chicken coop, feed chickens, and collect eggs. Children in rural areas could run and play among fields wholeheartedly, while caged chickens have to live in the dark and humid chicken houses for their whole lives, solely for laying eggs. Wu Yao was deeply empathetic to those chickens and hoped to do something to improve their living conditions. This was his initial motivation for establishing the Cooperative.

However, as one of the first explorers in the industry, the Cooperative faced numerous difficulties during the first two years. As there were rarely any young people willing to work in egg farms due to the arduous environment and limited funding to hire experienced professionals, the Cooperative was only run by Wu Yao's parents and one other partner in the beginning. The small team needed to figure out everything related to welfare farming by themselves.

In terms of farming experience, the Cooperative followed the free-range strategies employed by local farmers. They located the egg farm in a mountainous terrain and let laying hens move around freely without any security measures. However, as there were many wild animals in the mountains, together with thefts from neighbouring farmers, only 1000 lay hens were left from the initial 8000. Due to their lack of market experience, the purchased pullets carried diseases and had low egg production and high death rates. Regarding relevant knowledge and techniques, their initial attempts at chicken feed compositions were not scientific enough. They also lacked proper management of temperature, humidity, and contagious diseases, which led to further loss. Besides, as they lacked modern intelligent farming

equipment, all work had to be done by themselves, including opening the chicken coops, chasing the chickens back to the coops, adding feed and water, and cleaning. This resulted in intense cost and stress for human resources. In addition, due to the high cost and weak circulation of free-range eggs, it was hard to balance production and sales. The Cooperative was struggling to survive at that time.

The turning point came in 2017. Yonghui Superstores Co., Ltd was undergoing organizational transformation then. Seizing this opportunity, the cooperative collaborated with Yonghui Superstores Co., Ltd in regions of Beijing, Tianjin, and Hebei, setting up specific free-range egg stalls in affiliated supermarkets. The supermarkets would order free-range eggs every week, which would provide the Cooperative with a relatively stable sales channel. After that, the Cooperative could control production based on order numbers, which reduced unnecessary investment. Considering that the Cooperative did not adopt a large-scale intensive farming strategy, their production was limited, and they faced difficulties with transportation, Yonghui Superstores Co., Ltd kindly set up policies so that the Cooperative did not need to worry about processing returned products, restocking products, or price reduction. Support from Yonghui Superstores Co., Ltd was a significant assistance to the Cooperative, which also laid the foundation for its continual survival.

### Localization of international welfare farming concepts

To elevate the scale and efficiency of egg farming, the Cooperative analyzed their previous failures and learned about free-range farming techniques of laying hens from YouTube videos from other countries. In 2020, the Cooperative started to follow international animal welfare standards in its

farming practices and implemented a series of major improvements. This included softening egg nests, fermenting litter, reorganizing perches, setting up areas for scratching, improving the environment, planting trees, etc. Different chicken stocks started to have separate sleeping, drinking, and egg-laying areas.

Nonetheless, imported free-range farming equipment, such as automatic feeding machines, water-supply systems, and gates, are very expensive. Therefore, the Cooperative independently designed a series of equipment, making low-cost intelligent management of the chicken coops possible. Cotton duvets were used to maintain the temperature within the coops, 480 square meters of which only cost just over 2000 RMB. Outside the cotton duvets was a layer of cement, while the inner surface used the same material as vegetable greenhouses, which effectively prevented the cotton duvets from directly contacting ammonia and water vapor. Meanwhile, to enable the laying hens to move around freely from dawn every day while reducing labor costs, the Cooperative spent around 80 RMB (about only 11 USD) on a magnetic latch system, together with timed switches. These formed an automatic coop gating system controlled by electricity that is shut at 7 p.m. and opened at 5 a.m. every day. Furthermore, the Cooperative designed a double-deck feeding cabinet. The upper deck can store feed that lasts for around 20 days for the stock, while the lower deck is fitted with PVC tubes. The laying hens can reach their heads into the holes for food. With this automatic feeding system, it only takes 2 minutes for a worker to finish feeding all hens in one coop, greatly saving labor costs. The aforementioned devices designed by the Cooperative not only reached the same effects as imported free-range farming equipment but also had much lower costs, which represents an extremely successful attempt at farming technique localization.

Aside from all these, the workforce of the Cooperative mainly came from left-behind old people, mentally disabled, and handicapped people from nearby mountain regions. This approach addressed labor surplus issues in these regions while reducing the cost of human resources.

### **Challenges and transformation from the pandemic, and more sustainable plans for the future**

Despite various breakthroughs and advancements mentioned above, in 2020, the sudden pandemic outbreak still hit the Cooperative hard. As the transportation routes to Yonghui Superstores Co., Ltd were blocked, egg production and sales dropped drastically. But various challenges did not affect the cooperative's vision and resolve to develop high-quality free-range laying hens. In 2021, the Cooperative was awarded five stars in the Good Egg Production Award by a leading international organization in the field, Compassion in World Farming. With international acknowledgments, the Cooperative established collaboration with Shanghai Capella Hotels in the second half of 2021. The headquarters of Capella Hotels is located in France, and it requires affiliated hotels to purchase eggs from cage-free production only. The Hotel will make an order every week, each purchasing 1500 eggs. This partnership allows the Cooperative to estimate egg production based on regular demands, which to a certain extent relieves supply-demand imbalance.

The Cooperative is still facing many challenges. Wu Yao said that they have ruled out problems with veterinary medicine, disease prevention, feed composition, and farming environment, and have trialed seven different laying hen species, hoping to increase egg production as soon as possible. At the end of 2022, the Cooperative moved to a new location, but rather unsuccessfully. The soil at the

new site was not suitable for woodland free-range farming of laying hens. In early 2023, the Cooperative finally settled down after another move. Currently, the Cooperative is gradually recovering its operation, with the egg production rate at its historic minimum of only 1200 eggs per day.

Settling into its new location, the Cooperative is beginning to solve problems with egg nests. At the moment, the hygiene levels of eggs from most farms in China are not high. High-end hotel brands such as Marriot have been requiring egg suppliers to avoid caged production, and also have strict standards for the appearance of the eggs. To meet these requirements, the Cooperative partnered with local carpenters and again succeeded in independently designing low-cost and effective laying nests, based on the mechanisms introduced in YouTube videos from farmers in other countries. This design makes new eggs roll into a clean space by itself to ensure their hygiene and appearance.

As for future plans for new sites, Wu Yao still has a

lot of ideas. After learning that in Europe, free-range egg farming is now not only carried out within a fixed area, but with a more sustainable system of “rotational grazing”, the Cooperative started to consider adopting this strategy. This method enables the organic balance between livestock farming and soil. Animal feces, as organic fertilizers, can promote microbiome growth and insects to aerate the soil, allowing the vegetation root systems to penetrate deeper, retain water, and grow vibrantly. Over time, improved pastures will naturally attract other animals to the hillside of the free-range farm, creating a wholesome ecological cycle. The Cooperative is now planning and constructing the farm, aiming to implement basic rotational grazing. Due to limitations of the terrain, it is not yet possible for the Cooperative to first plant grass and then construct portable chicken houses as farmers in other countries did. Their current strategy for rotational grazing is to construct fixed chicken coops, divide the outdoor field into different functional areas, and let laying hens move around in different areas at different periods.

## Results and Impacts

- The cooperative was awarded Five Stars in Good Egg Award by Compassion in World Farming, meeting the following requirements:
  - Basic conditions (including cage-free rearing, use of laying houses, etc.) – Achieved
  - Indoor environment enrichment – Promised to achieve
  - Expansion of activity space (free-range setting) – Achieved
  - No beak-trimming – Achieved
  - No male chick culling in chicken species for dual meat and egg production – Promised to achieve.
- Before the pandemic, the Cooperative had a laying hen stock of 5000, with about 2850 laying hens (others as backup) and daily egg production of up to 2000. The egg production rate was almost 70%, generating an annual revenue of 60-70 thousand RMB (approximately 8,200-9,600 USD).

- Without professional background, the Cooperative successfully independently developed intelligent free-range farming techniques and devices, which is highly replicable and scalable.

## Future prospect

Currently, the aim of the Cooperative in the next three years is to increase soil fertility and realize organic cycling among plants, insects, and the microbiome by continuously improving the rotational grazing system. It also aims to achieve one integration of production and sales through collaborating with more hotels and enterprises. In terms of future plans for egg production, Wu Yao said that the major strategy is still going to be basing the production on order demands. Supply-demand imbalance is still the key challenge to free-range egg farming, which means it is not suitable for e-commerce. Furthermore, the authenticity of products claimed to be free-range on current e-commerce platforms also needs further investigation. The Cooperative has developed a mature system of egg production, and therefore, its most significant need now is to gather more sales channels to further solidify the market supply-demand relationship.

In the meantime, the Cooperative also hopes to achieve more breakthroughs in terms of farming techniques. They wish to gather more data and conduct scientific and systematic statistical analysis in three to five years of time. Then, they will be able to advertise to the public and encourage more small egg farmers to join free-range chicken and egg farming, in order to improve health condition of farm animals and educate more producers and consumers. Meanwhile, the cooperative is committed to educate more producers and consumers to make free-range eggs more recognized and accepted in the market.

Looking toward the general outlook on animal farming, Wu Yao said: “When introducing myself, I don’t want to say that I’m merely a worker in free-range egg farming industry. I am working on something in close connection with international and advanced ideas. My biggest wish is to produce food for mankind while being able to better protect the environment, truly realizing sustainable development, instead of the current strategies of using more fertilizers and herbicides that destroy the soil and ecological chain. We need better and more scientific ways to protect the entire ecological system.”

## Discussion

With the widespread implementation of intensive animal farming, it has become a luxury for livestock to be able to forage freely in natural environments. Tangshan City Fengrun District Free Eggs Farmers' Cooperative, with its persistence, developed a localized free-range egg farming system, despite the lack of funding and experience. While ensuring proper living conditions for laying hens, it effectively lowered the cost. Based on statistics in 2015, laying hens farms each raising less than 10 thousand hens accounts for 60% <sup>[2]</sup>. The low-cost free-range farming strategy of the Cooperative has high replicability. Thus, if their strategy can be adopted by more small individual farmers, then there would be a huge positive impact on the entire egg farming industry.

## Case Analysis

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### Dimensional analysis: levers of change employed in the case

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|----------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Food<br>production<br>and supply | Production         | The Cooperative combined advanced technologies from other countries and local resources to independently develop a series of low-cost and efficient free-range egg farming equipment. The optimized feed supply strategy simultaneously met the hens' nutritional needs and improved the economic efficiency of farming operations. As its strategies are easy to implement, they are highly scalable and replicable, which are worth being adopted by small individual farmers.                                                                                                                                                                                         |
|                                  | Conservation       | <p>Free-range chickens can help balance the ecological system. Their feces provide organic fertilizers to promote microbiome activities and insect aeration of the soil, so as to improve soil fertility and vegetation. This organic balance attracts the settling of other animals, thereby facilitating the recovery and protection of the ecological system.</p> <p>The free-range laying hens' manure, used as organic fertilizer, can enhance soil biological activity, improve soil structure, facilitate vegetation growth and water retention, thereby further attracting habitats for other wildlife and promoting ecosystem restoration and conservation.</p> |
|                                  | Livelihood         | The Cooperative in this case mainly relies on left-behind old people, mentally disabled, and handicapped people in the mountains and countryside as labor forces. By providing them with job opportunities the Cooperative settled surplus labor in these regions, and helped the marginalized community, who normally finds it hard to get a job, and to engage in society.                                                                                                                                                                                                                                                                                             |
| Food<br>environment              | Accessibility      | The Cooperative collaborated with Yonghui Superstore Co., Ltd and Capella Hotels to make free-range eggs accessible to consumers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                  | Financial capacity | The Cooperative collaborated with hotels and supermarkets that hold the same ideology, establishing a benign environment for the transformation of consumer behavior.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|  | Social norms | In the process of collaborating with local farmers and carpenters, the cooperative has also imparted to them the concept of free-range animal welfare farming practices, which includes an awareness of respecting animals' natural instincts and emphasizing ecological and environmental protection. |
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## Addressing the pillars of sustainable development

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|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PEOPLE</b><br>Nourishing everyone for health and wellbeing                             | Free-range laying hens are raised in environments more suitable for animal nature, and the occurrence of psychological and physiological diseases among them is reduced, which elevates the qualities, taste, and nutritional values of the eggs. Thus, consumers can access more secure and nutritious food. |
| <b>PLANET</b><br>Producing in harmony with nature                                         | Laying hens were raised freely in natural environments, promoting ecosystem restoration and protection                                                                                                                                                                                                        |
| <b>PROSPERITY</b><br>Inclusive, transformative and equitable recovery for the 2030 Agenda | The Cooperative recruited left-behind old people, mentally disabled, and handicapped people to alleviate the economic burden of these marginalized communities. This replicable free-range approach offers new way for farmers to increase their income.                                                      |

## References

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