# EGG & CHICKEN CASE STUDY
# BEIJING *YOU CHICKEN*

**Sustainable and organic egg and chicken meat production using a traditional, dual-purpose breed.**

COMPASSION in world farming

# BEIJING *YOU CHICKEN* PRODUCTION SYSTEM, BAINIANLIYUAN ECO-AGRICULTURE CO LTD, BEIJING, CHINA

## INTRODUCTION

The Bainianliyuan Eco-agriculture Co. Ltd supplies organic eggs and meat chickens to Beijing supermarkets. These are produced from Beijing *You Chicken*, also called "oil" chicken, a traditional dual-purpose breed that nearly became extinct in the 1970s. The brand is the second largest of the 20 large companies which sell eggs in the main Beijing supermarkets, representing up to 40% of supermarket sales[1].

The company keeps parent flocks from which they breed the chickens. Both male and female progeny are raised for meat and some females are reared for egg laying. Most of these birds are kept by a co-operative of 320 independent farmers under contract to the company which provides the birds and the feed to the farmers and markets the chickens and eggs. Between them, these farmers rear three million birds each year, including 800,000 laying hens. The parent company also owns a farm which keeps over 100,000 laying hens and 6,000 meat chickens. It was visited twice between 2009-2012 during this study.

*110,000 hens on one hillside.*

[1] However, most egg sales are not in supermarkets.

Humane sustainable aspects of this farming system are diverse:

- **Organic production of maize for chicken feed**, grown without fertiliser, pesticides or tillage to prevent nutrient leaching into the reservoirs adjacent to the fields that provide part of Beijing's water supply;
- **Anaerobic digestion** of manure produced on the company's farm to provide gas for heating and cooking for farm workers plus 1,000 local homes, whilst reducing risks of disease and environmental pollution;
- **Higher profit margins** per bird and per egg, both for the farmers and the company for a high-value product;
- **Higher welfare potential** in a system which keeps chickens and hens free-range using a traditional breed whose slow growth and moderate egg production puts the birds under less physiological pressure;
- **Use of a dual-purpose breed** means that males of a laying breed are not killed at birth, therefore avoiding waste of both life and resources.

## The Beijing *You Chicken*

Also called the Beijing *Oil* chicken due to the appearance of its feathers, the *You Chicken* is a traditional Chinese breed from the area around Beijing which nearly became extinct in the 1970s. It is now one of 50 rare breeds identified for special protection by the Chinese authorities and a breeding nucleus is maintained by the Oil Chicken Institute at the Beijing Academy of Agriculture and Forestry Animal Husbandry and Veterinary Research Institute, which also promotes the breed. Breeding nuclei are also maintained at other Chinese agricultural institutions.

The *You Chicken* is a dual-purpose breed. The males are slow growing and take 120 days to reach a weight of 1.5kg (some are also slaughtered at 0.5kg and 1kg at 60 and 90 days respectively). Whilst slower growth and longer life span reduce Food Conversion Efficiency (i.e. they are less efficient and consume more feed), there is a considerable Chinese demand for this meat which is considered more flavoursome. For example, there is a very substantial market in China for slow growing, traditional "yellow chickens", often kept free-range by small-scale farmers in the south of the country. Chinese consumers will pay a premium for what is locally known as "*Tu*" or "*Earth*" chickens – birds which are kept free-range and/or which taste "*like they used to*".

The hens lay moderate numbers of eggs (around 170 per year), just over half that of modern hybrids, which are also sold at a premium. The eggs and the chickens are marketed with three benefits:

- Taste and quality
- Health
- Social and environmental.

Quality, organic, environmental and health arguments are used to help promote the eggs. The information on the label states that the product is organic, that it is produced from chickens who live free-range on the hills without antibiotics, hormones or genetic modification. Additional information also states that the birds are raised in a healthy place, in the mountains where Beijing's clean water comes from; and that healthy birds produce healthy eggs whereas caged birds are in an unhealthy condition.

*Organic maize stalks drying in the sun.*

## Sustainable feed production

The company farm grows maize, grass and alfalfa, and buys in soya from elsewhere in China to be incorporated into its organic feed. This feed is used both on the company and the co-operative farms.

The maize is grown in fields adjacent to a large reservoir that supplies part of Beijing's water supply. To prevent nutrients and other damaging chemicals from polluting the water, the Beijing authorities have passed a law that includes "7 nos" including no fertiliser, no pesticide and no mechanical tilling[2]. Growing organic feed on this land helps to maintain water quality.

[2] It also includes no construction, no dwelling, no grazing and no tree planting.

## Nutrient cycling and energy generation

*Anaerobic digesters.*

*Loading manure for the digester.*

It is vital to ensure that manure from the chickens does not spread disease or pollute the environment. All the chicken droppings from the company farm are taken by tractor to the anaerobic digestion plant on site. The fermentation process kills viruses and bacteria as well as producing a more manageable digestate and renewable energy. Surplus grass and maize stalks are also added into the digester to increase the energy available for gas production.

Some of the digestate produced is used to fertilise the fields which grow the grass and alfalfa that are incorporated into the chicken feed, but it cannot be used on the maize fields since the ban on fertiliser use extends to organic fertiliser also. Most of the digestate is used off-site by local farmers to grow fruit and vegetables, including the farm workers on their vegetable plots. The company plans to develop a buying market for its organic fertiliser.

The methane gas generated by the digester is used for heating and cooking on-site by the farm workers and a surplus is sold to 1,000 local families off-site. This provides all their gas needs in summer and contributes to their requirements in winter. This potentially off-sets greenhouse gas emissions from other energy sources and produces low-cost energy.

Power for the street lamps around the company farm are provided by solar panels, although coal is used to provide energy for the rest of the farm.

## Socio-economic aspects


*Marketing of eggs.*

The company buys in parent breeding stock and supplies chicks to the co-operative farmers who are on what is locally referred to as a "co-operative contract". The co-operative farmers pay 3.5RMB[3] per chick, whether male or female, and they also buy feed from the company. In the case of cockerels, these are sold back to the company for about 20RMB depending on size. Eggs are also sold back to the company.

[3] RMB – Chinese currency Renminbi. At the end of 2012, there were approximately 6RMB to the US dollar, 8 to the Euro and 10 to the British pound. 3.5RMB is therefore about 21 US cents, 28 Euro cents and 35 British pence.

Quality markets help to support rural employment. The company farm employs 30 people, including 5 technicians, 24 stockpeople and 1 manager.

We are told the co-operative farmers can make a profit of 2-3RMB per bird compared with around 1RMB profit for an intensively farmed bird. The company can make an additional profit of 20RMB per chicken. The *You Chicken* eggs are also sold for nearly twice the price of standard battery eggs.

## Welfare aspects

*You Chicken* meat and eggs are sold principally on quality and taste, as well as for social and health benefits. Whilst there are clear welfare benefits to the system, this is not at present a key selling point.

This may change. The Chinese *yellow* chicken, often kept free-range by small traditional Chinese farmers, is popular on grounds of quality and taste, but we have seen it on sale in Beijing supermarkets with packaging that extolls the benefits of free-range production. Welfare may become a selling point for Chinese consumers in future.

There are several key welfare features on the company farm and co-operative farms:

- Hens and cockerels are kept free-range in paddocks, well covered with trees and small bushes;
- The hens produce only moderate numbers of eggs, helping them to sustain health through a longer egg-laying period;
- Hens have nest boxes to allow important natural behaviours;
- The slow-growing cockerels are much less likely to suffer from lameness, heart problems and fatigue, all of which are common in intensive broilers;
- Broiler breeders are likely to require little, if any, feed restriction;
- Being a dual-purpose breed, the cockerels also benefit from not being killed at birth, which is the normal fate of males from egg-laying breeds;
- A few cockerels are kept with the laying hen flocks. This provides a more natural social grouping which can be helpful for controlling aggression and feather pecking amongst the hens;
- Forced moulting is not practised, although some hens are kept beyond the first laying season.

## Range with tree and bush cover

*Trees are grown to provide cover for hens on range.*

*Pullets on range.*

The hens are kept in groups of 2,400-2,500 in sheds 40 x 7 metres in dimension and the cockerels in groups of 3-4,000. This equates to around 9 hens or 11-14 cockerels per square metre. The sheds have a series of pop-holes leading to a large, open range area, significant parts of which are covered with trees and small bushes.

Providing vegetation cover helps the birds to feel secure when ranging outside, since birds are naturally wary of aerial predators. Keeping the hens in relatively small groups in fairly narrow sheds is also good for ranging, possibly because individual birds will not have so many others to get past if they want to go outside. Ranging is good for birds since it keeps them occupied and reduces the risk of feather pecking and cannibalism.

The range also provides opportunities for dust-bathing and foraging. Many birds were observed dust-bathing, which is both a social activity and an opportunity for hens to remove grease from their feathers and discourage parasites. Foraging behaviour was also observed, although the loss of ground cover limited the amount of forage that the birds could obtain outside.

In many western free-range systems, pullets are not kept free-range. Here, the pullets are also kept with access to range from 45 days old. This means that by the time they reach laying age they are used to the system. Learning to range early can result in better ranging later, reducing both stress and the risk of feather pecking.

## Use of a robust, dual-purpose breed

The Beijing *You Chicken* is a robust breed with moderate levels of production. The hens produce just over half as many eggs as intensive breeds and the cockerels grow at a quarter of the rate of fast growing broilers.

These lower rates of production protect the birds from a range of health and welfare problems which intensively reared birds are prone to:

- Hens are less likely to suffer from osteoporosis, which can lead to bone breakages;
- Risk of feather pecking may be reduced due to lower nutrient demand;
- Cockerels are much less likely to suffer from fatigue, heart problems, lameness and mortality rates may be reduced.

These advantages particularly suit the *You Chickens* to lower-input, organic diets which are less concentrated in nutrients. Being a dual-purpose breed is also good for the welfare of the cockerels which, instead of being killed shortly after birth, are reared for 60-120 days for meat. There is also evidence from studies elsewhere in the world that eggs and meat from free-range and slower growing breeds are healthier. For example, studies suggest they contain higher quantities of long-chain omega-3 fatty-acids[i].

The hens start to lay at 130-150 days old, continuing to be productive until they are sent for slaughter at around 500 days old (some are kept for longer, until around 700 days). They lay between around 170 eggs per year, compared with over 300 eggs per year for many orthodox commercial breeds. This is partly because many of the birds show brooding behaviours at times, a natural trait which the Oil Chicken Institute is hoping to breed out of them in time.

However, this moderate egg yield has significant potential advantages for welfare, especially in an organic system. The production of large numbers of eggs can put hens under metabolic pressure, especially on a locally-produced, organic diet which has a less precise nutritional formulation. Highly productive hens can leach calcium from their bones in the process of making egg-shells, leading to a higher risk of bone fractures at their most productive period early in lay. Shortage of protein and essential amino-acids due to the requirements of egg production can also increase the risk of feather pecking and cannibalism, as hens turn to each other's bodies as a source of essential nutrients. Many more productive hens also become emaciated *towards* the end-of-lay as body condition deteriorates. This does not happen with the *You Chicken* hens, who are sold at the end-of-lay for meat at a weight of around 2kg – fetching a higher price even than the *You* broilers (hen meat is considered in China to be a particularly nutritious food for nursing mothers).

Producing more sustainable numbers of eggs makes the *You Chicken* suitable for higher welfare and organic systems, since it gives them the adaptability to cope with a varied diet without loss of body condition. Where flocks remain productive, they are sometimes allowed to moult naturally and continue producing until they are 700 days old. This is achieved without forced moulting, a procedure designed to speed up the moulting process when egg production ceases. Forced moulting involves depriving hens of adequate feed and water for a period and causes very poor welfare. It is banned by most organic certifying bodies.

*Ranging cockerels.*
*The provision of cover mimics the natural environment of chickens and encourages ranging.*

The cockerels take 60-120 days to reach a slaughter weight of 0.5-1.5kg compared to an intensive bird who can reach 1.5kg in around 30 days. A lower share, or partition of energy and other nutrients to production, leaves more available for balanced growth and exercise. Slow growth gives time for joints, muscles and the cardiovascular system to develop properly in proportion to the rest of the body. The birds are much more active since they are less likely to suffer from fatigue, lameness and heart problems. Robust breeds may also have stronger immune systems, reducing the need for antibiotic use which is common in intensive birds, whereas they are never used for the *You Chicken* cockerels and "very rarely" for the hens.

*Cockerel shed. Raised wire platform keep resting birds above their droppings but are not a good substitute for perches.*

Compared to the welfare of standard broiler breeders, there are also benefits for the parent birds. Since they don't have the genetics for fast growth, the parent birds can be kept on a diet without the normal feed restriction practised in standard farming (except for a few days around the start-of-lay) without the risk of obesity. Unfortunately, the parent flocks are kept in cages.

## Indoor environments

The hens are kept in groups of 2,400-2,500 at a stocking density of around 8.5 birds/$m^2$. Simple plastic nest boxes are provided for the hens to lay in. We were told very few eggs are laid outside the boxes. The sheds have large unglazed windows which provide ventilation and natural light. The windows are covered with netting and have cloth and plastic covers which can be used to close them up to keep the birds secure at night.

The sheds have a series of pop-holes leading to a large open-range area, significant parts of which are covered with trees and small bushes.

The cockerels are kept in groups of 3-4,000. Stocking densities inside the sheds are around 14 birds/$m^2$, reduced to 11 for those kept for the full 120 days. This means a maximum of around 18kg/$m^2$ compared to 25kg/$m^2$ we have previously been told is standard for intensive farms in China and over 40kg/$m^2$ for intensive farms in the EU with controlled ventilation. Stocking densities inside are of course lower when part of the flock is ranging outside.

Keeping birds in relatively small groups encourages ranging and lower stocking densities permit birds to move around easily, thus can reduce the build-up of heat, humidity and ammonia. Low stocking densities are also important for systems with cockerels approaching sexual maturity, reducing the risk of aggression or allowing extra space for subordinate birds to escape.

Inside the sheds, the birds are provided with a slightly raised, wire resting area. Whilst perching is natural for birds, this is not a particularly suitable surface. Being raised above the ground will help the birds to keep cool.

There is also a scratching area in the shed, although no litter is provided. Older birds can get out onto the range to scratch and dust-bathe, but the provision of litter inside would be beneficial to encourage natural behaviours, especially for younger birds before they are allowed out at 45 days old. The provision of litter is a requirement in all EU broiler systems.

*All sheds have natural light. Two wire platforms are provided for perching. You Chicken hens.*

## Health and welfare outcomes

Mortality levels for hens range from 3-7%, averaging 4%. The main causes of death are due to predators, feather pecking and cannibalism and sometimes due to suffocation when birds panic and run towards a corner of the shed. Mortality rates of less than 3% are claimed for the cockerels. This compares very favourably with common mortality rates in free-range production.

It is believed that levels of bone fracture are low. Bone fractures are a problem in battery units towards the end-of-lay, since lack of exercise leads to osteoporosis. Fractures are a problem in alternative systems around the peak-of-lay, due to bones being weakened in the process of egg production. Low levels of bone breakage are likely in the *You* birds, as they can exercise and they don't produce unsustainable numbers of eggs. It would be useful if levels of bone breakage were measured.

For meat birds, levels of hock burns and footpad dermatitis (FPD) are said to be very rarely seen (and you would expect FPD to be noticed in a country where chicken feet are eaten as a delicacy). Routine use of antibiotics is not permitted under organic regulations, although they are used therapeutically when necessary for pullets. They are not used at all for the cockerels which, combined with low mortality rates, suggests that levels of health are high.

## Improving welfare

Welfare might be improved by the provision of higher perches in the sheds. Perching is a natural behaviour which enables birds to avoid predators whilst resting. Although predators would normally not be able to get into the hen houses, higher perches would help the birds to feel more secure. Hens will naturally choose higher perches if they are provided. They might also enable birds to rest with less risk of feather pecking.

*Open nest boxes are provided for laying. It should be noted that hens naturally prefer enclosed nests.*

The provision of a foraging and dust-bathing area in the shed, along the middle concrete corridor, could also help welfare. Although it is true that the birds can perform these behaviours outside on range, indoor foraging areas are appreciated by birds, especially in poor weather or before the pop-holes are opened in the morning; indoor foraging areas could also reduce the risk of feather pecking (a displaced foraging behaviour). It would also be beneficial for the welfare of chicks in the first 45 days of life before they have access to the outdoor range.

Provision of enclosed nesting areas would also improve welfare since hens naturally seek out secluded areas in which to nest.

Welfare could also be improved by measuring welfare indicators such as hock burn and FPD in broilers (both said to be low), feather pecking and bone breakages in laying hens. It may well be that all of these are low, but it would be helpful to have figures for this.

Welfare of parent birds could be improved considerably by keeping them in more extensive, higher welfare, cage-free systems.

# SUMMARY

This system has benefits for chickens, the environment, consumers and producers:

1. **For consumers it provides eggs and meat which are valued for their higher quality, taste, health and environmental benefits.**
2. **For the birds, it means a life in a higher-welfare system, with a healthier breed, with access to the outdoors. Meat birds also benefit from a longer life.**
3. **Environmental benefits include the avoidance of chemical pesticides and fertilisers as well as the production of renewable energy in the biodigester.**
4. **The added value in the product means higher profit margins for the company and for the farmers.**
5. **Keeping birds with access to the outdoors can improve the nutritional quality of the meat and eggs, especially in relation to fat composition.**

# TABLES

| BROILER GROWER – DESCRIPTION OF SYSTEM | |
|---|---|
| Date/Time of visit | 24 May 2012 |
| Certification scheme | China Organic Food |
| Total number of birds on farm | 6,000 |
| Number of birds in each group (i.e. shed plus surround) if different | 3,000 to 4,000 in each shed |
| Breed | Beijing *You Chicken* |
| Feed type/amount/delivery | Self-produced corn and purchased soy |
| Food Conversion Ratio or FCR (can be worked out from amount of food each bird eats divided by weight of bird at slaughter) | Around 3 |
| Slaughter weight | 3 types:<br>0.5kg slaughtered at 60 days;<br>1kg at 90 days and 1.5kg at 120 days |
| Highest stocking density at slaughter ($kg/m^2$) | For those slaughtered at 60 days, about 14 birds per square metre. For those at 120 days, 11 birds maximum per square metre. |
| Number of thinnings | None |
| Mortality and cull rates | Less than 3% |
| Hock mark rates | Very rarely seen, not recorded |
| Footpad mark rates | Very rarely seen, not recorded |
| Other health problems | Very rarely seen, not recorded |

| | |
|---|---|
| Antibiotic use – what percentage of flocks receive some antibiotic treatment | None used |
| Welfare problems<br>E.g. aggression, feather pecking | Normal dominance behaviour. Cockerels showed some comb damage in consequence, though feather cover was good. |
| Lighting regimes (throughout life) | Natural light |
| Litter | None provided |
| Indoor environmental enrichment<br>Perches, bales, forage, toys | Iron box platforms |
| Number of stockpersons<br>(person hours per day/week) | A couple will take care of 2 to 3 barns, 8 hours per day |
| Frequency of checking birds | Very often, including feeding |
| Transport to slaughter<br>(distance + time) | 40km (about 1 hour) |
| Number of dead on arrival | About 10 birds out of 3000 (0.3%) |
| Market | Whole birds |
| Cost/price<br>(per bird and per kilo) | Price for 60-day old, 0.5kg male bird is between 30-40RMB;<br>90-day old 1kg male bird is between 50-60RMB;<br>120-day old 1.25kg female bird is 70-80 RMB.<br>The price per end-of-lay hen at 500 days old is 108RMB, but due to good market conditions the price was due to be raised to 198 per bird.<br>Profit per bird 2-3RMB for co-op farmer compared with 1RMB for an intensive bird; company makes 20RMB profit per bird. |
| Are sexes kept apart or mixed? | Apart |
| When is access to range provided? | Summer open for the whole day.<br>Winter from 9am to 4pm. |

| LAYING HENS FARM | |
|---|---|
| Date/Time of visit | 24 May 2012 |
| Certification system | China Organic Food   |
| Breed (males and females) | Beijing *You Chicken* |
| Total flock size | 105,000 |
| Group size | 2,400-2,500 |
| Age when transferred to laying house | 45 days |
| Age at end-of-lay | 500 days |
| No. of eggs per year/production cycle | 170 |
| Stocking density at beginning of lay (numbers/$m^2$) | 10 birds per square metre, about 1.25kg each |
| Feed type | Self-produced corn and purchased soy. |
| Amount of feed per day per bird | Information not available |
| Food Conversion Efficiency (FCR) | Information not available |
| Antibiotic use | The antibiotic used for treatment instead of prevention. Only a "little amount" was used for laying hens 2011-2012. |
| Veterinary visits | Irregular |
| Mutilations | None |
| Mortality and cull rates | No precise figures |
| Litter | None provided |
| Indoor environmental enrichment<br>Perches, bales, forage, toys | Iron box platforms |
| Outdoor environment | Range with tree cover |
| Rearing environment | As adults. Iron platforms. |

| | |
|---|---|
| Is forced moulting practised? | No |
| Number of stockpersons (person hours per day/week) | 24 stockpersons and 1 manager |
| Frequency of checking birds | Several times per day |
| Dead on arrivals | No precise figures, but claimed to be "very few" |
| Market | Supermarket |
| Price per egg | Sold for nearly twice the price of standard battery eggs |

# REFERENCES

[i] Compassion in World Farming, 2012. Nutritional Benefits of Higher Welfare Products. http://www.ciwf.org.uk/nutrition

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