BO-IL CAGE

BO-IL PRODUCTS
- Layer cage
- Broiler cage
- Rearing pullet cage
- Parent stock cage

2015, Break through 30mil. hens
History

1977.09 BO-IL industry Co., Ltd. incorporated, producing freezing component
1979.07 Cooler development
1985.02 Pipeline milking machine development in technical alliance with Honda Co., Ltd. in Japan
1986.06 Selected as promising SME
1988.07 Domestic inaugural development of closed type cooler
1989.09 Electric water heater development
1990.03 T.M.R. feed mixer development
1992.10 Upright poultry cage development (for layer and rearing pullet cage)
1992.11 Baler development
1994.12 Award by the minister of Agriculture and Fishing
1995.05 Tianjin BO-IL dairy and poultry equipments co.,ltd. incorporated by sole investor
1995.11 Selected as designated special case for military service (Military Manpower Administration)
2001.10 Livestock automatic feed feeder development
2003.03 Initial export to Japanese SEIMEI Farm
(1 henhouse of layer cage – 8 tiers 5 rows / 32,000 hens)
2003.03 North Korea Pyongyang farm
(2 henhouse rearing pullets : 4 tiers 4 rows / 30,000 hens)
2010.02 Moved to the newly built headquarter and factory
(land: 9,441m², building: 4,145m²)
2015.07 Moved to the newly and expanded China factory in Tianjin
2015.08 Supplied 26 mil. layer cage in domestic and 6 mil. layer cage abroad
2015.08 Established Indonesia office
### Chicken related industries & BO-IL’s products

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- This catalog recomposed to compare various type of cage.
1. BO-IL CAGE

1-1 Cage specification & net

<table>
<thead>
<tr>
<th>Cage 1 Section Specification</th>
<th>Layer (animal welfare reg.)</th>
<th>Broiler</th>
<th>Rearing pullet</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 hens</td>
<td>8 hens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height of 1 cage.</td>
<td></td>
<td></td>
<td></td>
<td>Cage + manure belt</td>
</tr>
<tr>
<td>Cage length per 1 section</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td></td>
</tr>
<tr>
<td>Cage width</td>
<td>1,180</td>
<td>1,300</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Width(extended)</td>
<td>+40</td>
<td>+40</td>
<td>-</td>
<td>Front extended door net</td>
</tr>
<tr>
<td>No. of sector in one section</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

* As material, Zinc for wire, Galvarium for feeding container, Zinc coated sheet for 3ts such as supporting bar, are used to enhance anti-corrosion.

The floor net of cage is designed in consideration of hole size and thickness of net according to the chicken’s characteristics. Especially the floor net for layer is designed to be sloped to allow eggs to naturally fall on the egg belt.

Cage door net is sliding or hinged type, easy for feeding activities and locking. Layer cage door net is sliding type, especially extended door net supply to the birds much more actual living space.

Partition net is made wire-grid for so well for ventilation and lighting.

Parent stock cage is designed (larger cage height and unit size) in consideration of size of chicken, space for crossbreeding, movement and the characteristics of breeding cock and hen together.
1-2 Henhouse and cage arrangement

Cage tiers = N, number of cage rows = R, number of cage section = S, Passage Wp = min900, number of floor = 1, height margin (Hs) = min500

<table>
<thead>
<tr>
<th>Cage width</th>
<th>7 hens</th>
<th>8 hens (N-cage)</th>
<th>Animal welfare law standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer</td>
<td>Wc</td>
<td>1,512</td>
<td>1,632</td>
</tr>
<tr>
<td>Broiler</td>
<td>Wc</td>
<td>1,500</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passage width</th>
<th>900</th>
<th>900</th>
<th>min900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wp</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height of cage tiers</th>
<th>Hc</th>
<th>600(750)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Leg height</td>
<td>Hl</td>
<td>+272(180)</td>
<td></td>
</tr>
<tr>
<td>- Floor height</td>
<td>Hfh</td>
<td>+800</td>
<td></td>
</tr>
<tr>
<td>- Hopper height</td>
<td>Hfc</td>
<td>+228.5</td>
<td></td>
</tr>
<tr>
<td>Height margin</td>
<td>Hh</td>
<td>+252</td>
<td></td>
</tr>
</tbody>
</table>

- Leg height (Hl) + Floor height (Hfh) + Hh + Hfc = 228.5 + 252 + 600(750) + 1,512 = 5,000
- For broiler cage

Cage height = Number of tier(N) x 600 + leg height + floor height + Other For example
- (hopper type, 5 tiers, no of floor 1) = 5 tiers x 600 + 252 + 272 + 252 = 4,824
- (chain type, 5 tiers, no of floor 1) = 5 tiers x 600 + 272 + 228.5 + 272 + 0 = 3,501

Ground plan

Front view

Side view
For the ventilation, the tunnel ventilation system and the chimney ventilation system are used at the same time.

**Tunnel ventilation system** in the way that the fresh air is inflowed inside Henhouse through the intake air shutter and the generated heat and gas in henhouse are exhausted outside automatically through the large fans.

**Chimney ventilation system** is the way that the heated air of the upper side of Henhouse is automatically and efficiently emitted through the fan installed at the roof of henhouse. The fan is automatically controlled by sensing the temperature at the upper center of henhouse.

- Each temperature sensor is selected as dual sensor for reliability enhancement.
- For ventilation at power failure, some of tunnel ventilation fan are designed to operate automatically by emergency power supply.
- Tunnel ventilation fans are grouped and operated ON/OFF step by step.

Cooling pad is installed in the air inlet side of broiler henhouse to reduce air influx temperature, but it is optional.

**CONTROL SCHEME**

The side baffles on the top side of side wall are used as secondary usage of intaking air in case of a small amount of ventilation. Concurrent opening and closing of side baffles is possible by winch manually and automatically. It is fully opened in summer but partially opened in winter.
3. Manure drying & disposal

3-1 Manure disposal

The manure which dried by sparged air from air duct are delivered out of henhouse through PP manure belt conveyor, manure dropping device at edge and cross manure belt.

- PP manure belt is durable and less deformed.
- V type guide at the both side of belt prevents slip down from belt.
- Device to remove the manure stained to #1 roller.
- Double scraper are installed at the manure belt of #2 roller to remove manures on belt completely.
- On the manure dropping device, adjustment bolt for adjusting belt tension and driving motor equipped.

3-2 Manure drying (for layer cage)

Air supplied from air mixer, blast duct is shot to the manure belt for drying, through air duct installed at the upper or the lower floor net.

- Air mixer
- Air sparging
- Manure belt driving motor
- Manure scraper
- Tension adjustment work
- Cross manure belt roller (for 12-tier cage)
- Manure dropping device
- Air duct for manure drying installed at the upper side of floor net
- Air duct for manure drying installed at the under side of floor net (it makes extended living space)
Egg collecting facility is composed of the elevator(or lift) which load eggs on the egg belt to the egg conveyor and transportation conveyor to egg collecting house. This facility is equipped in layer cage and parent stock cage. The eggs rolled down from the floor net in each cage are collected by the egg belt after then loaded to the egg elevator by driving egg belt. Like this, the eggs in each tier are carried to egg conveyor through the egg elevator(or lift) and delivered to egg collecting house.

4-1 Lift type

Lift method is egg delivery device from egg belt by vertically moving conveyer.

4-2 Elevator type

Egg belt connection by ultrasonic waves welding machine

Egg Belt and 2 axis, on egg loader are driven by one motor

Egg collecting belt(pp+pet)
5-1 One-step forwarding (for broiler cage)
The broiler cage is the cage for breeding broiler since new born chicks stage until shipment. Breeding period is short about 30 days so multiple shipments are implemented per year. Previously, Plastic floor net installed at each sector is picked out and dropped to manure belt one by one. But we developed one-step forwarding (BO-IL patent) whereby we manipulate the floor nets concurrently for each tier, dropping outgoing chicken simultaneously and shipping through the lift installed at the back frame.

5-2 Hot water boiler heating (for rearing pullet)
Rearing pullet cage for breeding hen since new born chicks age before spawning. We developed hot water boiler heating system that improved the problems in existing heaters in preparation for high breeding temperature and abrupt temperature. (hot water supply method through the heating pipes installed under the floor net.) Now this heating system is under patent.
6. Water supply facility

Water supply facility is the device to supply water, consist of water supply part such as water supply header, water supply pipe and nipple within the Henhouse.

- Water consumed by water supply pipe nipple within cage is automatically supplied by ball float tank (or pressure reducing regulator).
- Filter for preventing inflow of particle materials and medicator installed at water supply header.
- Prop under water supply pipe: V-type for layer cage, drip cup for broiler and rearing installed into cage.
- Height adjustment function of water supply pipe based upon chicken size of broiler and rearing pullet.

Nipple for rearing pullet: water come out by touching tip whatever direction

Nipple for layer: By pushing, water supply & drop created

Adjustable height of water supply pipe in the broiler and rearing pullet cage

Partition net

WINCH

Adjusted height by winch

Water supply pipe height adjustment winch

Water supply prop (drip cup) for broiler and rearing pullet
Feeding facility is consist of delivery system from silo to feeding part in Henhouse. In the layer cage and the rearing pullet cage and the parent stock cage, method of transfer feed is hopper type and chain type, whereby feeding container is equipped straight outside the cage. In case of broiler, feeding container is installed inside cage, whereby feed is delivered to feeding container by auger. 

- Broiler : feeding container with height adjustment function is installed inside cage .  
- Broiler, layer, rearing pullet : feeding container is equipped straight outside cage. especially for rearing pullet cage the height of feeding can be adjusted by feeding bar.

7-2 Hopper type feeding for layer, rearing and P.S.

7-3 Height adjustment of rearing pullet feeding

For the rearing cage height adjustment can be adjusted by moving feeding bar like as following diagram.
7-4 Feeding of broiler cage

Feeding container for broiler cage is installed inside cage, like the water supply, feeding height can be adjusted by winching possible to eat feed easily according to size of chicken. Also this container is designed to adjust quantity of feed quantity easily and minimize feed loss.

7-5 Feed delivery (Silo → Feed hopper in henhouse)

Feeds are supplied from silo to hopper within Henhouse through multiple step noiseless screw conveyor (90mm auger in case of broiler). This is composed to supply feed automatically driving screw conveyor if hopper at lower S/C back outlet is empty.
8. Power distribution diagram and supply scope of electric work

Power is supplied through 3 phase-380V-60hz receiver. In case of power failure, emergency generator supplies electricity to programmed fan-moter and fan control panel for automatic starting. Control power is used as 220V by combining with one of R(or S,T) at the power distribution board.

9. Shock wave to prevent egg cracking

Short device which is installed under feeding container makes the electric shock to prevent chicken to pecking the egg.

All of the power line installed under feeding container shall be well insulated. Otherwise, it’s a cause of error such as short alam and electric shock.