“WHAT WE DO & WHY IT MATTERS”
WHEN CONSIDERING A CAGE FREE OPEN AVIARY PRODUCTION SYSTEM

NATURA® Primus

NATURA® Step

Big Dutchman
Innovation Breeds Success

1/2017

By Bill Snow, Big Dutchman Cage-Free / Alternative Housing Specialist

AN INTRODUCTION TO THE AVIARY FAMILY

The interest in aviary (cage-free) equipment has grown substantially during the last few years in the commercial egg production industry. It is often confusing for egg producers to keep track of the different types of equipment offered. With that in mind we will start with a short summary of the following major categories:

1) Single tier open aviaries

This is the simplest equipment arrangement, consisting of one row of nests in the center of the house, slats on either side, with feeders and drinkers. It is best suited to smaller flocks and is popular among some organic egg producers. Big Dutchman's product under this category is called COLONY 2+.

2) Multitier open aviaries

These are multi-tiered systems which are fully open, giving complete freedom to the bird to move in and out of the equipment at all times. Although not as easy to manage as select-access aviaries, these systems can be very efficient and are gaining market share due to the fact they appear to be the preferred type of equipment by cage-free certifying entities. Big Dutchman has a wide family of products under this category, including the most popular in the industry within this segment, the NATURAStep.

3) Select-access aviaries

This refers to multitier systems featuring doors which allow birds in and out of the system at the bottom level at selected times. These are very popular for attention to hen welfare, excellent egg production figures, and ease of management. Big Dutchman's product family corresponding to this category includes the best sellers NATURA60 and NATURA70.

4) Hybrid aviaries

Also known as "combi" systems, this category of equipment evolved from enriched cages. They offer the flexibility of being able to operate as either cages or aviaries with modifications. Big Dutchman's VillaFlex addresses this segment.

The objective of this article is to discuss specifically the category of multitier open-access aviaries. However, since no egg production system functions well without a well-raised pullet, we will start with aviary rearing equipment, our NATURAPrimus product. Incidentally, this type of pullet rearing system is very desirable for any of the categories of cage free egg production listed.

Details, photos and videos can be seen by visiting: www.bigdutchmanusa.com/cagefree

Single tier open aviary pictured

WHAT WE'VE DONE

Since 2008, aviary systems have been gaining momentum as housing systems for commercial egg production in the U.S. and Canada. More recently, aviary systems are being installed in Latin America as well. Currently aviary-type systems represent about 12% of the total egg production in the U.S. and this number is expected to continue to grow. To meet this demand, Big Dutchman has been developing and fine tuning systems for cage-free aviary production for over 30 years. The first of these systems was designed in 1985 and installed in Switzerland in 1986.

These aviary systems allow farmers to utilize vertical space in an existing egg production building which would otherwise be wasted. This benefits the flock owner as well as the flock. Growers are able to house more birds in the same building footprint while the vertical layout resembles the birds' natural habitat. This allows the flock to instinctively go up in the system to find more hiding spots and cover, making the birds feel safer. This results in better use of the entire house for the flock owner and a calmer, healthier flock. These systems are designed to be cage-free and there are many variables that will determine the success of the producer and farm manager. The better a flock manager understands all the variables inherent to an aviary system, the more effective he or she will be.

Flock sizes in open aviary systems for cage-free and organic production range from 3,000 to 300,000 hens. Management of these systems must be spot-on from the first day of housing, and like all cage-free egg production this must begin with the pullets. Problems in a layer house can usually be fixed, however, typically in order to get at the root of a problem, one must look at how the pullets were raised.

"You can fix problems in a layer house, however, typically in order to get at the root of a problem, you must look at how your pullets were raised."

Bill Snow and Bryant Wiley observing a pullet flock.

HOUSING SYSTEM - RAISING A BETTER PULLET

There are many different kinds of aviary rearing systems, but the most recognized system today is the Big Dutchman NATURAPrimus, which has been in operation since early 2000. With the Primus system's sixteen-plus years in the market, Big Dutchman has had the opportunity to observe how hens interact with the system and make subtle improvements where needed. With any system, correct management is vital. Once a grower learns to manage a flock properly in the Primus system, it may very well become the preferred system for raising cage free pullets. This is no doubt because the system is designed to make management as effective as possible without sacrificing bird behavior.

For a healthy layer, the rearing system must closely match the layer housing system. What makes this system unique is how it adapts to the flock as they grow, which is critical in raising a healthy flock. To start, day-old chicks are placed in the middle tier of the system where they have access to foraging, scratching, dust bathing, perching, watering, and feed. Birds will engage in all of these activities on the first day they are placed in the system. The system is designed to be opened in stages as the chicks age, gradually introducing the birds to larger group numbers.

After the system is completely opened, all tiers of the system are accessible to the birds by way of adjustable perches and ramps on the outside of the system. The angles of ascent and descent are the same in the rearing house as they are in the layer house. A close match between the rearing system and the layer system means less stress on the birds when they are moved into the layer house.

Bridges and ramps are used to to help young birds get from one tier to another. This helps with bird movement, builds strength, and helps to reduce bird aggression.

THE SYSTEM ADAPTS TO YOUR FLOCK AS THEY GROW

DAY OLD CHICKS	22 DAY OLD CHICKS	15 WEEK OLD CHICKS
		

SYSTEM DESIGN - THE START OF EVERYTHING

HOW AVIARIES STARTED

As the market began to move from traditional cage to cage-free systems, farmers were challenged to meet existing demand for their product in the same building footprint, but with fewer birds. When elevated cage systems were removed from existing buildings, the issue that arose was how to best utilize the vertical space that would be wasted with the floor systems available at that time.

Pullets need the ability to act out natural behaviors.

At one time, bird behavior was merely an afterthought. Hens were denied access to their preferred types of environment and lacked the freedom to move where they wanted. Hens feel protected from aggressors when they are able to seek shelter in higher roosting areas. Aviary type systems were developed for the industry with a fresh outlook to understand more about what the birds desire, and how they utilize this more natural environment.

A successful aviary environment is more than just creating space for your flock, but is about creating quality space.

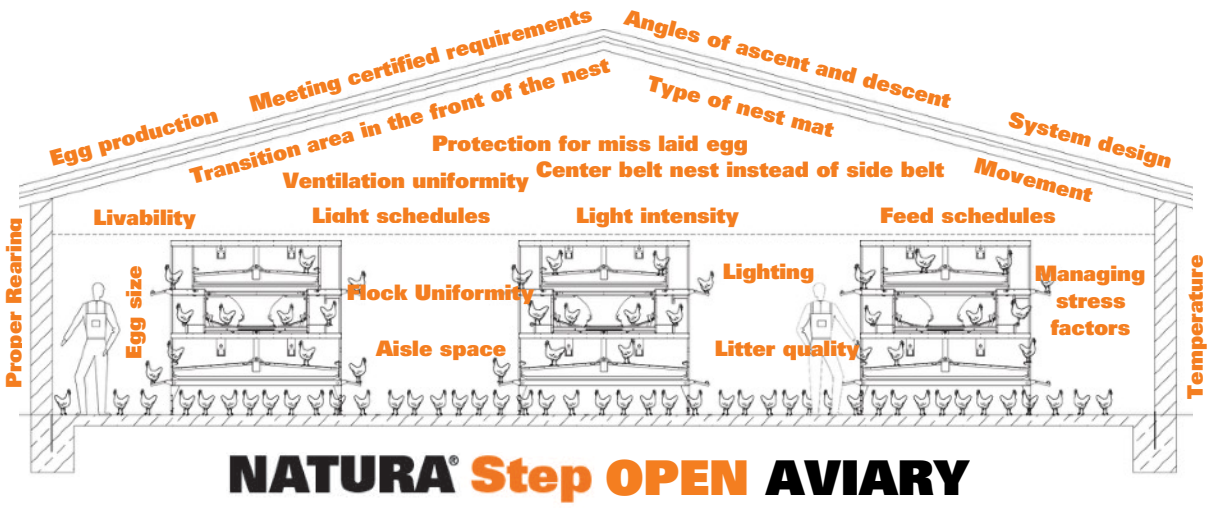
When looking at the design of a cage-free system there are many factors to consider in order to create quality space for the flock and allow for effective management. Key points are: flock movement, ease of management, nest position, feed and water layout, lighting, ventilation, and litter. The better the system design, the better the welfare of the hen, which results in superior egg production. System design is the basis for a successful operation and simply meeting certifier recommendations is not enough to guarantee the success of the flock. Creating a system to house egg laying hens is relatively simple, but knowing how well the system works in regards to hen husbandry requires a deeper level of understanding and development. If the system design is right, everything else is much easier for the hen and for the flock manager.

The system height is not an issue if the flock can be managed effectively on the elevated tiers. What we have found to be more difficult in Europe and in the US is developing a system that is specifically designed from a bird welfare standpoint, and matching that system to people's perceptions of what that system should look like. Big Dutchman's goal as a company is to build the best system possible for the hens, and then teach growers how that system should be managed to get the best results.

"Anybody can create a system to house egg laying hens, but the key is knowing how well the system works in regards to hen husbandry."

POINTS TO PONDER

WHAT ARE SOME OF THE MOST IMPORTANT FACTORS WHEN CONSIDERING CAGE-FREE SYSTEM DESIGN AND FUNCTIONALITY?



"A system that's easy to manage, will be managed well, and will result in a healthier flock, and better production."

Cage-Free Specialist Bill Snow (left) meeting with a customer.

INTRODUCING, THE NATURAStep OPEN AVIARY DESIGN

Open access design allows the flock to move in and out of the system at all times.

Big Dutchman's NATURAStep is an open-access aviary system that is completely open horizontally and vertically, and is designed to optimize bird movement up and down within the system. The position of its various components facilitates bird movement, enhances the ability of less dominant hens to escape from aggressors, and encourages more desirable behaviors.

FLOCK MOVEMENT

There are many key points in a successful cage-free system design, but how well the flock moves within that system is perhaps the most vital. Flock movement affects mislaid eggs, flock uniformity, management, stress, and mortality. With the NATURAStep the barn can be arranged in one row or multiple rows. The hens move up and down in the system within each row. There is no need for the flock to jump across the aisles to ascend or descend. Birds jumping back and forth between rows are sometimes jumping into other social hierarchies, which can result in decreased flock movement and cause a higher degree of stress. Birds will of course move back and forth between system rows, but the better the vertical movement within the individual row, the lower the opportunity for injury. Additionally, aisle space is required for optimum litter quality, ventilation, and lighting. Providing this aisle space will increase flock movement and will benefit the overall welfare of the hens.

With no partitions separating each section within the system row, birds are able to move freely while personnel walk the aisles of the barn. The hens can move away from disturbances to where they feel more secure, without piling against a partition. This allows visibility to see what is going on inside the whole

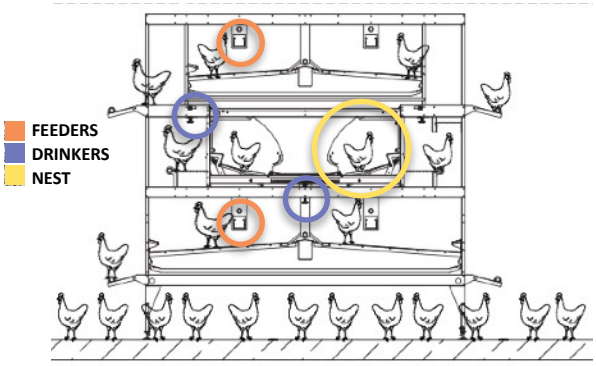
Flock movement improves overall nest acceptance.

house. In this environment the flock is calmer and experiences less stress.

Flock movement also affects mislaid eggs. If mislaid eggs are left in the house, it will encourage other hens to lay their eggs in the same incorrect location. Eventually, these eggs will get damaged and/or eaten by the flock. Hens will eventually start looking for eggs to eat and will consume less of the nutrients they need from the intended feed source. Flock uniformity will suffer and mortality will result. A system that is designed to keep the flock moving, and one that keeps the number of mislaid eggs to a bare minimum, will play a large role in the success of the flock.

"Providing this aisle space will increase flock movement and will benefit the overall welfare of the hens."

EQUIPMENT LAYOUT



Feed and water are available on the bottom level of the NATURAStep system. If there is a hen which is not moving well for various reasons, such as poor health or injury, she therefore has an area where she can get what she needs to heal. Hens will naturally move to the higher levels of the system to roost at night, resulting in fewer hens on this lower level. It is the only level of a cage free system that should have both feed and water. Placing feed and water together on a higher level of the system creates an environment where the hens never need to leave that particular level, which creates the potential for overcrowding within that area. It also creates an environment of higher competition for what the flock seeks and needs. Flock uniformity will suffer, leading to hen aggression and mortality. In essence, flock management will always be fighting the design of the system for proper care of the birds.

The top level of the NATURAStep system has feed for the flock to eat and perching for the flock to roost. The hens must leave this area to drink, and it is this design which keeps the flock moving and creates space in the system so the hens have less of a desire to mislay eggs due to overcrowding.

The majority of the watering is located just outside of the nest area, ensuring that the hens visit this area every day, which increases the likelihood that they will choose the nest as the best place to lay their eggs.

MINIMIZING STRESS

Minimizing stress is the single most important part of cage-free layer production.

In cage-free production it is easy for birds to become stressed and the size of the flock is a significant factor. There is a hierarchy with hens, and they need an environment where they feel safe, not only from predators but also from each other. This sounds distressing, but it is the nature of egg-laying hens in a cage-free environment, and must be managed to minimize stress on the flock.

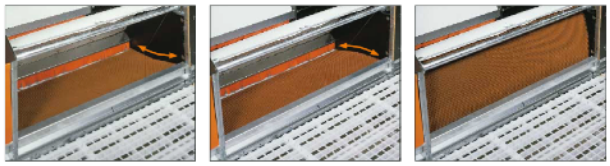
Industry guidelines limit group size, but these are mostly generic in order to cover all cage-free production. In most systems, group size is controlled by partitioning the length of the barn to separate bird groups. In reality, group size is only one factor in creating the ideal cage-free environment. Ventilation, building style, lighting, system type, and the ability to manage the system and flock all play a critically important role in the overall health of the flock. A properly designed aviary system does a better job of matching what birds require for optimum health.

For example, insufficient aisle widths between rows will create added stress on the hen when people walk through the house for regular management tasks. Adequate walking area will give the birds the necessary amount of space to feel secure and protected. Far from being wasted space, sufficiently wide aisles provide “quality space” which has a direct result on the amount of stress the flock may experience.

NEST

Nest placement is important to maximize egg production.

The nest in Big Dutchman's NATURAStep system is a dedicated cage-free nest. Each individual nest has sidewalls and a back wall, as well as a solid nest mat to reduce air drafts. The hens desire and look for this type of area when choosing a place to lay their eggs. The hen is most vulnerable when she is laying, so she will always seek out the most secure and darkened area for a sense of protection. The area in front of the nest, which is called the staging area, is designed to be clean from any type of litter or debris, which in turn keeps the nesting area cleaner. The NATURAStep features a rear roll-out of the egg to a 500mm-wide egg belt. This reduces obstruction, allowing the egg to roll to the egg belt with fewer collisions, resulting in a lower number of checks and cracks. Our patented tilting nest tray ensures the egg will reach the egg belt before the nest closes for the night.



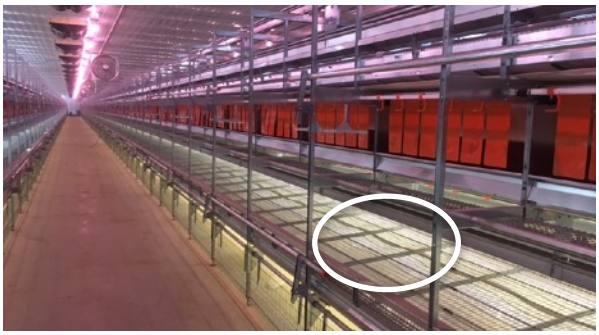
Patented tilting nest floor ensures eggs will roll onto the egg belt

By design, the nest area is located on one level of the system, resulting in up to 98% of the eggs being laid in this one area. Nests on multiple levels give hens more ability to choose, but it also reduces the nest space where hens need it most. For example, imagine a 3 tier system with the nests in each tier. This would result in 33% of the total nest space located in each tier of the system. If a disproportionate number of hens prefer a certain tier of the system to lay in comparison to other tiers, this creates an environment for larger bird numbers and thus higher competition within a given tier, resulting in more eggs laid in an overcrowded tier. Competition causes stress and aggression which leads to mortality. If 100% of the nests are on one tier of the system the birds will have more nest space for the entire flock with less stress, and less competition.

If the system provides enough space for laying that is equal for all birds, the dominant birds have no advantage over the rest of the flock which effectively eliminates one point of stress. The NATURAStep system gives each hen the same opportunity for adequate laying space. Additionally, this area is free from other hens that are moving up and down in the system to reach different levels. Hens are unable to pass through the nest area to get to another area of the system. This system's nest is designed specifically for a cage-free laying hen and has been tested thoroughly over the past 30 years.

"If you provide a system with enough space for laying that is equal for all, you can take away the dominate bird's advantage which effectively eliminates one point of stress."

REINFORCED FLOOR



For cage and hybrid-type egg production the floor area typically should have some flexibility to improve egg roll-out. In a NATURAStep system this is not necessary because almost all eggs are laid in the nest.

In a dedicated cage-free NATURAStep system, the floor has less flexibility. The focus can shift from the egg to the hen, without sacrificing egg quality and production. Only a small percentage of eggs laid in a dedicated cage-free system are laid outside of the nest, so a flexible floor is unnecessary. Instead, a reinforced floor helps to prevent entrapment of the hen. This reinforced floor within the NATURAStep system is designed for optimum bird health and built to handle the amount of stress placed on the system for the life of the equipment.

APPROACH PERCH (PATENTED)

The stainless steel approach perch is a Big Dutchman patented design to improve the quality of litter in the aisle between system rows. When the hen is resting on the approach perch she is positioned to look out over the aisle so that all her excrement lands on the manure belt and not in the litter aisle. This approach perch also helps to protect any mislaid eggs in the system.

Even in the case of eggs laid within the system (but outside the nest,) there is an option to automate egg collection. While this reduces the necessity of manual egg collection, it may not be a reliable solution to prevent mislaid eggs. Walking through the flock with the first lights coming on in the morning and removing any mislaid eggs outside of the nest before the first eggs are laid in the morning is the only way to dependably reduce the number of mislaid egg. The primary goal is to keep the flock moving so they will look for the dedicated nest area within the system which offers less possibility for interruption when laying an egg.

The stainless steel approach perch is a Big Dutchman patented design to improve the quality of litter in the aisle between system rows.

LITTER AISLE SPACE / LITTER QUALITY

Litter aisle space in the cage-free system is critical for a healthy and calm flock. The wider the litter aisle, the better ventilation and lighting uniformity will be in the house. This will ensure that the flock has the litter space it needs to engage in dust-bathing and foraging, and the hens will spend more time engaged in the litter instead of pecking each other. Wider aisles will discourage crowding of the hens and improve movement within the system row.

Adequate litter aisle width is quality space for the flock to act out natural behaviors.

Litter quality is equally important in the outcome of a flock. Birds excrete manure onto the litter aisle floor and this litter needs be of good quality. The wider the litter aisle is, the easier it is for the birds to spread out this fresh, wet manure that otherwise tends to build up around the edges of the system. It is necessary for the hens to scratch at the manure and move it to the aisle area where it can dry more easily and adequate space is required for this to happen effectively. Space creates open areas where ventilation has an opportunity to reach the litter and help in the drying process.

In a completely open system the flock has access to the floor at all times, making litter quality that much more important. During the day when the flock is on the litter aisle floor there must be sufficient room to give every opportunity for optimal litter quality. Higher quality litter is more likely to keep hens engaged in it, which promotes better drying of the manure and less flock stress.

PERCH AND STEP

A unique "step" is used to provide easy bird movement from one tier to another.

The perch in a cage-free system is used primarily for the flock to go from one area of the system to another. During the day no more than about 20% of the flock should be resting on a perch at any given time. If more than 20% of the birds are sitting on perches during the day it may mean that there is something wrong with the design or management of the system, unless it is close to the end of the day when the flock is getting ready to roost for the night.

The perch position within the system encourages flock movement, while other perches at higher levels give the hens preferred areas to roost. Perches enhance the ability of the hen to ascend and descend within the system row. The position of the perch should be where the hen feels most comfortable when jumping to a perch located just outside the system instead of making longer jumps across the entire aisle width. This makes it easier for the flock to move from one area to another and also creates an environment with less opportunity for injury.

LIGHTING

The house lighting needs to be as uniform as possible both outside and within the housing system. The system itself needs to be lit to discourage mislaid eggs throughout all tiers and underneath at the floor level. Light needs to be uniform both outside the system and where feed and water are located to make these areas equally enticing for the flock and to provide a less crowded environment.

All house lighting needs to be dimmable to provide the ability to turn down the intensity if needed as the birds age. Dimming the lights also will help the birds move back into the system at night, allowing the flock the opportunity to get to their desired roost while the lights are dimming.

Dimmable LED lighting under the system shown here.

The NATURAStep system takes full advantage of litter aisle lights hung from the ceiling. The openness of the system makes it possible for the angles of the light to reach inside each tier, creating a more uniform environment between the tiers of the system.

BIRD WELFARE

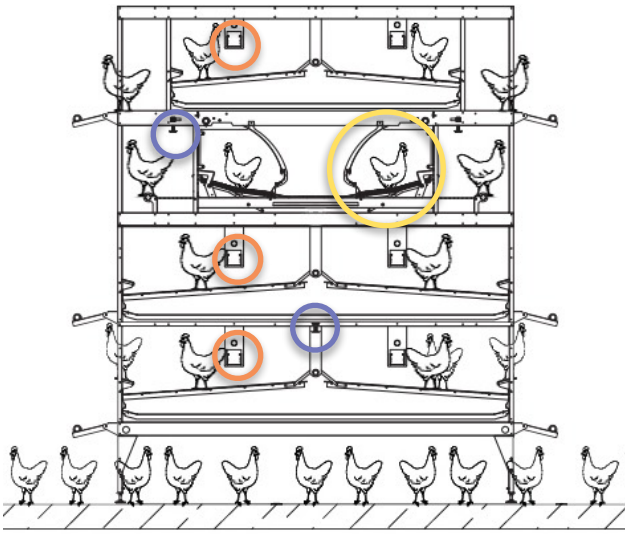
Big Dutchman's goal is to design systems that work for both the producer and the laying hen. With an efficient system, there is less work for management, and less stress on the hen. Less time and money is invested in managing the system, so more emphasis can fall on the welfare of the flock. Proper system design benefits the flock owner, the farm manager, and the flock.

Today the egg industry is facing tough decisions on the type of system to install for new cage-free production. Every day farmers ask, "Will cages be banned in the U.S. and Canada? Will I be able to operate a fully enriched system, and if so, for how long? Will I need to start producing eggs with cage-free flocks, and if I do, where do I start?" Hopefully the points discussed here offer a better understanding of some important aspects of cage-free production. **Contact us to learn "what we do, and why it matters."**

"We design our systems with the welfare of the hen in mind."

NATURA® Step

4 tier option



FEEDERS
DRINKERS
NEST

Erika Blair
Big Dutchman
Cage-Free Layer Specialist
eblair@bigdutchmanusa.com
616-368-2049

Colton Hill
Big Dutchman
Cage-Free Layer Specialist
chill@bigdutchmanusa.com
903-720-3825

"If bird welfare is the goal, then selecting a system that gives your flock the greatest opportunity for optimum performance, while making management easy and effective, needs to take priority."

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