Designing the ideal building layout for breeding Pekin ducks

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Genetic selection aims to improve technical results, with each new generation achieving a better performance than the previous one. Nothing is new. However, the expression of the improvement obtained through genetic selection is critically affected if birds are not bred in an appropriate environment, which is often forgotten. It is mainly the housing, the place where birds are bred during their productive life, which should be considered.

The birds' environment encompasses several topics to be taken into account and for each topic the point of view could be different depending on the location in the world, the climate, market requirements, types and prices of equipment and the materials that are available and/or suitable.

The best building in the world for Pekin duck breeder husbandry does not exist; there is only the most adapted one or an ideal one.

Type of flooring

When it comes to the type of flooring, the question is not whether it must be a concrete floor or a dirt floor as birds are not directly placed on the floor. Everyone agrees that, when it comes to biosecurity, a smooth concrete floor, with no holes or cracks, that is easy to wash and disinfect and with the correct slope is the most convenient.

The real question concerns the necessity to set up slats underneath the drinking system. Pekin duck legs are quite fragile and slippery plastic slats are not the best flooring especially as, in most cases, there is an access ramp with a significant slope to reach this area. However, the Pekin duck is a waterfowl with specific behaviour, and for which water is much more than a nutrient. This bird likes to fully dive its head under water.

As a result, Pekin ducks waste a lot of water and the area around the drinking system is always wet and dirty, even though litter is renewed once a day with good quality litter.

A slatted floor containing an access ramp and drinking equipment.

Dirty and wet litter is not necessarily better for the birds' legs than slippery slats. The best compromise has to be found, which also depends on other factors, such as the difficulty getting rid of the liquid effluent collected in the concrete channel set below the slatted flooring. In some countries regulation is very severe about liquid manure treatment.

However, it is wise to maintain drinking equipment in which ducks can dive their head; thus the most adapted flooring underneath this equipment remains the plastic slats because of water wasting and dirty litter issues.

Depending on the production cycle, manure height is variable. If Pekin duck breeders stay their entire life in the same shed, manure will pile up during 75-80 weeks.

If there are specific buildings for young breeding and for the laying phase, manure will pile up during 20 weeks for young breeders and 55-60 weeks for layers. Slat area height has to be defined according to the expected manure height, taking into account that the less slope there is to access the slats the better. In production systems where breeders remain in the same place for 80 weeks, a good compromise could be to remove litter at 19-20 weeks of age before birds start to lay.

Nests will most likely be placed on the opposite side of the slatted floor or at least on the opposite side to drinking and feeding equipment. The nesting area can be closed during the day or can remain accessible during the whole day.

In case of automatic nesting systems, the layout principle is similar, but slatted flooring is set next to the nest for technical reasons linked to nesting system automation.

Environment control

When it comes to the debate about the size of the building a range of 1600-1800m^2 seems to be the maximum – mainly because of the difficulties of managing ventilation for bigger units.

More than the size of the building, the proportion between length and width is important for tunnel ventilated duck houses. Indeed, tunnel ventilated buildings are built in hot climates to reach high air velocity and the size of the smaller side wall determines the air velocity, whatever the length with a similar fan capacity.

Tunnel ventilated sheds look like a 'tube'. The width can represent about 10-15% of the length and a pad-cooling system is installed at the air entrance, on the opposite side of the fans. In tropical climates, ventilation set up should allow airflow to reach 2-3m/second to lower the temperature felt by the birds.

In the case of naturally ventilated buildings with side curtains or windows with no fans, the house width should not exceed 12m, and orientation must be decided on according to dominant winds.

In temperate climates, regular lateral ventilation is most likely set, with air entrance on one side and fans on the opposite, with air blowing in the widthwise or transversal direction.

Climate plays a significant role in the building layout. In areas where winters are very cold with minus temperatures and summers very hot (easily reaching more than 35°C), the ideal setup is sometimes a combination of lateral and tunnel ventilation.

Whatever the type of ventilation, temperature targets remain the same. Ambient temperature for day old ducklings

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must be about 27-29°C for the first three days then decreasing 3°C for the three following days. In the second week the ideal temperature is around 20°C, 18°C for week three and 15°C for the following two weeks.

For the rest of their life birds should not be exposed to temperatures below 13-15°C, in order to control humidity levels and litter quality. Except in hot areas, a heating system or heat exchanger is essential to keep a comfortable temperature and humidity. Moreover, roof and wall insulation plays a crucial role in maintaining the correct temperature inside the duck houses. Investment in insulation pays back well, even though this factor is sometimes neglected.

Last, but not least, density has to be adjusted to the capacity in order to control the environment inside the duck house. An acceptable density range would be between 2-4 birds per square metre, males and females included. To define the optimal density, building equipment must be analysed taking the climate into account. For example, density in a naturally ventilated duck house with no pad-cooling and no fans in a tropical country should not be higher than 2.0-2.5 birds/m^2.

Conversely, density in a breeder building equipped with a combined ventilation system (longitudinal and lateral ventilation) in a continental country could be up to 3.5-4.0 birds/m^2.

Specific attention is required when a closed nesting zone is setup. In this situation, birds have access to the nest area about 5-6 hours per day, which means that for the 18 or 19 remaining hours, density is considerably increased. Density should be adjusted to the area where breeders spend most of their time so they are not housed too intensively.

The number of sections inside the building will be defined according to the number of birds placed. It is wise to divide the flock into several pens (maximum 2,000 birds per section) using small fences. Specific attention should be paid to the quantity of equipment, drinking and feeding systems, nests and space, which must be the same for each pen, proportional to the number of birds.

Lighting equipment

The lighting program for Pekin duck breeders is very simple. For the first three days, birds will get 24 hours of light to encourage ducklings to explore their environment and find both water and feed. Then light duration will be decreased at a rate of one hour every day or every two days until the level of 17 hours constant photoperiod per day is reached and it will remain so until the end of their life.

It does not mean that Pekin ducks are not sensitive to light stimulation and whatever the source of light there are some rules to respect. Light intensity should be dimmable as much as possible, so that it can be reduced in case of excessive nervousness.

Moreover, light intensity measured in lux must be identical in any point of the building at the bird's eye level. These two comments are valuable only if artificial light is used.

Light temperature is measured in degrees kelvin. High kelvin rating light will have a white or bluish hue with a short wavelength, while low kelvin rating light will have a more yellowish hue with a long wavelength; the lower the colour/temperature the longer the wavelength. High colour/temperature light is much more stimulating, while low colour/temperature light is more effective at penetrating the brain to stimulate photoreceptors.

In conclusion, during the brooding stage, day old birds should receive bright white light but will basically need yellow/red light for reproduction. Incandescent light bulbs and energy consuming halogen lighting have been phased out by more efficient alternatives. New light technologies, such as LED, compact fluorescent bulbs and high pressure sodium bulbs, are able to supply different types of intensity and colour/temperature light.

Light intensity requirements are a minimum of 40 lux during the startup phase and laying period. Intensity can be decreased gradually down to 5 or 10 lux during the rearing phase, depending on bird behaviour, but it must be increased up to 30-40 lux before the first eggs are laid.

Feeding equipment

During the brooding phase, which does not last more than three weeks for Pekin ducks, small feeding pans are convenient as long as there are enough in numbers (one per 50 birds).

During the growing phase, young breeders will be under feed restriction and access to feed could become a big issue. The challenge during this phase is to distribute feed rapidly, offering access that allows all birds to eat at the same time in order to obtain good weight uniformity. This is key to reaching good peak of lay.

Floor feeding is probably the best with regard to rapid feed distribution, access to feed and duration of the meal. The disadvantage is that litter and feed must be top quality. If pellet quality is poor and feed has too much fine, this part of the feed will be wasted. Likewise, if litter is dirty, birds will not be attracted and the proportion of feed wasted could become important. Floor feeding does not necessarily require high investment, as it could be manual. However, automatic spin-feeders do exist with different levels of automation.

Dimmable light tubes in the young breeder building.

Manual floor feeding in a grandparent farm in Vietnam.

Automatic pan feeders are also suitable as they have lower requirements in terms of pellet and litter quality. However, the difficulty is the access to feeders – especially if spacing between pans is less than 1.0m.

The speed of feed distribution may also be an issue as the feed line has to be filled up and dropped down several times to distribute the correct amount of feed.

Later on, during the layer phase, the situation is completely different as the ducks are no longer under feed restriction and have access to feed for several hours per day. Furthermore, during the laying period, feed intake must be stimulated. Floor feeding is no longer suitable; pan feeders will be the most convenient.

To summarise, if the breeder phase and laying phase happen in different buildings, the startup phase feeding equipment and floor feeding system could be the set-up for the first 20 weeks then regular pan feeders for the rest of the cycle. If both phases happen in the same place, it is the same rule for the startup phase feeding system. Then one automatic feed line with pans could be installed for the laying period requirement and will be used during the growing period with a complementary amount of feed distributed on the floor.

Conclusion

Pekin ducks are robust and more resistant to cold temperatures than other poultry for example. To obtain the best technical performance and to optimise their genetic potential, the environment in which breeders are reared must respect certain rules and take into account factors such as the rearing building layout and specific waterfowl behaviour. ■