Lighting and its influence on pig welfare and production

Although it is often overlooked, lighting is an important part of pig management. It can directly influence a pig's welfare and performance.

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It is important that the light climate is adjusted to the vision and needs of the pig. Light influences the pig's biological clock, biorhythm, social behaviour and overall activity. A correct light climate depends on several factors: light spectrum, distribution, (non) flickering, light intensity and photoperiods are the most important ones.

The pig's vision

A pig's panoramic vision (total vision) is 310°. As you can imagine, pigs have a preference for their monocular vision, since this represents a major part of their panoramic vision (as shown in Fig. 1). This means that it is easier for them to detect danger. On the other hand, it is more difficult for pigs to estimate distances due to their relatively small binocular vision.

Light spectrum

The visible spectrum is the part of the electromagnetic spectrum that can be seen.

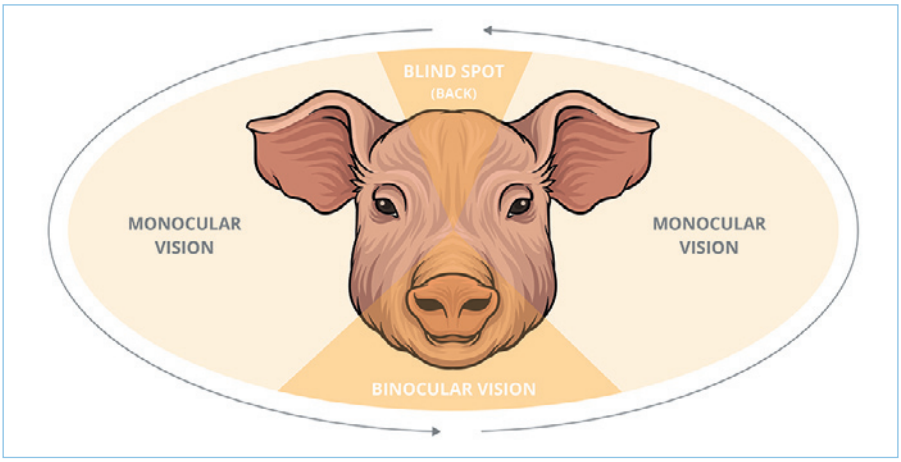

Fig. 1. A pig's panoramic vision.

Electromagnetic radiation within this spectrum is also called visible light. The different wavelengths are seen by the eye as different colours: red for the longest wavelength and violet for the shortest one. The visible spectrum of human beings and pigs differs significantly.

The visible spectrum of pigs reaches from 380-694nm with peak wavelengths at 439nm (blue) and 556nm (green). There is a difference between spectral sensitivity based on cone-sensitivity, looking at the cones and rods in the eyes, and spectral sensitivity based on behavioural responses.

When looking at the improvement of the pig's welfare and performance, it is best to look at the spectral sensitivity based on behavioural responses.

This visible spectrum is shown in Fig. 2.

By adapting the light to the pig's visible spectrum, the pig's vision will improve, which will eventually lead to improved (social) behaviour, better usage of the environment and decreased stress.

Light distribution

Light distribution shows how evenly light is distributed in the house. When light distribution is uniform, this means there are no bright spots and shadows.

Pigs show an aversion to bright spots, shadows, painted black patterns and painted white patterns.

This could be caused by depth perception problems.

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Fig 2. Spectral sensitivity of pig vs. human being.

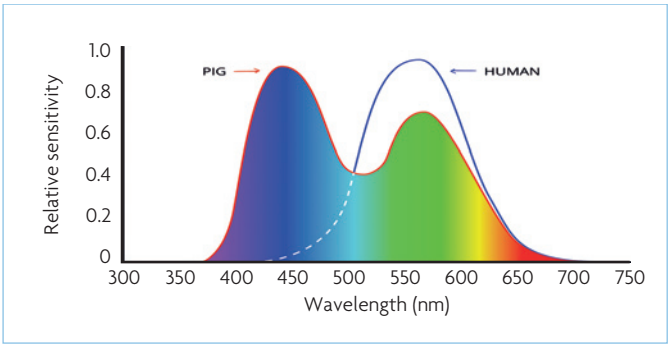
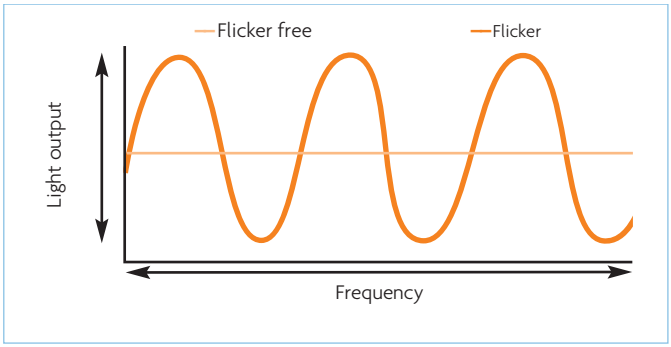


Fig. 3. Light flicker.



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When shadows or bright spots fall across walkways or pens, pigs can balk. They respond to contrasts of light and have the tendency to walk towards a more brightly illuminated area. These behavioural responses are partly caused by their instinct and partly caused by their rearing environment.

As such, it is important that lighting solutions offer a uniform light spread, so bright spots and shadows can be prevented. It is also important to make a proper, tailor-made light plan that fits the needs of the house, to enable the creation of uniform light distribution.

Flicker

As can be seen in Fig. 3, flicker is the rapid change in the light output of a lamp. This rapid change in light output can be perceived consciously and unconsciously. However, from a certain frequency (flicker fusion frequency), it is no longer perceivable.

Pigs perceive light flickering similarly to human beings. This means that pigs will notice flickering at a similar level. For human beings, flickering can lead to headaches, eyestrain and loss of concentration.

This may mean that a pig's health will be affected by flickering as well. As such, 100% flicker-free lighting would be highly recommended.

Light intensity

Light intensity stands for the brightness of light, measured in lux.

Recommended light intensities for pigs are widely spread. European legislation on lighting establishes a minimum of 40 lux with a photoperiod of at least eight hours a day. Several studies have been conducted on light intensities at different life stages.

It is important to know that pigs do show preferences for a specific light intensity. However, looking at the studies until now, there appears to be no consistency to these preferences. More research has to take place to advise the correct light intensity per life phase.

What is clear though, is that by using a correct light intensity, fertility, growth, wean-to- serve intervals and more can be improved.

Photoperiod

The photoperiod stands for the length of the day in hours of light, i.e. the number of hours that the lights are on in the house.

Earlier studies conducted with pigs showed, for instance, that long photo-periods have a positive influence on production results.

Due to a higher suckling frequency and a higher milk solid content, piglets were heavier and more piglets were weaned per litter compared with short day photoperiods.

To optimise performance, it is important to provide the right photoperiod in every phase of the pig's life.

A correct photoperiod in each phase can have several advantages, such as a better feed conversion rate and improved fertility.

Conclusion

Since light has a strong influence on pig welfare and performance, it is important to ensure an optimal light climate in a pig house.

By adapting the light to the pig's visible spectrum, the pig's vision will improve, which will eventually improve (social) behaviour, usage of the environment and stress levels. By providing uniform light distribution, unwanted behaviour can be prevented, whilst non-flickering lights may improve a pig's health.

Applying the correct light intensity and applying a correct photoperiod in every phase of the pig's life, can significantly improve pig performance. ■