



This note is extracted from “Lighting for Pig Units” a review commissioned by BPEX and prepared and submitted by Dr Nina Taylor on 30 April 2010.

Pig biology

Pigs need the right light levels so that they can identify each other, communicate and see pen features such as feeders. There is good evidence that pigs’ eyes are not adapted for extremely bright light and that they may be better suited to dim levels of natural light. This knowledge is vital when deciding how to light your indoor or outdoor pig units.

While pigs need natural light to produce vitamin D3, a deficiency of vitamin D is not considered a problem in pig production, as vitamin D2 is provided in balanced pig diets.

Commercial lighting is unlikely to reach a level which pigs find aversive, however, high intensity lighting e.g. spotlights should be avoided. Pigs prefer to sleep in dim lighting/darkness, suggesting that lying areas of the pen should not be brightly lit in order to promote resting behaviour.

Colour vision and flicker sensitivity

Evidence shows that pigs have poorer colour perception than humans and in particular a reduced sensitivity to the red end of the spectrum. There is little research into the effect of coloured lights on pig production. In cases where red light has been used, pigs respond as though in darkness.

There is currently little research into pigs’ flicker sensitivity, but it is unlikely that pigs can see flicker from correctly functioning fluorescent tubes. (Tubes that are failing and have visible flicker to humans should be removed.)

Seasonality and productivity

A pig’s reproductive success can be seasonally-affected, with reduced reproduction during the summer months; the predominant reason for this being temperature related.

Controlling day lengths in pig units can affect reproductive behaviour and success. However, lighting only plays a minor part in this subject with the real impact coming from sire line traits.

Other important effects of seasonality:

- Increasing day length (15–18 hours) increases piglet suckling
- Increasing day length increases food intake in growers/finishers
- 24 hour light can increase stress levels and disruptive behaviour can reduce productivity (especially in young pigs).

Welfare

Twenty four hour light can increase stress levels in pigs. Bright luminance can also result in eye damage and weight loss. Aside from these issues, generally, pig behaviour is affected very little by lighting factors and they are highly tolerant/adaptable to artificial lighting regimes.

Legislation

Currently Defra states that pigs in buildings with no natural light should have at least 40 lux of additional light for a minimum period of eight hours per day. The original research this was based on stated that 40–80 lux is sufficient to allow pigs to see objects, visual signs and distinguish between night and day. However, later science could not fully endorse this, stating the light source (incandescent or fluorescent) will also effect how brightly the pig sees their environment. Fluorescent lighting is seen as nearly twice as bright as incandescent lighting using the same lux level.

Conclusion

The amount of research available on the effect of lighting is minimal and does not provide sufficient evidence to make accurate conclusions. Information on seasonality in pigs would be beneficial, especially in regards to over or under use of lighting and, therefore, wasting energy or providing a suboptimal environment.

Future Research

- The effect of illuminance and spectrum on discrimination and communication, which are involved in fighting at mixing and other behaviours
- Flicker perception of pigs to ensure the fluorescent lighting is not perceived as flickering, which would have welfare consequences
- The maximum illuminance that is perceived as a dark period (or darkness)
- Dawn and dusk periods
- Brightness perception of different commercial light sources such that recommended illuminance can be matched
- Motivation for illuminance.

LED Lighting

This report also considers the effect of LED (light emitting diode) lighting on pigs. LED lights differ from conventional lighting (tungsten or fluorescent) in the following ways:

- Reduced energy consumption and, therefore, reduced costs
- Reduced heat from bulbs which will result in a reduction of burnt-on dust on bulb surfaces, therefore, prolonging the life of the bulb
- Discreet size of LEDs may help to reduce physical damage to bulbs during building cleaning
- Minimal flicker – unlike fluorescent tubes.

A bespoke LED bulb has been created for the poultry market which has removed the red part of the colour spectrum. This reduces the chickens' ability to see red objects in their environment which are common causes of aggression. This report has been put together in order for the pig industry to see if the same techniques could be applied to reduce tail biting in pigs.

From current research it is believed that reducing the red component of the light will not have any significant behavioural benefits or detrimental effects on pigs, therefore, the bespoke poultry LED may be suitable for use on pig units. Although the colour balance has been shown to reduce aggression and feather pecking in poultry, it is unlikely to influence behaviour such as tail biting in pigs because this is not triggered visually.

One key benefit of LED lighting is the ability to dim the lights, providing dawn and dusk periods, reducing the competition for food when lights are switched on in the morning and reducing potentially startling effects when lights are switched on or off.

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