



## The Importance of Light for Dairy Cattle

Scientific research has shown that optimum light conditions are essential for the well-being and health of dairy cattle and their production<sup>1</sup>. Light affects the performance of dairy cattle at various levels. The key findings are summarised below:

### **Behaviour:**

Good lighting conditions, in other words a sufficient quantity of light of sufficient duration, has a high impact on animal behaviour. Cows are herd animals whereby social interaction – looking each other up, developing a stable hierarchy – is very important. Sufficient light contributes to the animals' ability to properly observe their environment (less likely to injure themselves on obstacles), see and respond to their herd companions, find feed and water, and the like. In other words, they are better able to look each other up and the hierarchy is better maintained.

Cows turn out to be more active under good lighting conditions, are more likely to be at the feeding gate, and have a better feed intake. In addition, they exhibit better oestrus conditions. Research shows that cows themselves prefer well-lit spaces over darker spaces.

Good lighting conditions in the stable can therefore be expected to contribute to good and calm herd behaviour.

This is not only limited to behaviour, but light is also demonstrably important to the dairy cattle's health and production, and increased light can result in improved health and production.

### **Metabolism and hormone management and production**

Sufficient light is important for the production of vitamin D, blood levels, the hormone prolactin (for udder tissue) and the hormone oxytocin (milking duration).

#### *Vitamin D:*

Light is important for the formation of Vitamin D in the body. This vitamin in turn is important for managing the body's calcium levels. A shortage of vitamin D increases the risk of milk fever. Research has shown that shorter periods of light cause calcium levels in the blood to decline.

#### *Blood levels:*

Light intensity (quantity of light in the stable) is also important. Under better lighting conditions, the blood is found to contain higher levels of various substances, including:

- calcium
- white blood cells (= immune system)
- red blood cells (= transport of oxygen)
- Hb concentration (= oxygen ingress)
- bicarbonate (= rumen function)

#### *Prolactin:*

This hormone increases with improved lighting conditions. It is important for the formation of udder tissue and therefore for improved milk production.

#### *Oxytocin:*

Oxytocin is released at lower levels in darker stables, which affects milking duration. Cows release their milk less easily when there is less oxytocin.

### **Growth**

<sup>1</sup>Penev T., Radev V., Slavov T., Kirov V., Dimov D., Atanassov A., Marinov I., (2014). Effect of lighting on the growth, development, behaviour, production and reproduction traits in dairy cows. International Journal of Current Microbiology and Applied Sciences 11, p. 798-810.

Calves born under better lighting conditions perform better than calves born in a stable with less light. This also applies to heifers that, among other things, will mature faster when there is more light.



#### ***New-born calves:***

Pregnant cows housed under better (sufficient light duration and intensity) lighting conditions produce calves with a better average birth weight (+2 kg), higher resistance and reduced mortality. When these calves are kept under good lighting conditions, they prove to grow better due to increased feed intake, exercise and a better metabolism.

#### ***Heifers:***

When they are exposed to more light for longer periods of time, heifers exhibit higher body growth, better prolactin blood levels (improved udder tissue generation) and mature faster in comparison to heifers exposed to light for short periods.

#### **Fertility and calving interval:**

Certain studies show that the interval between calving and becoming pregnant again can be shortened by 22 days when an optimum light intensity of 150 lux is maintained. In addition, the cow requires 0.6 fewer inseminations in comparison to control groups exposed to an unfavourable light management regimen: shorter periods of light or less light in the stable.

#### **Dry phase (recovery udder tissue, body reserves, cell count and production):**

Effective light management is of importance here as well. Eight hours of light and sixteen hours of dark appears the most optimal for the effective recovery of udder tissue and body reserves. As a result production is higher during the next lactation (a difference of 3.6 kg/day has been observed). In addition, the cell count is low, which reduces the chance of mastitis and uterine infection after calving. A study carried out in 2011 shows a positive production difference as a result of effective light management, amounting to approximately 614 kg more milk per year than the control group (14.8% higher production).

#### **Health and production:**

All in all it appears that effective light management during lactation (16 hours light with light intensity around 150 lux and 8 hours dark) contributes to positive herd behaviour and improved metabolism, feed and water intake, better health, growth, calf raising and milk production.

In short, healthier cows with better production!

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