



greppa näringen



**Rickard Olsson, Lely**

Kurs: Belysning i olika stallmiljöer  
Linköping 2019-05-20



Europeiska jordbruksfonden för  
landsbygdsutveckling: Europa  
Investerar i landsbygdsområden

# *LELY L4C LED*



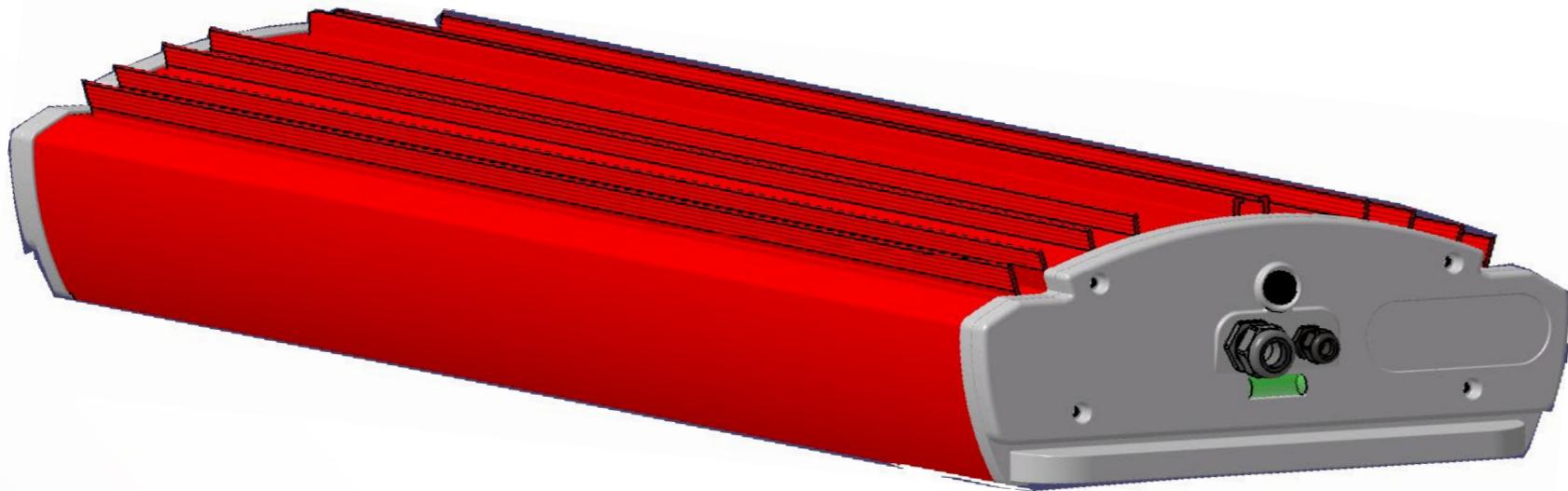
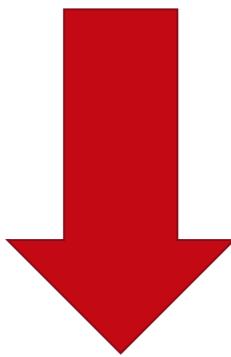
2019-05-20

*farming innovators*



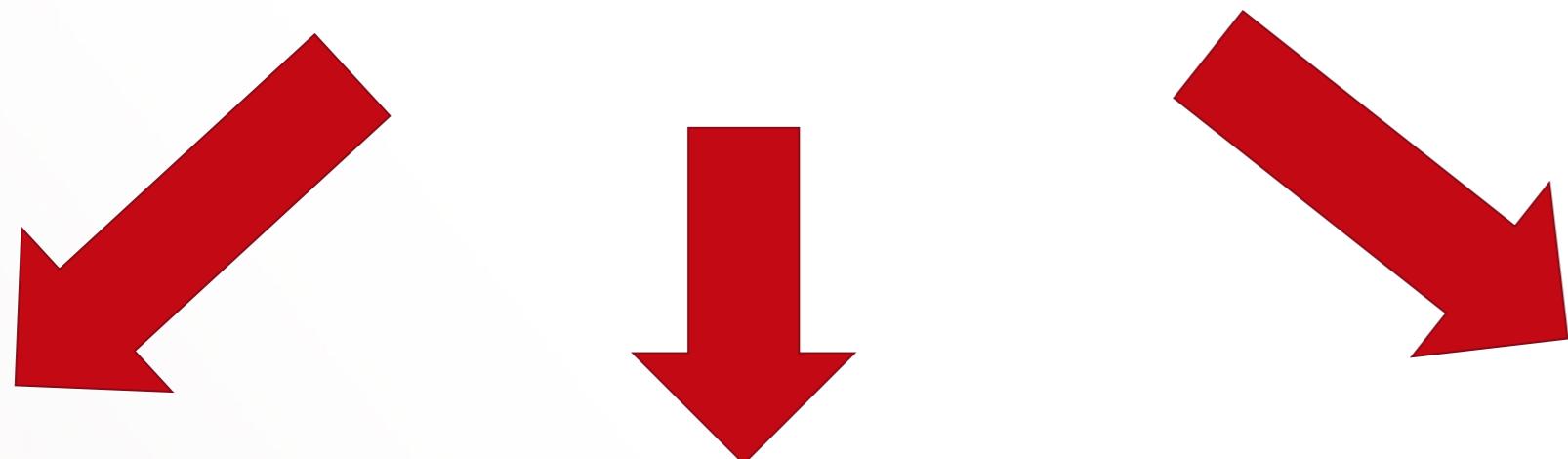
# *Lumen och Lm/W*

250 Watt



$Lm/W = \text{effekt}$

$$\begin{aligned} & 36.000 \text{ Lm} / 250\text{W} \\ & = 144 \text{ Lm/W} \end{aligned}$$



36.000 Lumen

# *Ljusets påverkan på mjölkboskap*





The schematic picture to the left (figure 2) represents the life time of a cow and which light schedule is needed for each stage to achieve the best results. This diagram shows the recommendations and benefits of using specific light schedule at different stages of a cow's life and production cycle

#### Benefits for young stock

- Good development of the mammary gland
- Higher milk production in the future
- Earlier puberty
- Faster growth

#### Benefits for milking cows

- Increased milk production of 8 – 10%
- Higher activity
- Higher feed intake
- Clearer heat signal

#### Benefits for dry cows

- Increased milk production in the next lactation
- Helps to reduce the dry period (from 60 to 42 days)

- “Lång dag” (även kallad lång fotoperiod) – 16 timmars ljus följt av 8 timmars mörker
- “Kort dag” (även kallad kort fotoperiod) – 8 timmars ljus följt av 16 timmars mörker

# Mjölkkor



Högre  
mjölkproduktion



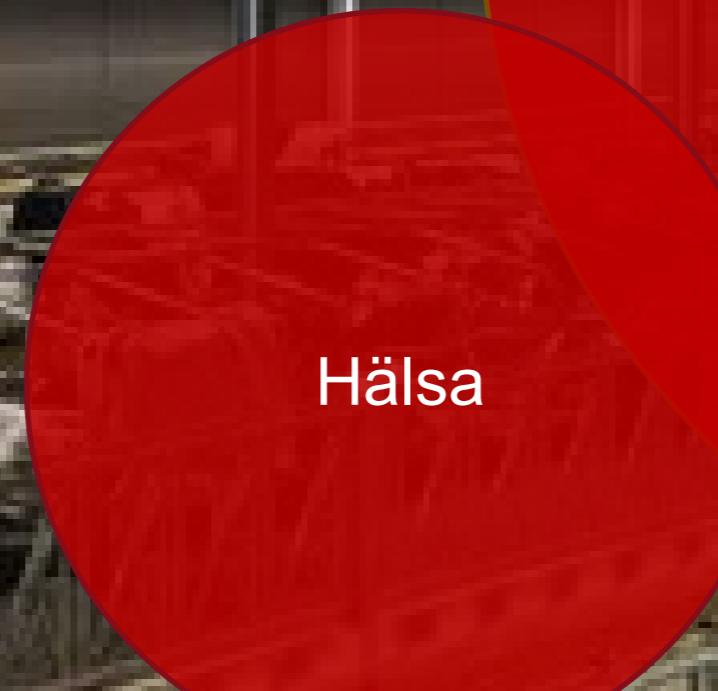
Förbättrad  
fertilitet



Kortare  
kalvningsintervall



150-200  
lux



Hälsa



Fett & protein  
oförändrat



Ökat foderintag



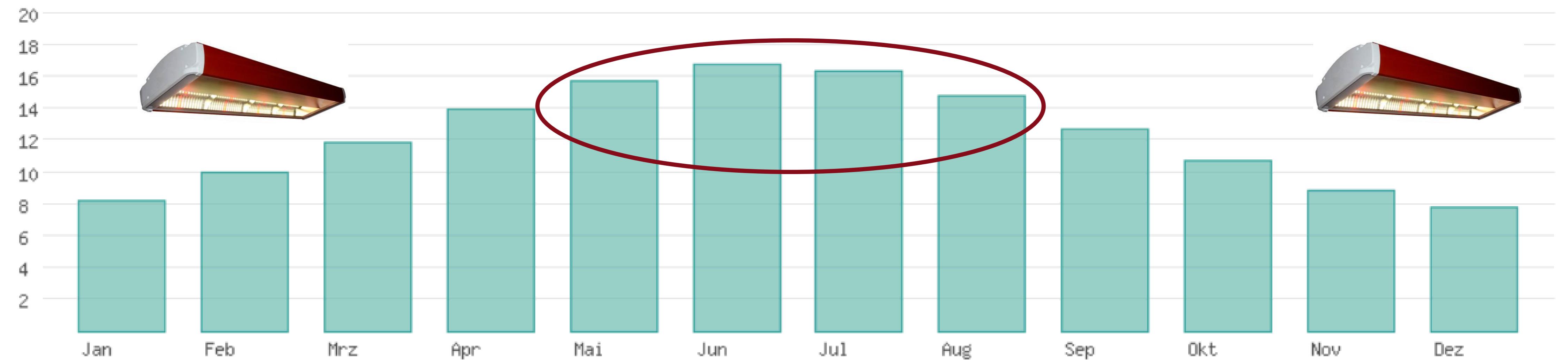
# *Ungdjur*



# Medeltal dagsljus över året (Holland)

- Bästa dagsljuset för lakterande kor är sommartid (Maj – Augusti i nedan exempel)
- Behov av kompletterande ljus för perioden September – April

Average length of daylight in Amsterdam



Source: <https://www.worlddata.info/europe/netherlands/sunset.php>

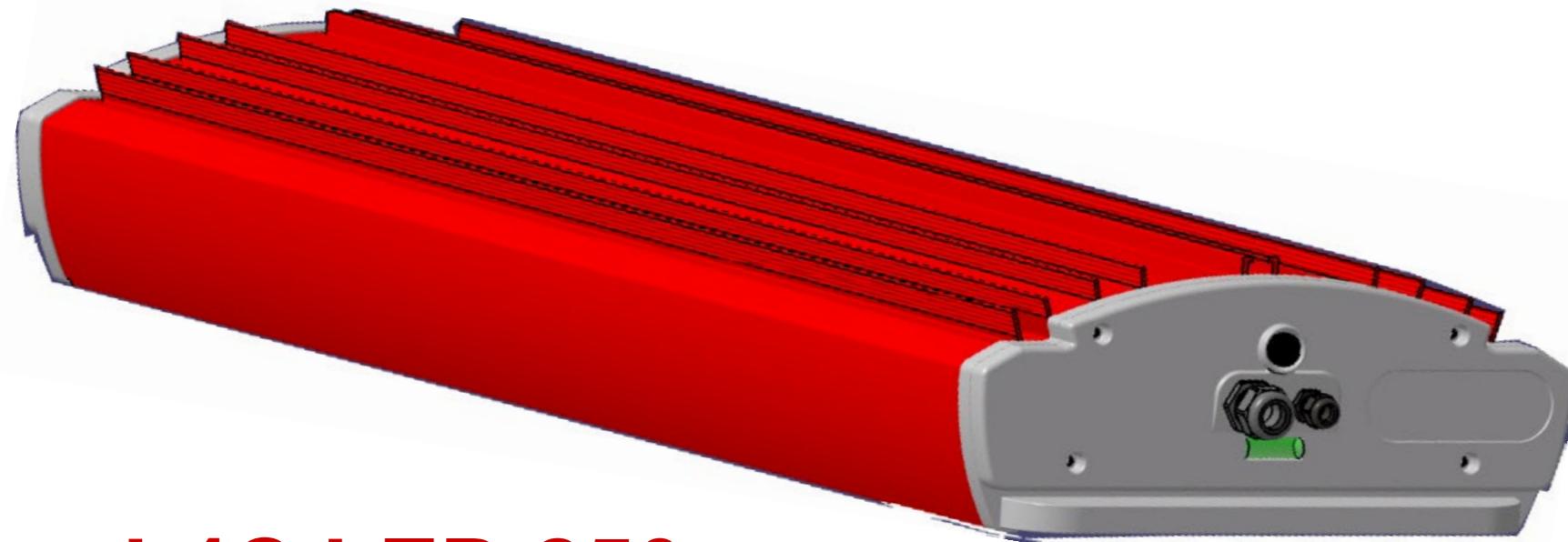
# Sinkor



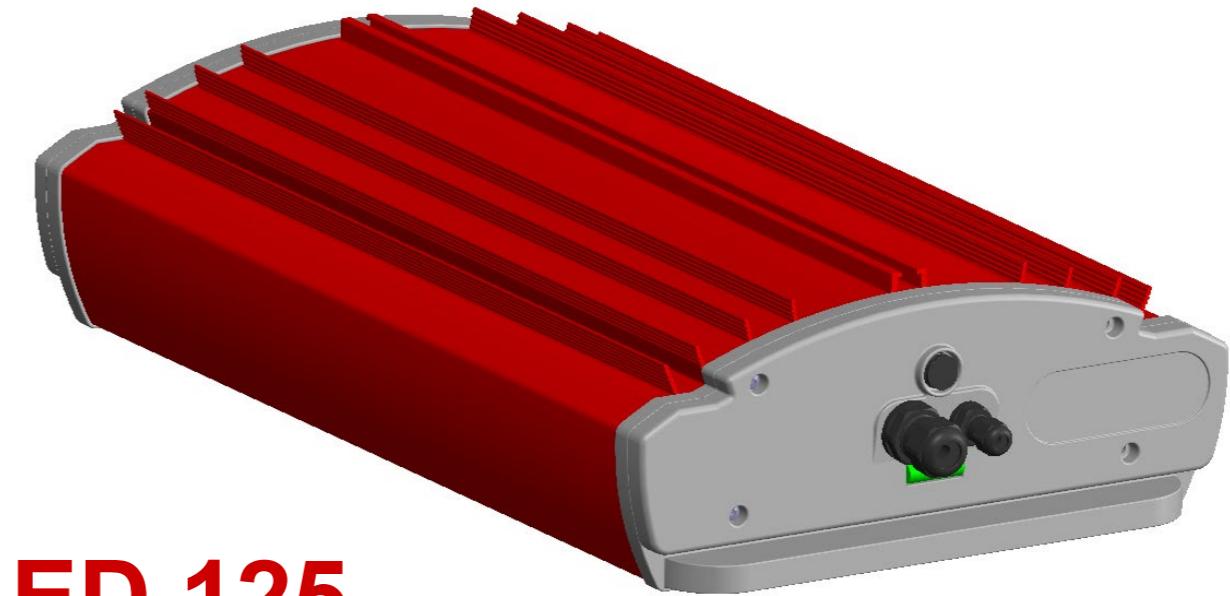
# *Produktinformation*



# ***LELY L4C LED***



**L4C LED 250**



**L4C LED 125**



**Ljussensor**



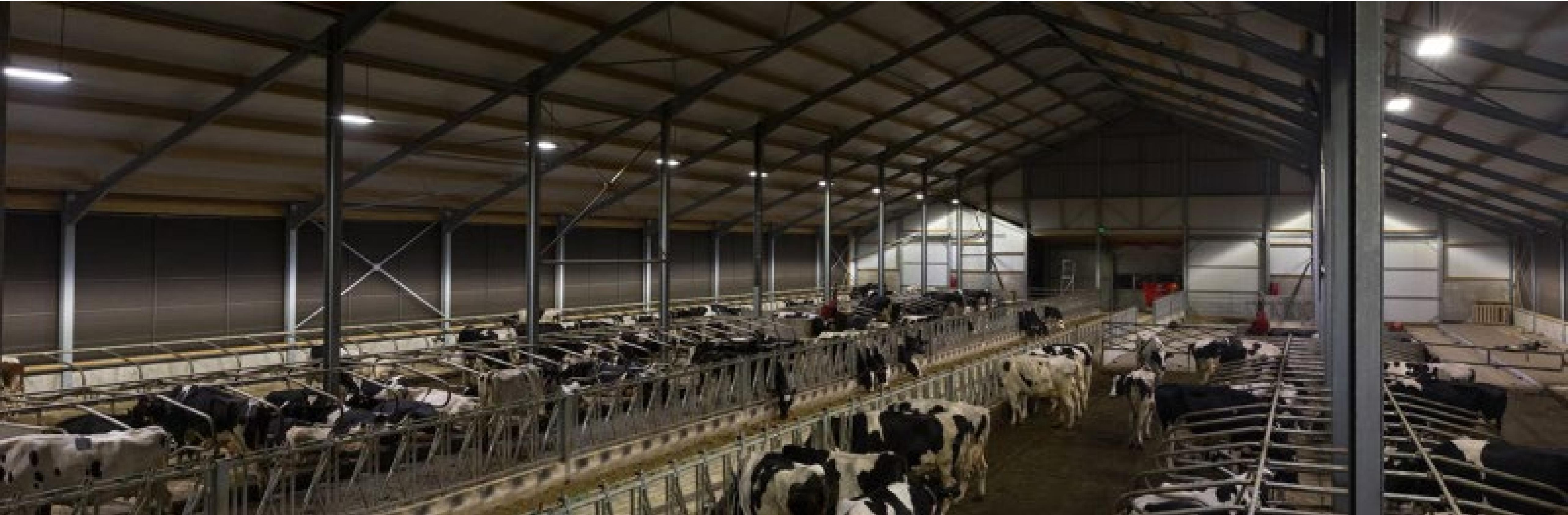
**L4C LED Control box**



**L4C LED Switch box**



# L4C LED 250

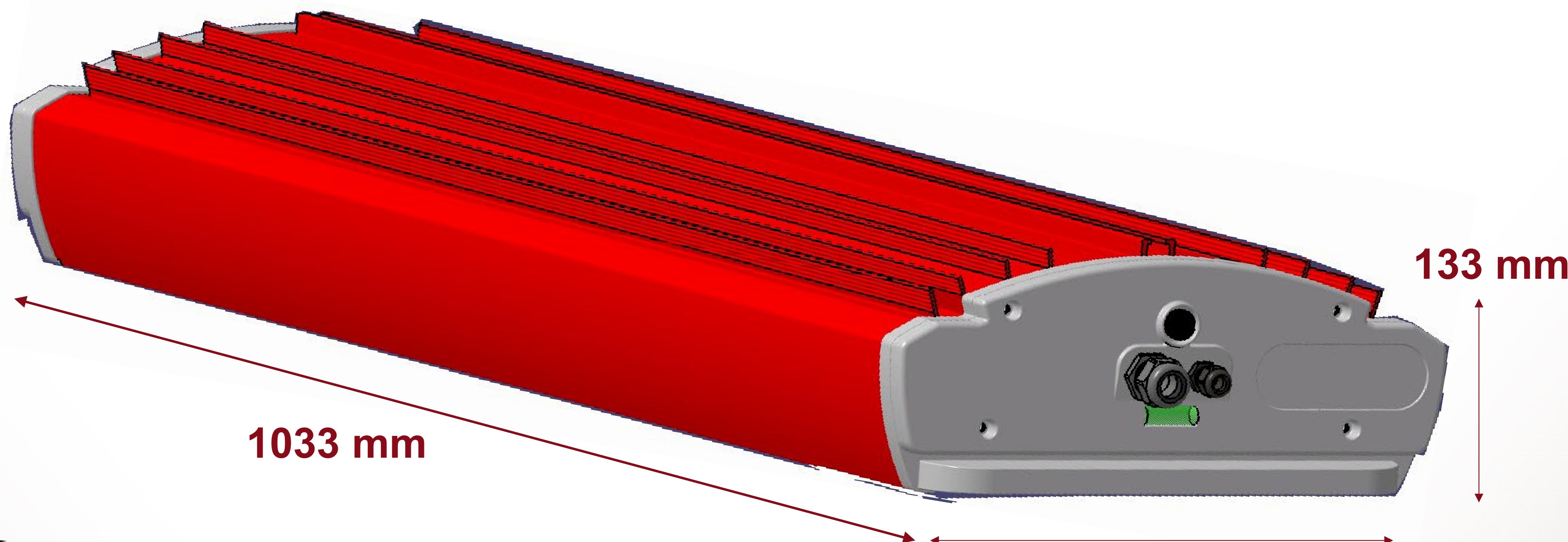


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# *L4C LED 250*



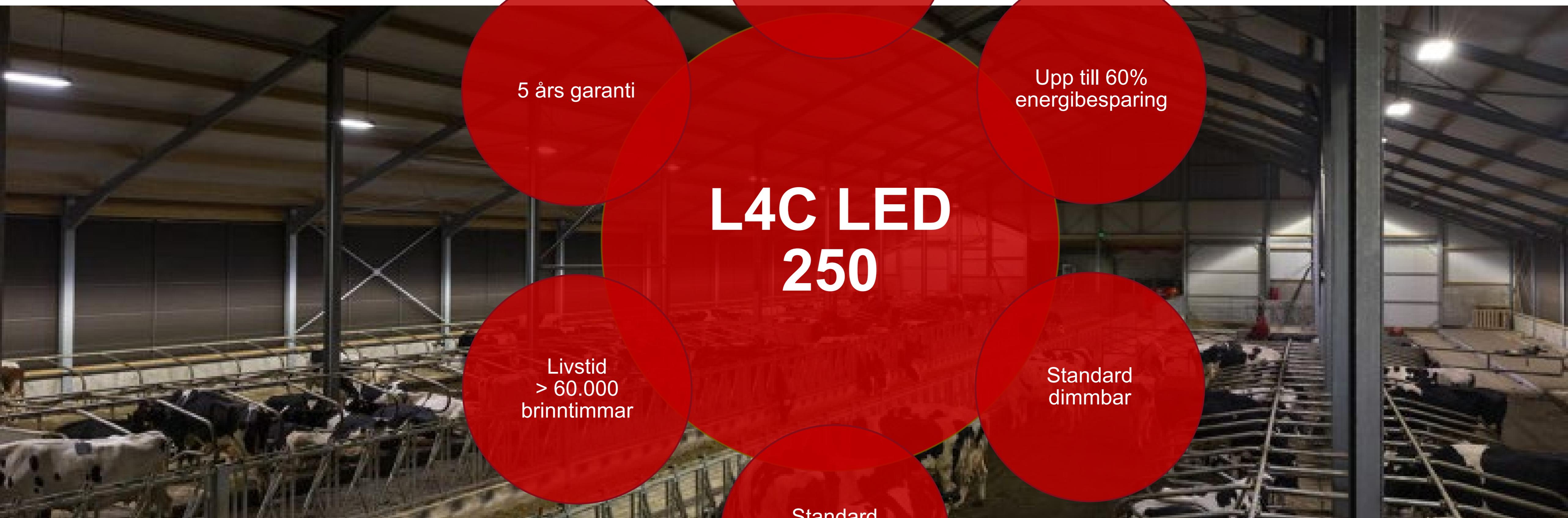
# *L4C LED 250*



**kg** 15,0

**LELY**

# L4C LED 250



## L4C LED 250

5 års garanti

36.000 lumen  
(144 Lm/W)

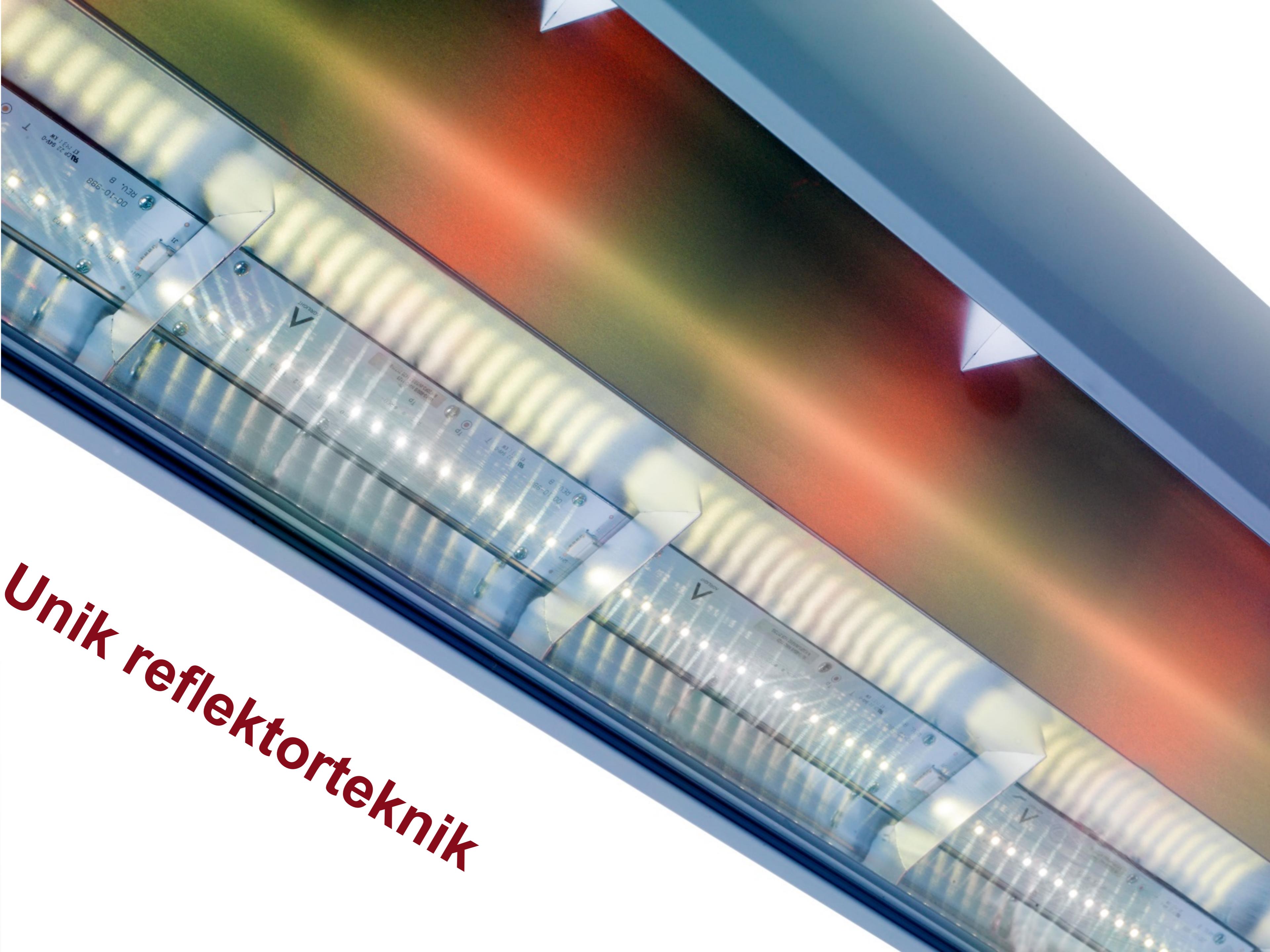
Upp till 60%  
energibesparing

Livstid  
> 60.000  
brinntimmar

Standard  
dimmbar

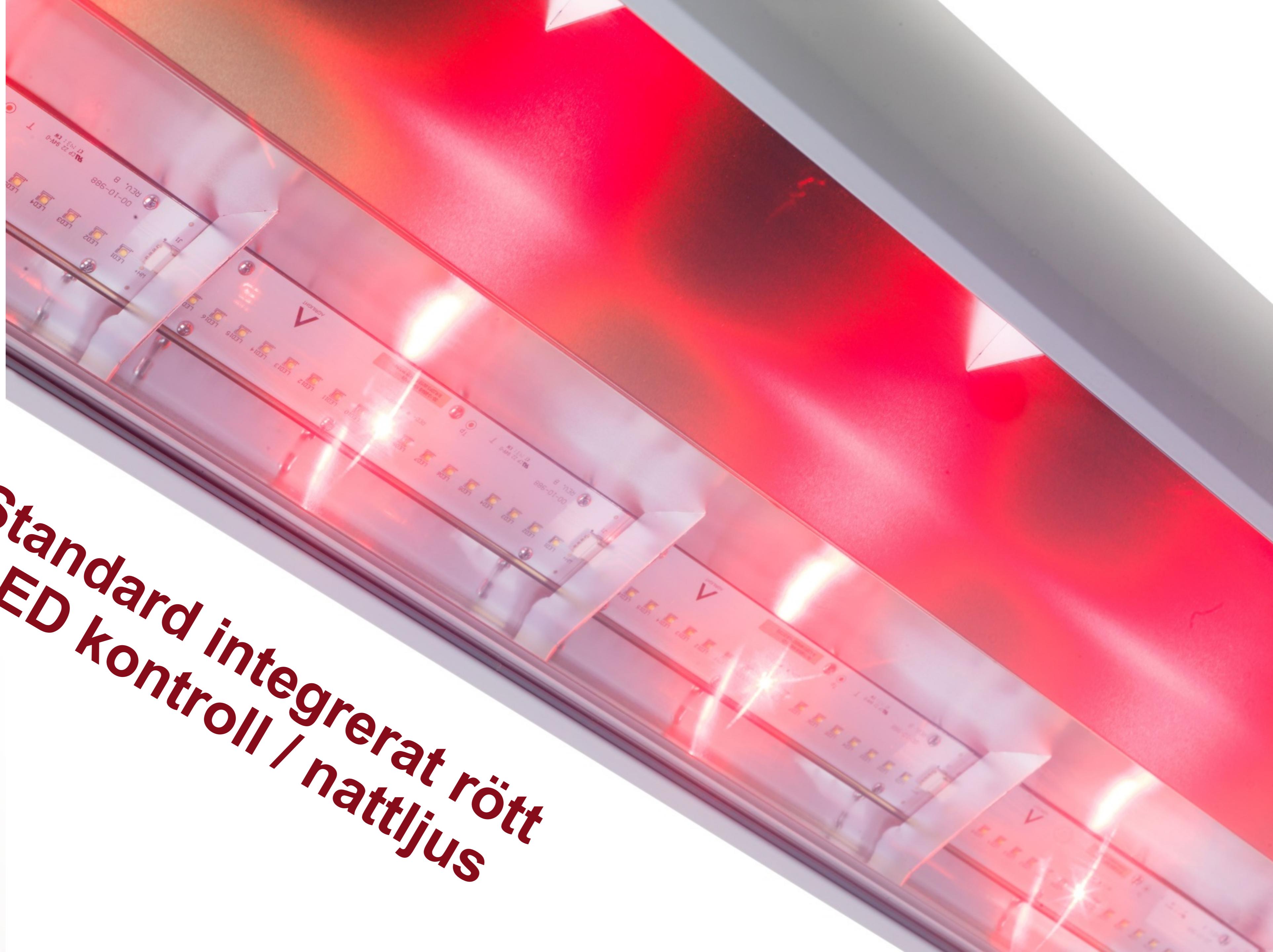
Standard  
integrerat rött  
kontroll / nattljus





*Unik reflektorteknik*





Standard integrerat rött  
LED kontroll / nattljus

LELY

# *L4C LED 250 fakta*

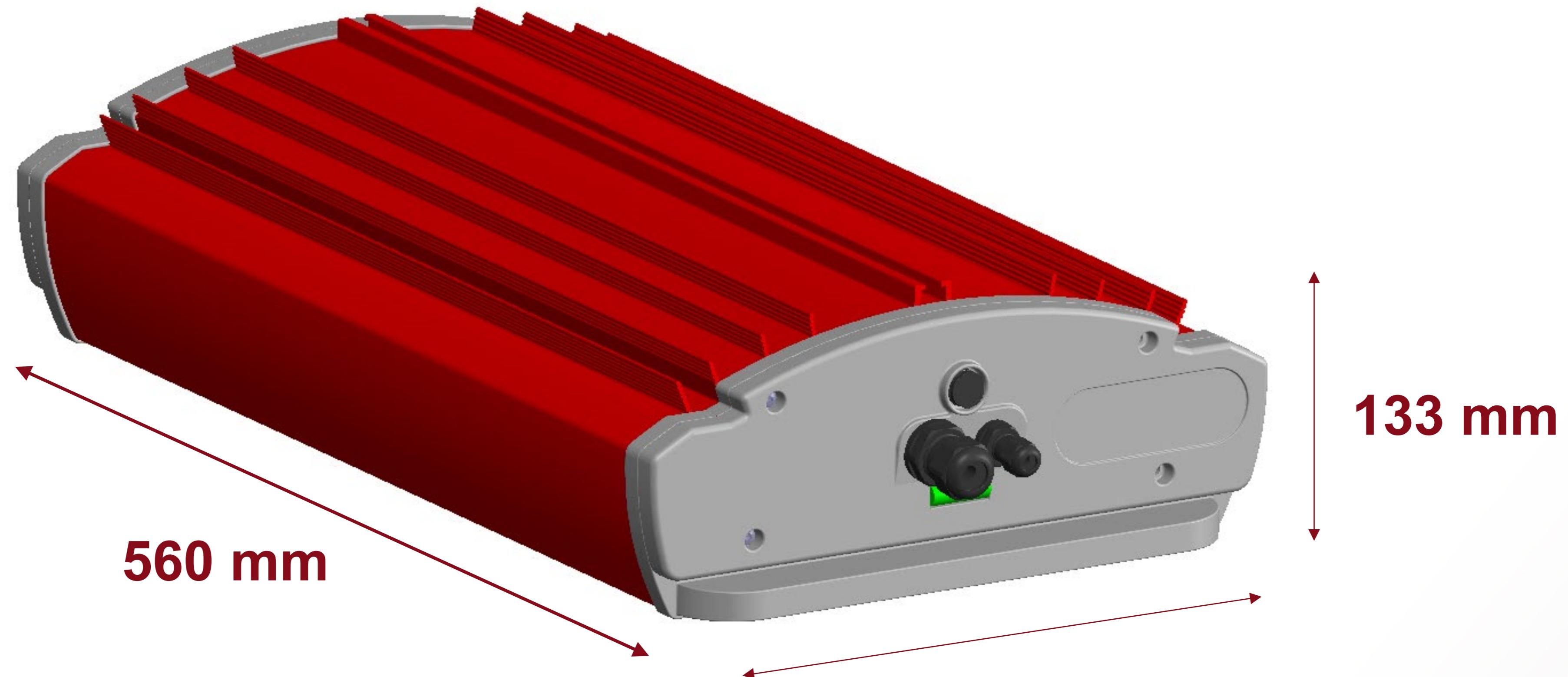
- 36.000 lumen
- 144 Lm/W (Lumen per Watt)
- Sprider upp till 23 meter vid en höjd på 6,5 meter (minimum 150 lux)
- Jämn ljusfördelning på golvnivå
- Färg 4.250K (+/- 5%)



# L4C LED 125



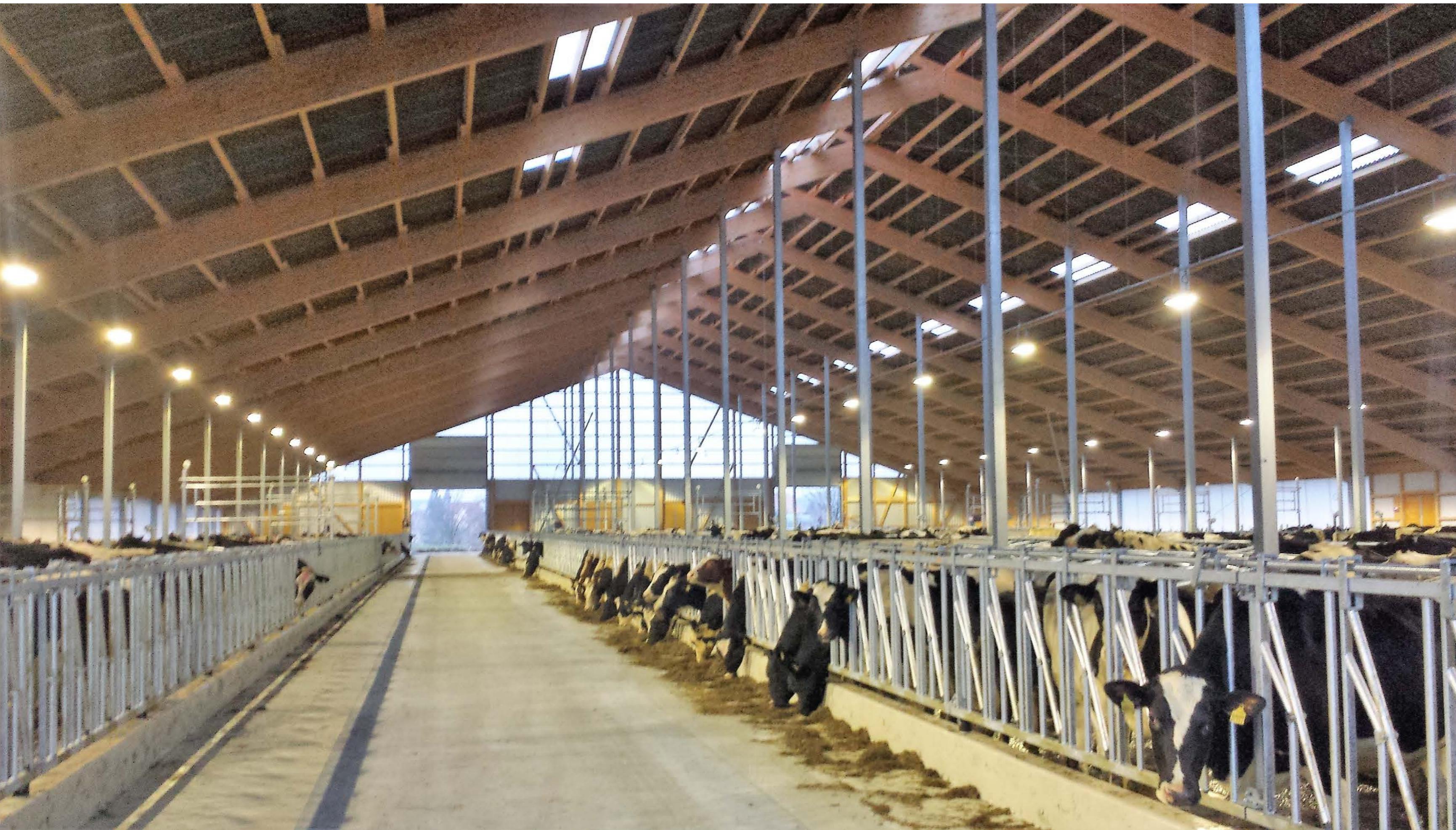
# *L4C LED 125*



**kg** 8,0



*L4C LED 125*



# L4C LED 125



L4C LED  
125



# *L4C LED 125 fakta*

- 18.000 lumen
- 144 Lm/W (Lumen per Watt)
- Sprider upp till 23 meter vid en höjd på 6,5 meter (minimum 80 lux)
- Sprider upp till 13 meter vid en höjd på 3,5 meter (minimum 150 lux)
- Jämn ljusfördelning på golvnivå
- Färg 4.250K (+/- 5%)
- Jämförbar produkt som L4C LED 250, enda skillnad:
  - EJ integrerat rött LED nattljus
  - Lägre avgiven ljuseffekt
- Kan användas i kombination med L4C LED 250 för olika delar av stallet
- **MEN.... -Vilken ljusnivå önskar lantbrukaren??**



*L4C LED kvalité*



# *Livstid -Skydd o Miljö*

## **Skydd**

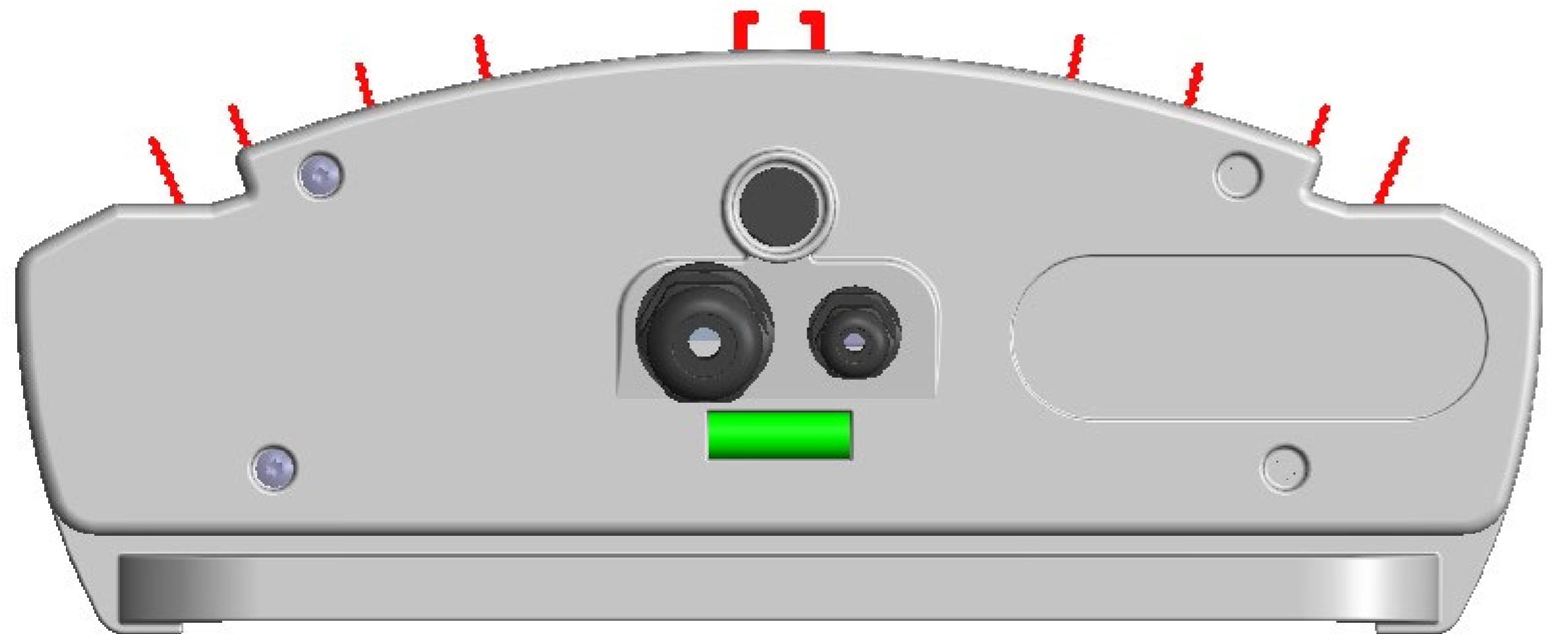
- Inbyggt överhetningsskydd
- Inbyggd överspänningsskydd

## **Miljö**

- Tillämplig för stallmiljö, byggd för ändamålet
- Ammoniak (NH<sub>3</sub>) resistent upp till min. 20 ppm  
(parts per million) (Mjölkstallar normalt 0,5 - 6 ppm)



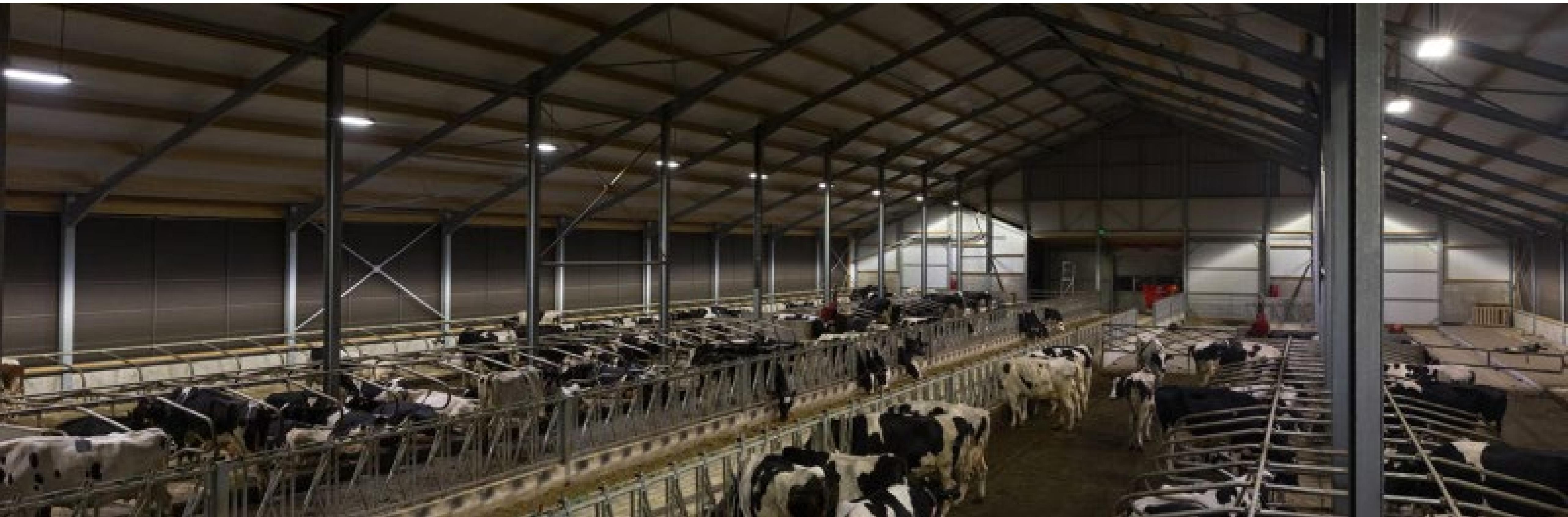
# *Livstid -Kylning*



## **L4C LED: Designad för stallmiljön**

- Kylningsflänsarna säkerställer högsta möjliga livslängd
- L4C LED har överdimensionerad kylning:
  - Även nedsmutsad så har L4C LED tillräcklig kylkapacitet.

# L4C LED Control box



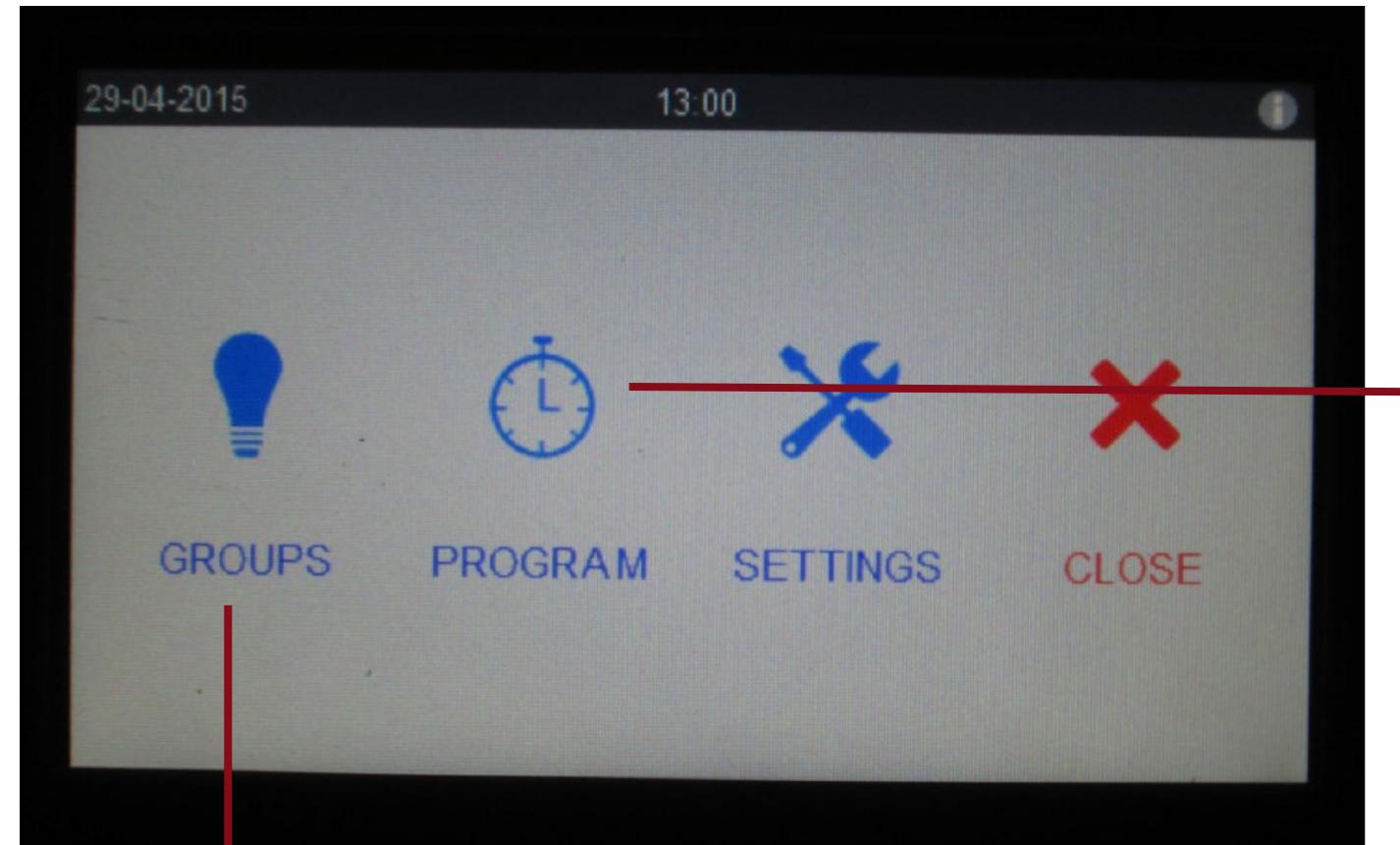
# LELY L4C LED



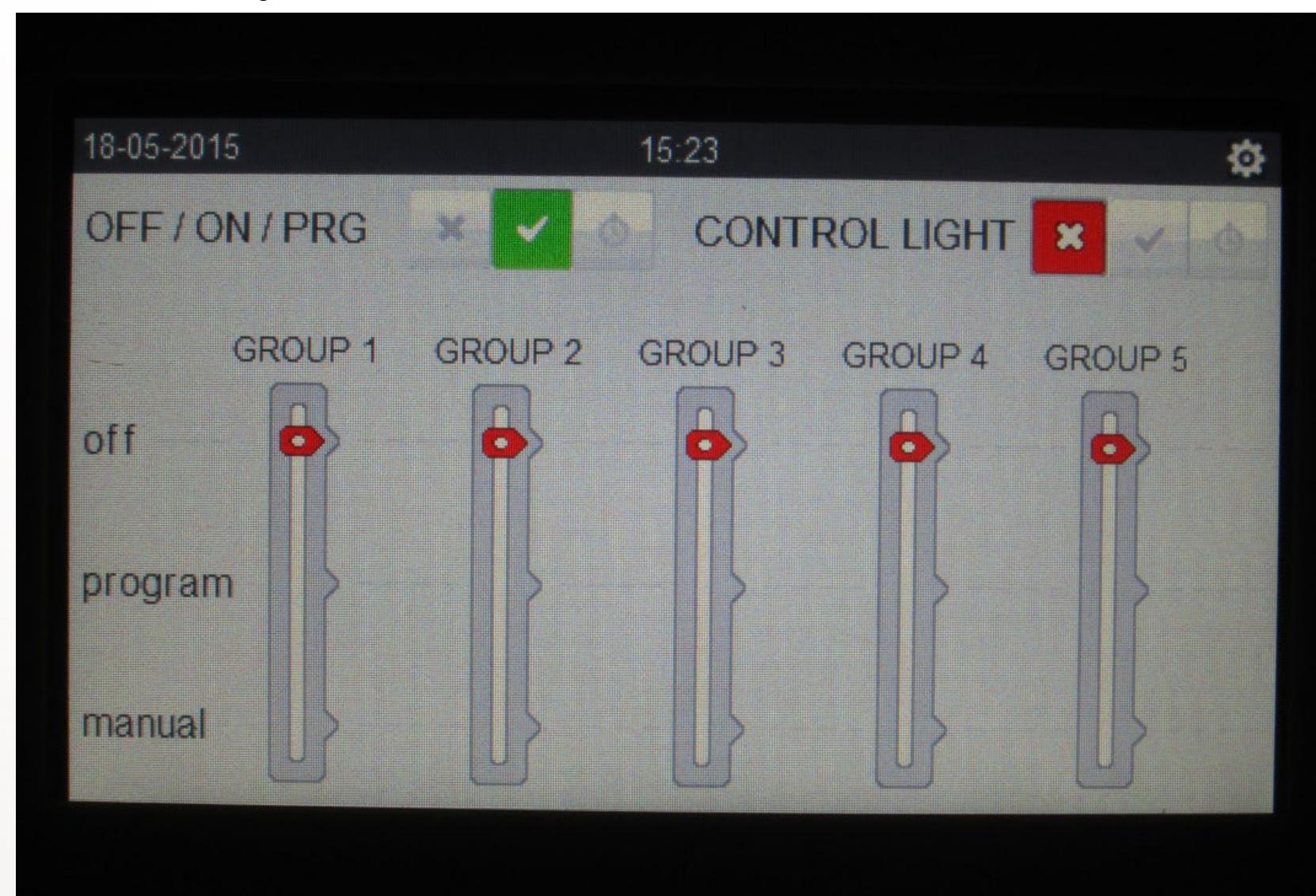
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# L4C Control box



Startmeny;



Max 5 ljusgrupper per control box

10 olika program kan skapas per grupp.  
Per program kan 8 olika tider ställas, med önskad händelse;

PROGRAM				11:16		
		PROGRAM 1	PROGRAM 2	PROGRAM 3	PROGRAM 4	
1	5:30	0 %	5	0:00	0 %	
2	6:00	100 %	6	0:00	0 %	
3	21:30	100 %	7	0:00	0 %	
4	22:00	0 %	8	0:00	0 %	

EXEMPEL enl. ovan.

- \* 1) Gruppens fixturer startas 05:30
- \* 2) Mellan 05:30 – 06:00 ökas ljusstyrkan successivt upp till 100%
- \* 3) Mellan 06:00 – 21:30 kvarstår ljusstyrkan på 100%
- \* 4) Mellan 21:30 – 22:00 sänks ljusstyrkan successivt ned till 0%

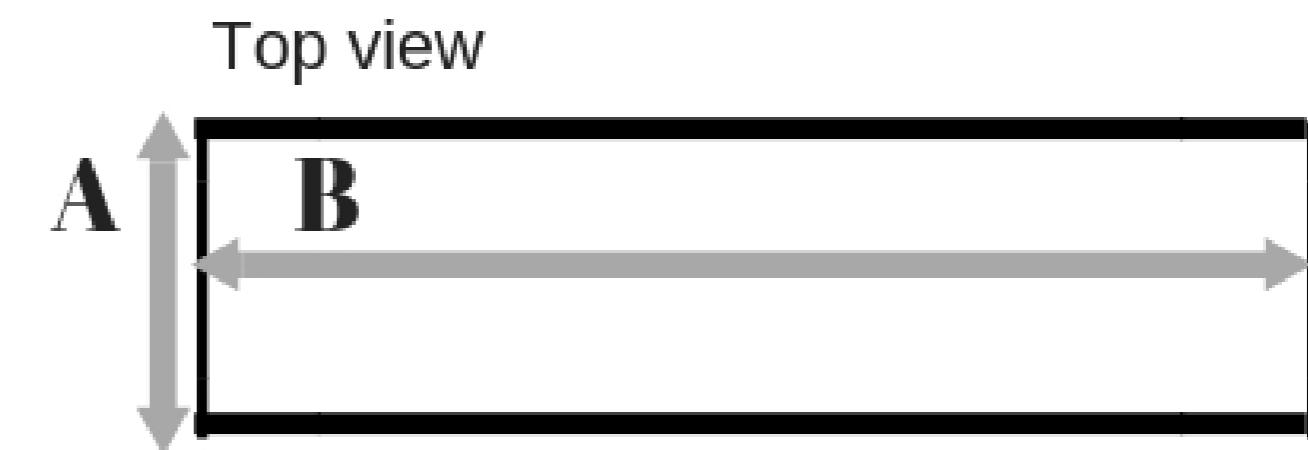
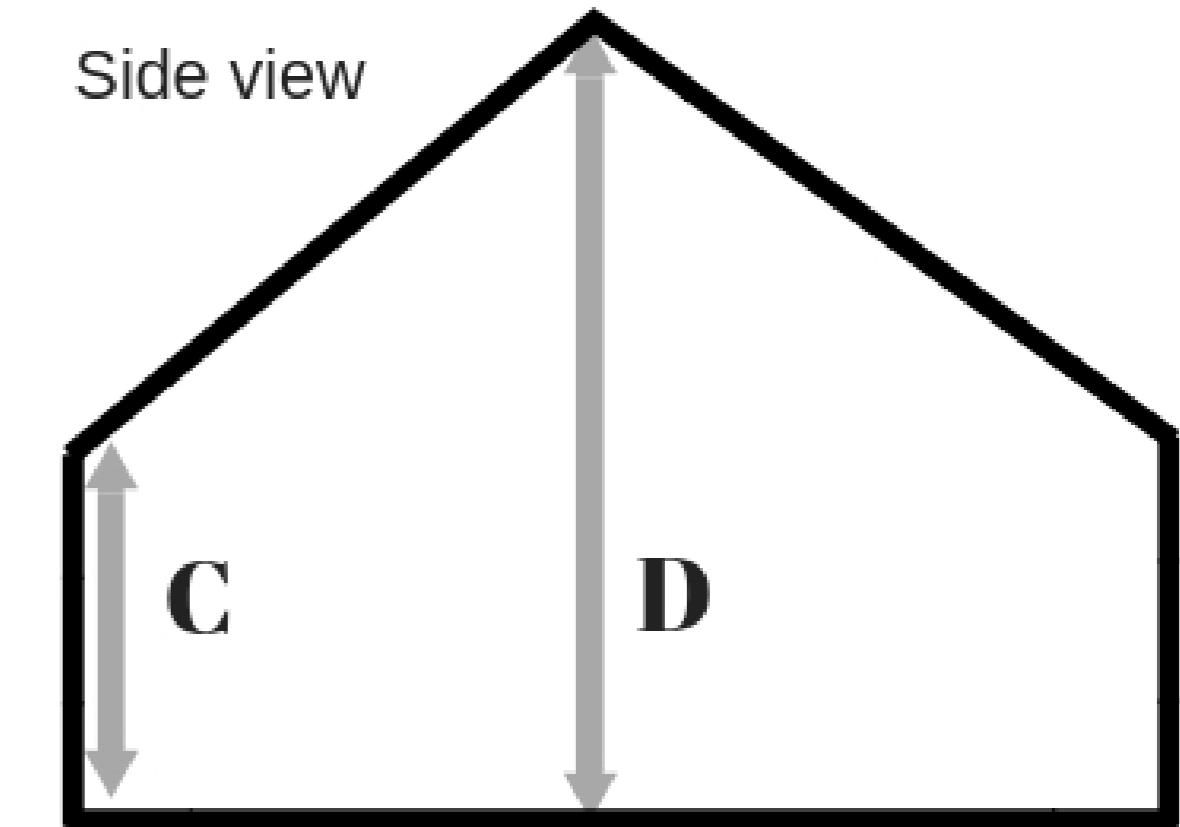


# Behovsberäkning

1. A –Bredd
2. B –Längd
3. C –Sidoväggens höjd
4. D –Taknockens höjd

Andra särskilda faktorer eller önskemål att ta hänsyn till?

Se exempel på ljusberäkning som separat bilaga.



*Tack för visat intresse!*





# LIGHT PLAN

## Lely L4C LED



Project Jansson  
Project nr. AL17-1055-02



*innovators in agriculture*

[www.lely.com](http://www.lely.com)

# Lely L4C – Light plan

<b>Project number</b>	AL17-1055-02
<b>Company</b>	Lely Center Valdemarsvik
<b>Contact</b>	Rickard Olsson
<b>Address</b>	Hagagatan 50, 594 30 , GAMLEBY
<b>Tel.</b>	+46 (0)70 584 59 81
<b>E-Mail</b>	rolsson@val.lelycenter.com
<b>Project</b>	Jansson
<b>Date</b>	30-10-2017
<b>Barn type</b>	Dairy: 16 x 28,50 meters



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## 1. The importance of Light for dairy cows

### Why is optimum light distribution in the barn important for the cows?

Cows can perform better, when there is a day and night light cycle stimulated in the barn (a natural light cycle). Light activates certain hormones in cow's brain, which makes the cow more active. This can result in higher milk production.

To ensure the best natural light cycle for milking cows, it is advised to have sixteen hours of light and eight hours darkness in the barn.

For the dry cows it is the other way around – eight hours of light and sixteen hours of darkness. The dry cows need more resting time, since they are preparing for calving.

### Why is optimum light distribution in the barn important for the farmer?

Well-distributed and correct lighting in the barn provides the farmer with a safe working environment, as well as clarity. Efficient lighting in the barn enables the farmer to detect cow signals much better. It is easier to notice if cows are in first stage lameness or if they are in heat. Cows dung is also a good signal of the cows health and it is easier to analyze in a well-lit barn.

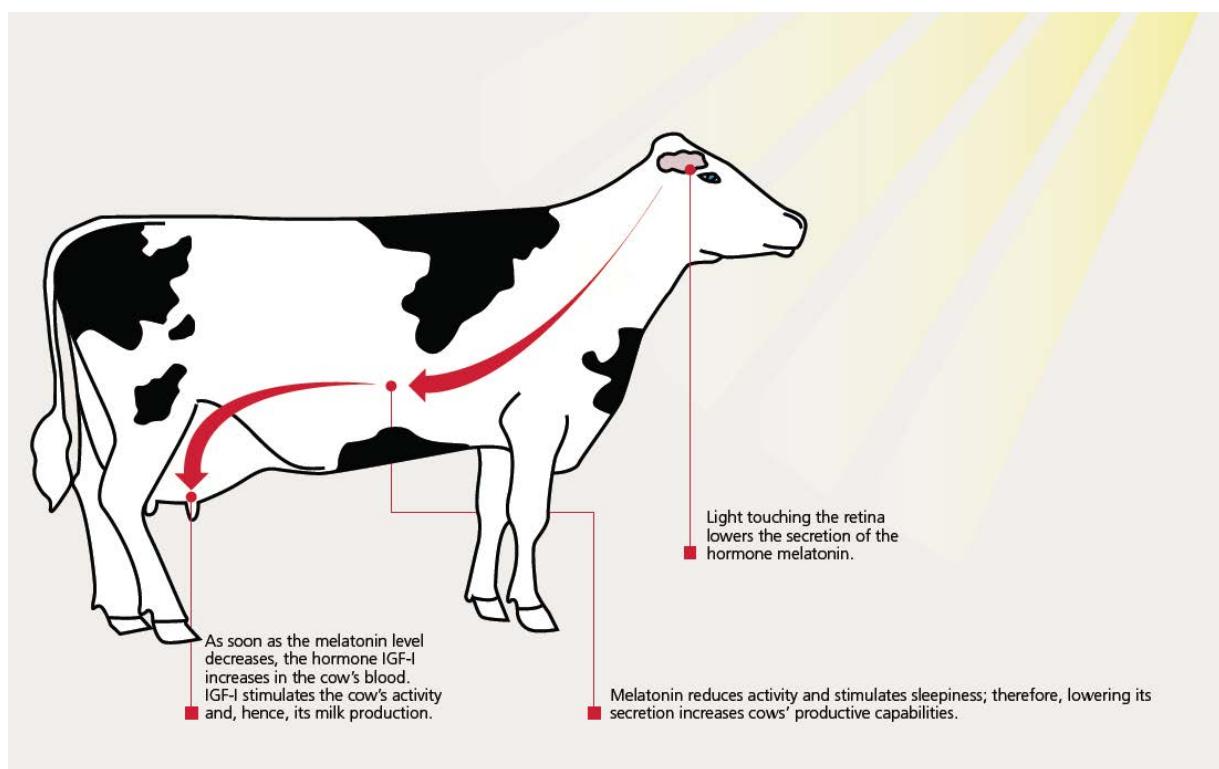
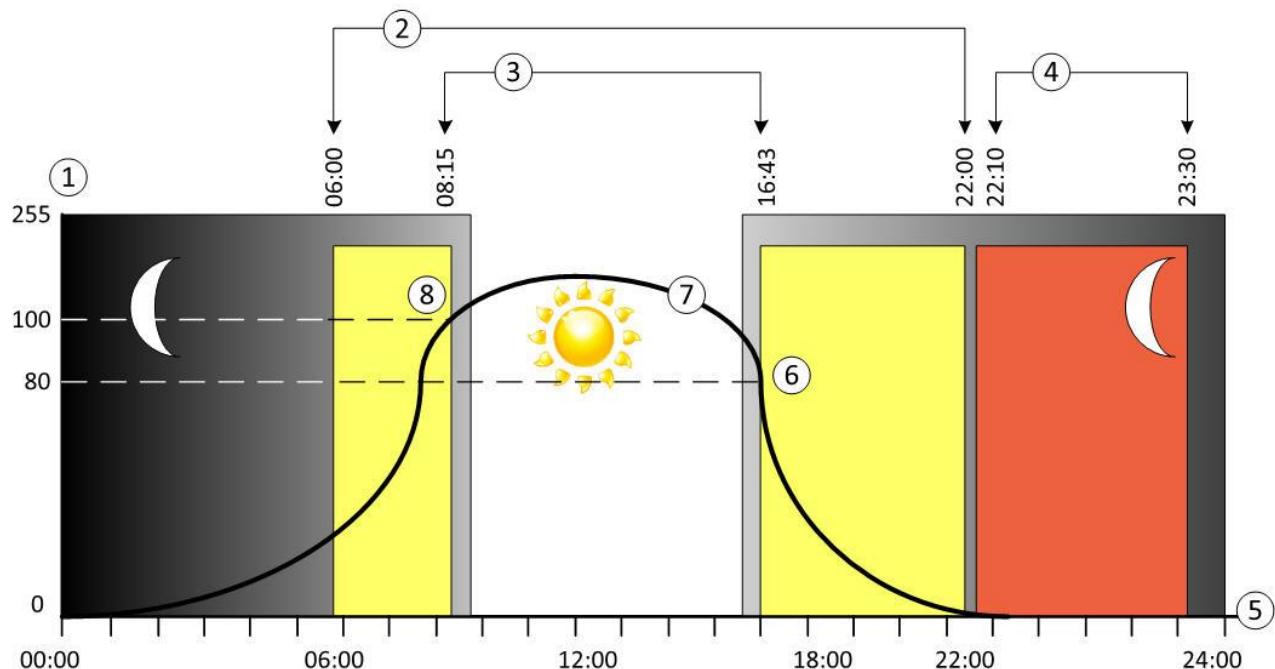


Figure 1: How light stimulates the milk production

## 2. Lely Light for Cows (L4C) concept

Providing optimal distributed light at the lowest energy cost, helps to increase milk production, feed intake, heat detection and improves with health issues.

**How does the L4C system work?**

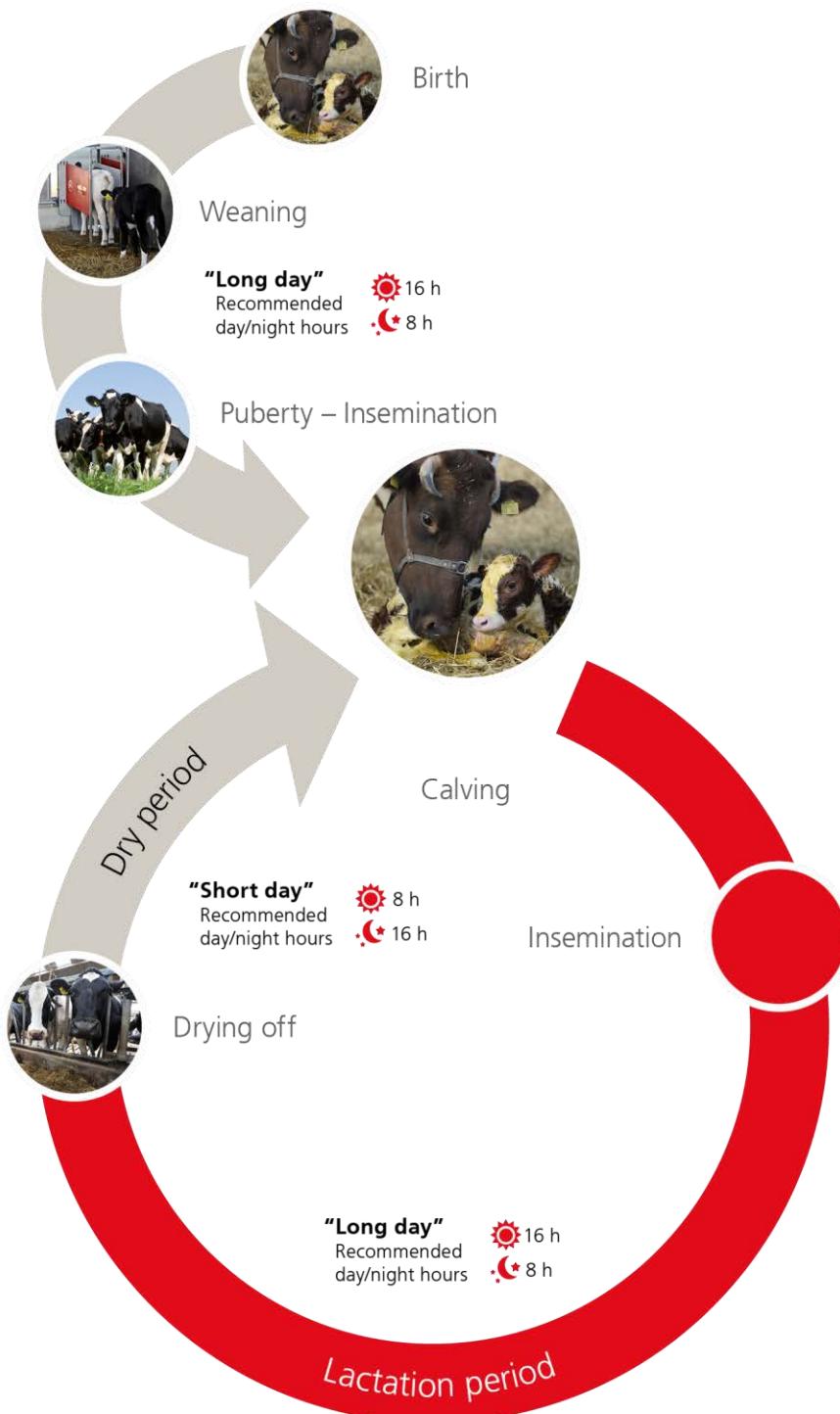


*Figure 2. Light switch graph*

Key: 1. Light level - 2. Switch block main light - 3. Switch moments dependent on light level - 4. Switch block night light - 5. Time line - 6. Low switch value of the light sensor - 7. Light level - 8. High switch value of the sensor

Cows are performing better when there is a natural light cycle ensured in the barn (day and night rhythm). With L4C system the farmer can program a sixteen hour day period and an eight hour night period for milking cows and the opposite schedule for his dry cows, all are managed automatically.

When there is enough day light coming from outside, the L4C lights will gradually switch off. When the day light intensity reduces, L4C will switch on to provide the necessary light level for the cows.



This diagram shows the recommendations and benefits of using specific light schedule at different stages of a cow's life and production cycle

### Benefits for young stock

- Good development of the mammary gland
- Higher milk production in the future
- Earlier puberty
- Faster growth

### Benefits lactation period

- Increased milk production of 8 – 10%
- Higher activity
- Higher feed intake
- Clearer heat signal

### Benefits dry period

- Increased milk production in the next lactation
- Reduction of the dry period possible (from 60 to 42 days)

## Why to choose for Lely L4C?

### 1. Light for clarity

- A. Safe working environment for the farmer and other people.
- B. Better detection of cow signals (cows in heat, lame cows, etc.)

### 2. Optimize cow activity

- A. Simulation of the natural light cycle – improved cow activity.
- B. Stimulation of feed intake – improved milk production.

### 3. Flexibility

- A. User friendly interface to manage the light set up in the barn.
- B. Easy and flexible – the L4C system can easily be extended or changed depending from the barn layout.
- C. Custom made light plan – according to individual barn set up and situation.

#### Do you know that...

- an increase in feed consumption can accompany the increase in milk production;
- milk production can increase by 6 to 10% if the days are lengthened and supplemented at a light level equal to daylight;
- the milk's fat content either does not change or hardly changes if milk production increases;
- the cows are more active and fertile for longer periods when exposed to longer days;
- cattle with fertile periods that return faster, can lead to shortened calving index;

### 3. Light plan calculation: LED fixtures

#### Light calculation:

**Lely L4C LED**  
**L4C LED 250 fixtures**  
 Average light level in the barn between 150 to 200 lux



**L4C LED 250 - control light**



**L4C LED 250 - day light**

#### Summary Light Calculation

<b>Total quantity</b>	4 Fixtures with a total power of 1000 Watt
<b>Installation bracket</b>	4 x set installation bracket 1010mm
<b>Controlling</b>	1 L4C LED Control box per 30 fixtures 1 L4C LED Switch box per 1 L4C LED Control box
<b>Light level</b>	198 Lux (average, calculated without reflection)
<b>Uniformity</b>	52,6 %

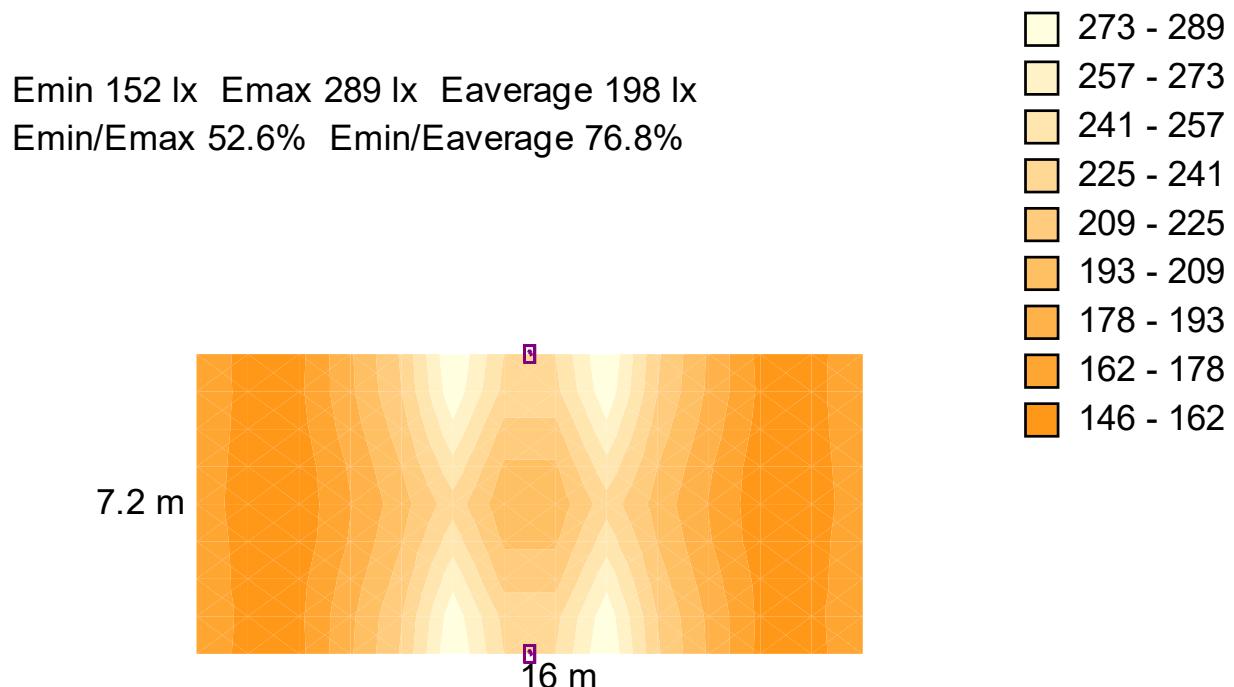
#### Calculation values

<b>Amount</b>	4 x L4C LED 250 355934
<b>Height</b>	5,1 meters
<b>Fixtures</b>	L4C LED 250 355934
<b>Luminous flux</b>	L4C LED 250 (09-2016) 250
<b>Calculation value</b>	36000 Lumen by 250 Watt LED

## **LED – Graphic display:**

The graph below shows the light level on ground level, the Emin/ Emax stand for the ratio between the minimal (Emin) and maximal (Emax) light level.

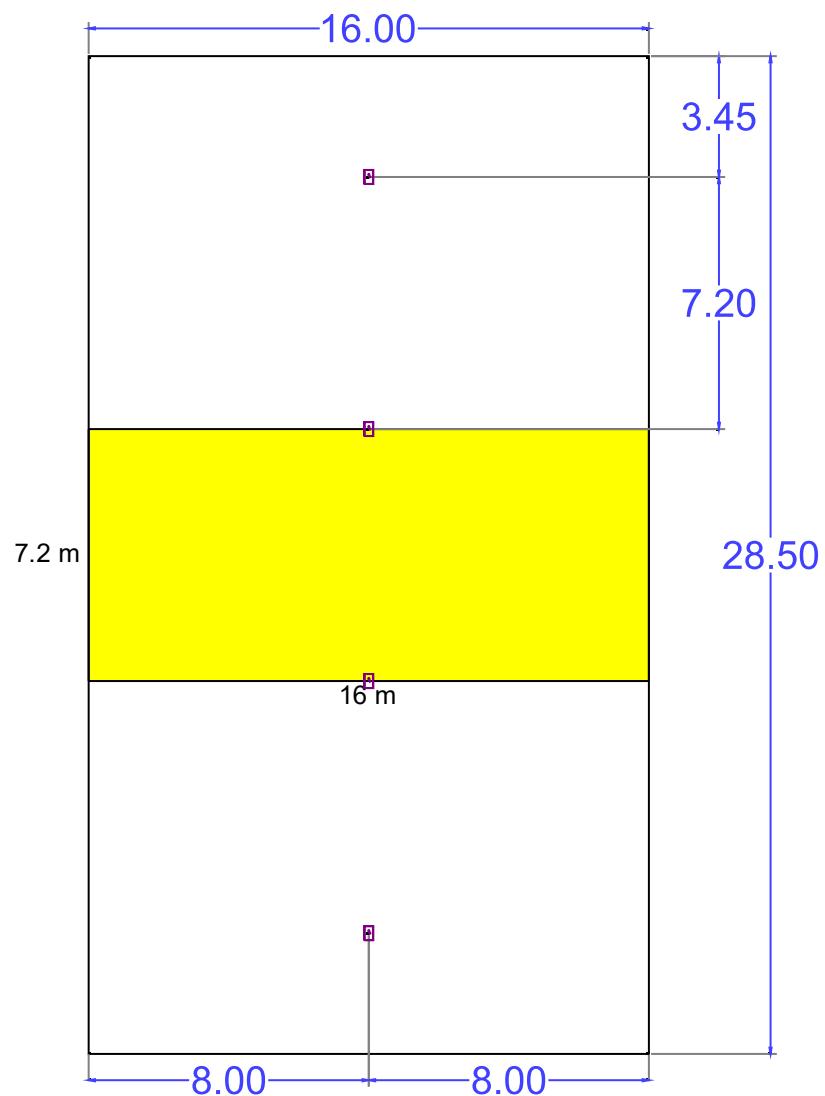
A good lighting level is considered to be all above 45%, the higher this number, the better the distribution is.



## **LED - Light level:**

*Light yield denoted yellow surface (see installation drawing):*

169	158	157	191	227	289	241	241	289	227	191	157	158	169
170	158	158	190	225	284	236	236	284	225	190	158	158	170
171	157	156	186	217	269	220	220	269	217	186	156	157	171
170	156	153	180	209	251	207	207	251	209	180	153	156	170
170	155	152	177	202	235	198	198	235	202	177	152	155	170
171	156	153	179	208	250	207	207	250	208	179	153	156	171
171	157	157	185	216	267	219	219	267	216	185	157	157	171
170	159	158	190	224	283	236	236	283	224	190	158	159	170
169	158	157	191	227	288	241	241	288	227	191	157	158	169

**View from above**

## 4. L4C light options

### Option 1 LED fixtures

Light-Emitting Diode (LED) white light, 200 lux  Standard with integrated LED night lights	>60.000 burning hours 33.500 lumen	 
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### Option 2 – High Pressure Sodium fixtures

High pressure sodium (HPS) yellow lights, 200 lux  Available also with integrated LED night lights for 400 Watt fixtures	18.000-20.000 burning hours 58.000 lumen <u>Cheaper in purchase</u> <u>Cheaper in usage</u>	 
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### Option 3 – Metal Halide fixtures

Metal halide (MH) white light, 200 lux  Available also with integrated LED night lights for 400 Watt fixtures	8.000-10.000 burning hours 38.000 lumen	 
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### Night light option for barns with separate LED night light

The separate night lights are not calculated on the light plan anymore. If the farmer is interested to have these fixtures, it is advised to have 10 m between 2 night light fixtures, if installed in one row.

Or 12 m between two night light fixtures, if installed in two rows.

Separate LED night light – red light, 1-3 lux	25.000 burning hours for the lamp	 
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## 5. L4C LED project components

Light fixture - 250 watt LED fixture	According to the light plan	
Light Management System with touch screen	According to the light plan	
L4C LED BOX Switch	According to the light plan	
Installation strips (360mm, 1010mm, chain mounting)	According to the light plan	
Light sensor	1 light sensor is included with the Light Management System	

**Optional components**

LED TL fixture 2x28 Watt, incl. lamp	To light up lower places in the barn when a standard L4C system cannot be used.  Or for additional rooms as robot room, milk tank room and office.	
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## 6. Notes

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greppa näringen



**Rickard Olsson, Lely**

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Linköping 2019-05-20



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