

Research:

**Increased  
Milk Yields**  
and more through  
**professional  
lighting**

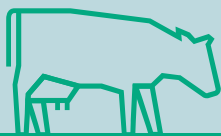


The **RUDAX** is our dedicated lighting solution for Dairy Cattle. The RUDAX has a cool white light output, that can be mixed with blue light. The light has been tested in several farms in both China and the Netherlands, where we have seen **milk production improvements of 8%**. In this paper we will tell you more about our two year study in the Netherlands.



## Purpose

The RUDAX tests in China led to higher milk production, but also to better feed intake in heat stressed days and increased fertility. With the Dutch research, we focused on milk production, having a look at the other aspects as well, to learn more about the influence of the RUDAX in Dutch Cattle farms.



*The main purpose of this research is to see what difference the RUDAX makes to milk production in dairy cattle farms in the Netherlands.*

# The research set-up:

We have set up the research in collaboration with a Dutch farmer with 100 dairy cows, of which 85 were in production. We compared data of two years with sodium lighting with data of two years with RUDAX lighting and a HATO advised light scheme.

Data was collected and provided by the milk company, the inseminator and the veterinarian.

A milk robot inside the house was used to milk the cows.

## Before situation

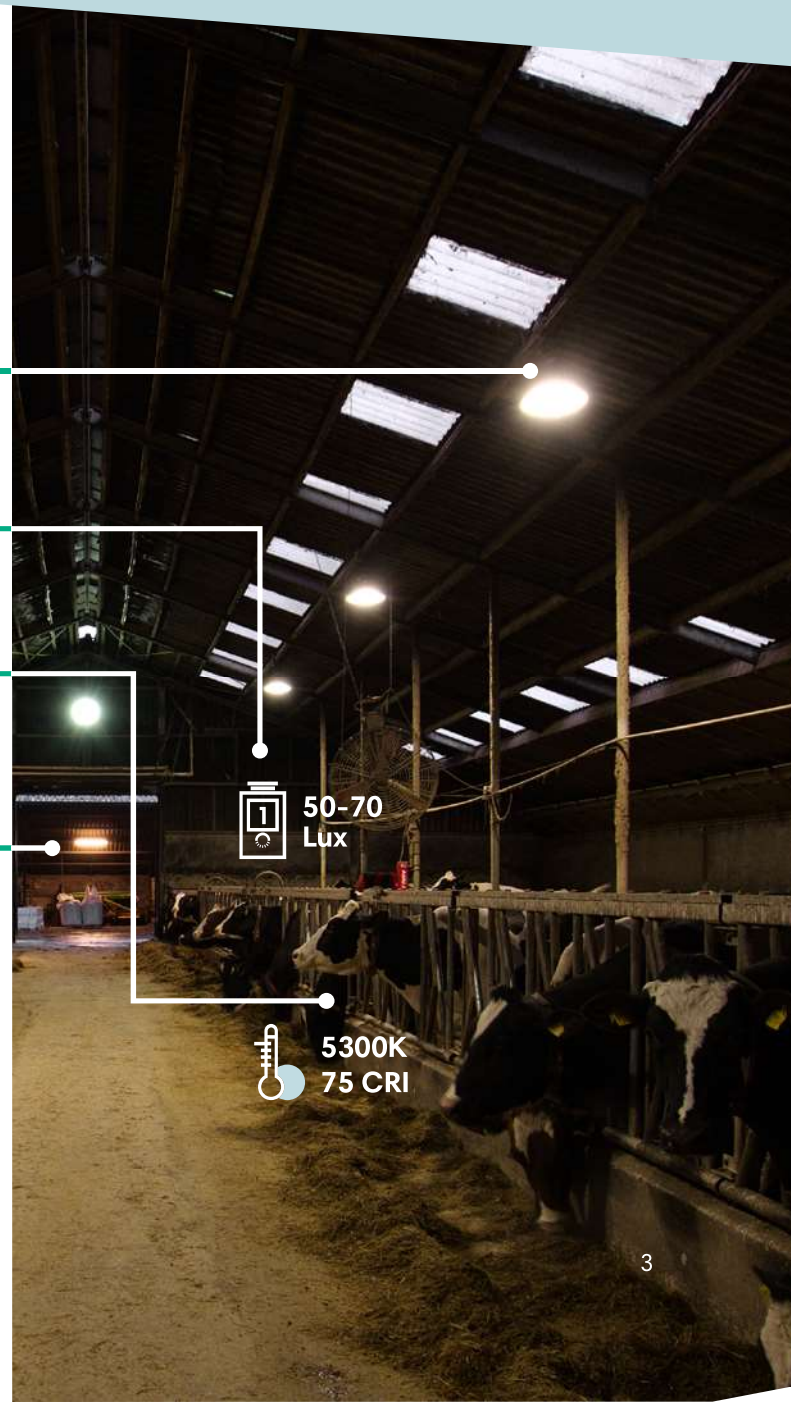
During the before situation, sodium lighting was used.

The light intensity was 50 lux on average in the resting area and 70 lux in the feeding area.

The CRI (Colour Rendering Index) of the lamps was 75 with a colour temperature of 5300K (cool white).

The lights didn't have sensors to regulate the light intensities nor did they have dimming possibilities.

They were on 24 hours a day, 7 days per week.



# After situation

We installed 39 RUDAX led lights.

These provided an average light intensity of 180 lux in the resting area and 120 lux in the feeding alley.

The CRI (Colour Rendering Index) of the lamps was 83 with an average colour temperature of 4600K.



A light sensor to regulate the light intensity was used, and the RUDAX enabled 100-0% dimming.



4600K  
83 CRI

180-120  
Lux

The photoperiod (period of time with the lights on) was regulated with a controller and consisted of 18 hours of light in total.



11h



5h



2h



6h



During 11 hours, white light was used, during 5 hours white light was mixed with blue and during 2 hours, blue light was used monochromatically. During the remaining 6 hours, the lights were off to realize full darkness.

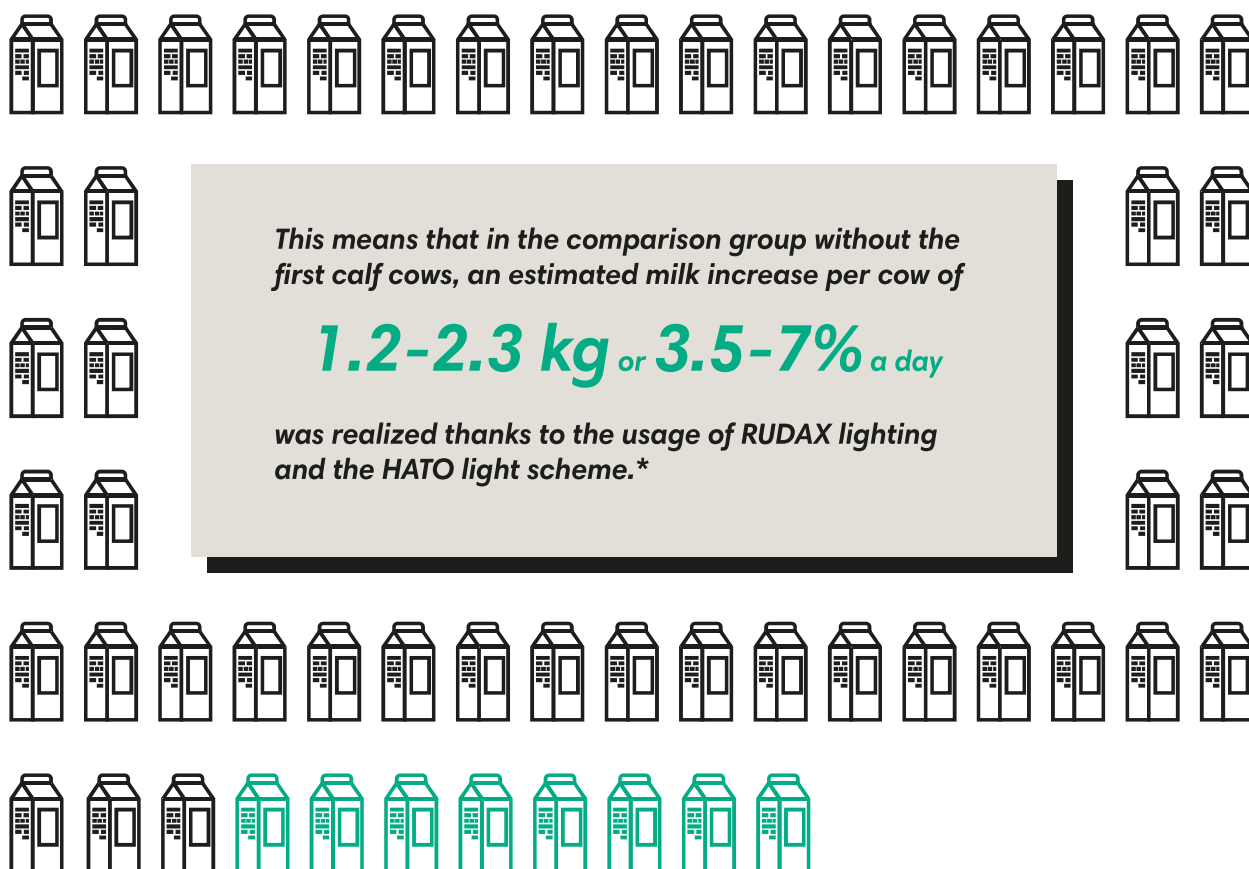
# The Results

## Increased milk production

The 305 days production was taken into account. The statistic comparison groups were divided into a group with first calf cows and a group without these first calf cows.

This because the first calf cows were not in the 'before' group, so we also tried to see what the effect was without these. We saw that when the first calf cows were included in the calculations an increase of **8.9 kg milk per day** was seen (+28%). Without these first calves the average increased amount was still significant with **+5.8 kg per day** (+17,5%).

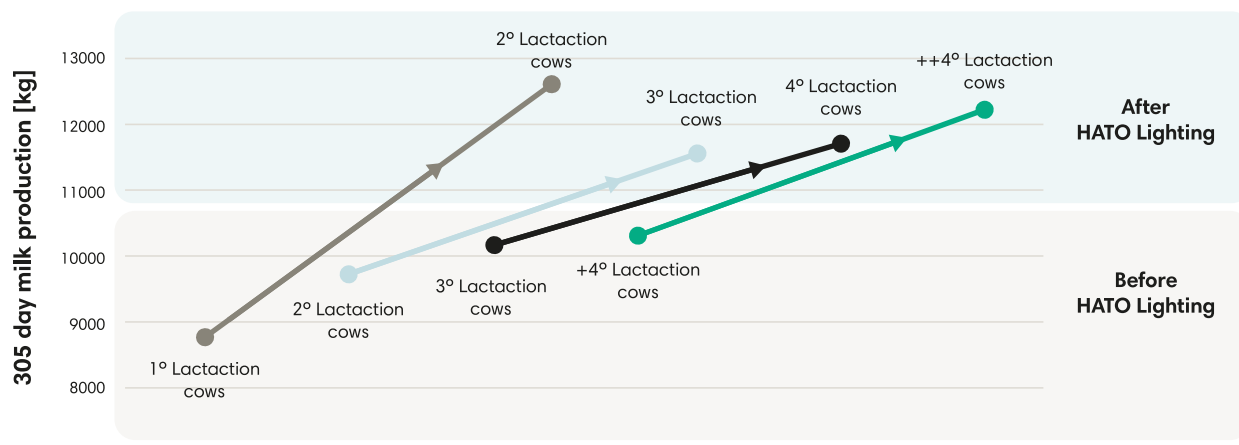
During the two years of trial the farmer made changes to his insemination and health management. The estimation is that around **20%-40%** of the increase in milk production is **the effect of the lighting**. Other factors improving the milk production were management changes and lactation numbers that belonged outside of the target group.



# The Results

The graphic below shows the improvement in milk production per lactation.

## Milk production following up lactation



- ✓ The biggest impact is seen in the “**Gray Group**” which were cows in first lactation before HATO Lighting.

These cows were in their second lactation when HATO Lighting was used. Normally, second lactation cows can increase their milk production between 10% and 15%, but with HATO Lighting the improvement is **more than 30%**.

An improvement of almost  
**2750 kg**  
per cow in 305 days

- ✓ The other groups showed a similar increase, and it is seen that in **3rd and 4th lactating cows**, the milk production still increased.

- ✓ At **4+ lactations**, there is even still an improvement of:

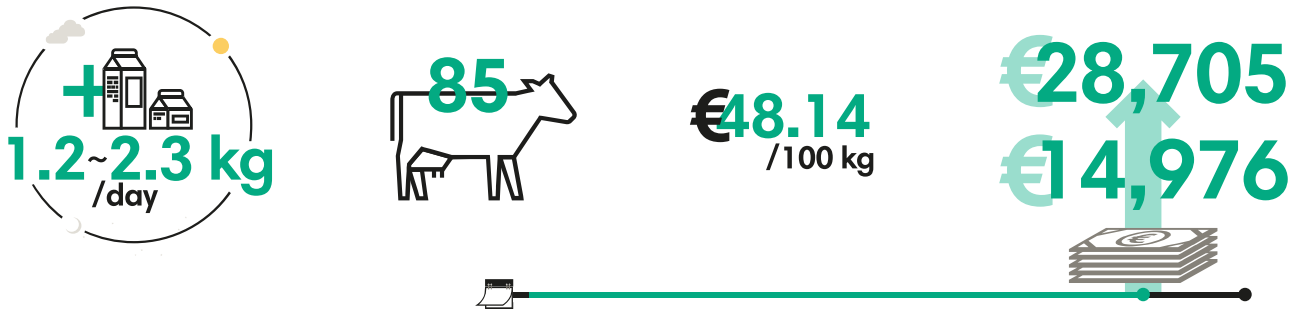
**5.9 kg/day**



# The Results

## Profits

During our two year study, the increases in milk production gave additional profits. When we calculate with the additional 1.2 to 2.3 kg milk per cow per day, with 85 cows and a milk price of €48.14 per 100 kg milk on average, this results in an increased profit of between resp. €14,976- and €28,705- per 305 day production.



## Milk composition

The fat percentage with sodium lights was 4.34%.  
With RUDAX lighting it was 4.36%.

With regard to the amount of protein in the milk we saw a similar result: 3.49% with sodium lighting and 3.52% with RUDAX lighting.

No negative difference in milk composition was seen. This results into a milk production increase with maintained composition.

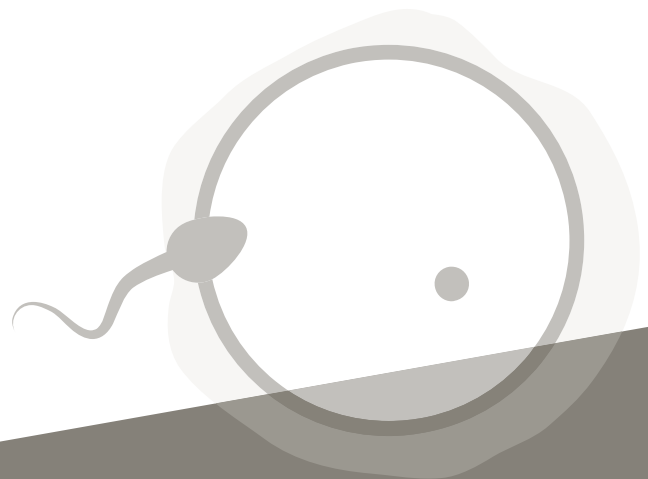
	Before HATO	After HATO	Significant
Fat	4.34%	4.36%	0.603
Protein	3.49%	3.52%	0.200
Lactose	4.58%	4.58%	0.754

## Fertility

The results on fertility showed us mixed signals.

The time between calves and the time between calf and first insemination showed an improvement of resp. 15 days.

After discussion with the farmer, it was concluded that the fertility was mainly affected by a different management style and it is impossible to have a final result on the effects of lighting here.



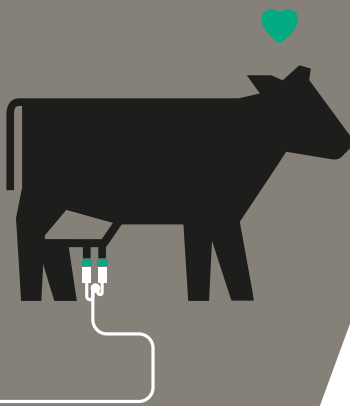
# The Results

## Cow behaviour

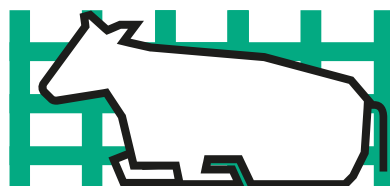
Several changes in behaviour of the cows were noticed after installing the RUDAX and using the HATO light scheme:

It was expected that the cows would not be willing to come to the milking robot when it was dark. But the opposite was seen to be true.

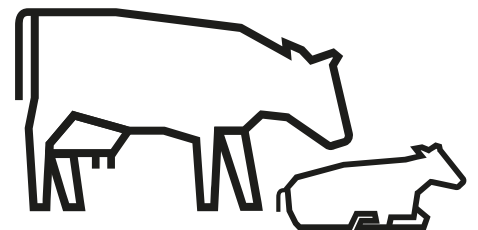
The cows were coming to the milking robot, even when the lights were off. Turning the lights off during the night has multiple benefits for the cows. It is important to regulate melatonin levels, also for milk production. But also to have a regular day and night rhythm. This can avoid stress situations and improves health.



The cows were laying down better and more in the boxes. Before, the farmer noticed that the cows sometimes were laying down in the aisles as well, which is not preferred since this can induce mastitis. The observed change shows that the cows are more at ease and will also have an effect on decreasing mastitis with the cows.



Delivery of calves during day time increased. Of course, this is preferred by the farmer, because the farmer is then able to help the cow with delivery when it is necessary. This compared to delivery during the night time. It is assumed that this was caused by the new light scheme that made sure the cows had a good day and night rhythm.



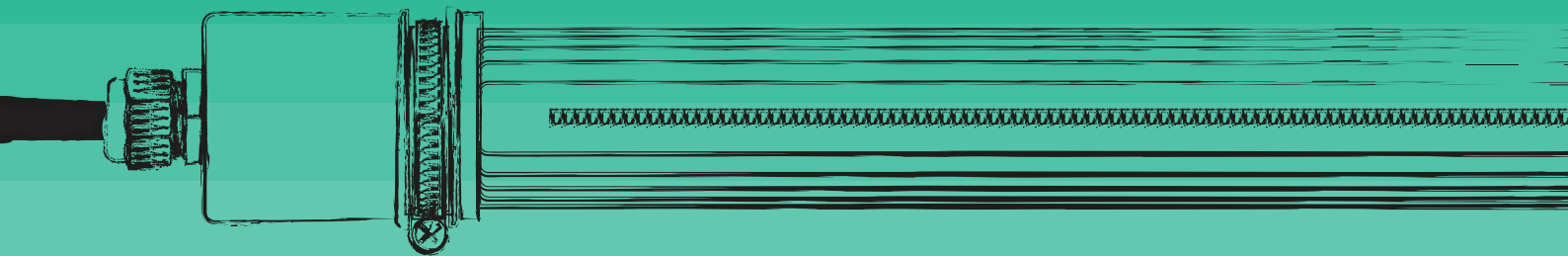


# Practical benefits

After speaking to the farmer, we identified some practical, yet important other benefits of the RUDAX for farmers.

First of all, the farmer experienced a higher work enjoyment due to better vision in the house. It was easier to see the cows and also check them for any anomalies.

Besides that, it's way easier to control and adjust the RUDAX lighting. This enables to adapt the lighting to the cows their needs and makes it easier to provide them with a proper day and night schedule.



Last but not least, thanks to being specifically designed for cattle farming and the usage of high quality materials, the RUDAX has a long, problem-free lifetime. Its high quality LEDs will work for approximately 10 years, and after that they continue to work at 80% intensity. This saves a major amount of costs and labour



# Conclusion

To conclude, replacing lighting with RUDAX lighting and using the HATO light schedule, several improvements are observed in this high production dairy farm:



## Increased daily milk production per cow

1.2 - 2.3 kg  
3.5 - 7%

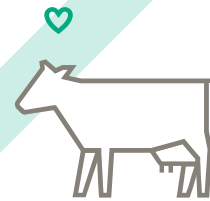


## Increased profits

between  
€14,976 and €28,705  
per 305 day production



## Practical benefits that increase work joy for the farmer



## Improved cow behaviour

- ♥ Cows come to the milking robot, even with the lights off
- ♥ Cows lay down better and in the boxes
- ♥ More day-time calf deliveries

Get in contact to know  
**How our lighting solutions** can help  
your specific business

- ✓ Increase profits
- ✓ Improve animal behaviour
- ✓ Improve work conditions
- ✓ and more



Contact us



# Calculations

## Milk increase calculation

Milk increase excl. first lactation cows:  
5.8 kg per cow or 17.5%

Estimated influence lighting:  
20-40%

20% influence lighting

40% influence lighting

5.8 kg	17.5%	5.8 kg	17.5%
<u>0.2</u>	<u>0.2</u>	<u>0.4</u>	<u>0.4</u>
<b>1.16 kg</b>	<b>3.5%</b>	<b>2.32 kg</b>	<b>7%</b>

Additional milk production per cow per day:

**1.2 – 2.3 kg**

**3.5 – 7%**

## Additional profit calculation

Milk price:

Average global milk price last 12 months = €48,14 per 100 kg (2022)

Source

85 cows in production  
305 day production

1.2 kg per day per cow

$85 \times 1.2 \times 305 = 31,110 \text{ kg}$

$\frac{31,110 \text{ kg} \times 48.14\text{€}}{100 \text{ kg}} = \text{€ } 14,976$

2.3 kg per day per cow

$85 \times 2.3 \times 305 = 59,627.5 \text{ kg}$

$\frac{59,627.5 \text{ kg} \times 48.14\text{€}}{100 \text{ kg}} = \text{€ } 28,705$

**Additional profit between  
€14,976 & €28,705**



# RUDAX:

## *Cattle Lighting the HATO Way*

Visit RUDAX product page



# About HATO

Since 1974, we have been working on the best lighting solutions for the agricultural sector. We know that an optimal light climate forms the basis for responsible and profitable livestock farming. Our knowledge of the sector and our genuine involvement with our customers form the basis for a durable cooperation and underline our role as a market leader.

That's how we continuously improve the wellbeing of farmers and animals through our knowledge and lighting.

## Our mission

At HATO, we know that lighting is fundamental for globally responsible livestock farming.

## Our vision

High quality lighting that improves welfare and livestock production must be affordable for all farmers.

## Our values



### Integrity

We treat the world and everything in it honestly, openly and with respect.

Our norms and values are more important to us than a quick win.



### Innovation

Innovation is in our DNA.

We were born from a deep passion for innovation and look for new solutions to improve ourselves on a daily basis.

Without courage, no progression.



### Family

HATO = family. Both internally and externally. We work with each other, not for each other.

We believe that we reach the best results by working together and treating each other as family. Our way of cooperating is honest, sincere and forgiving.

# *Improving life through brightness*

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