Lighting Management

Cage-free Academy

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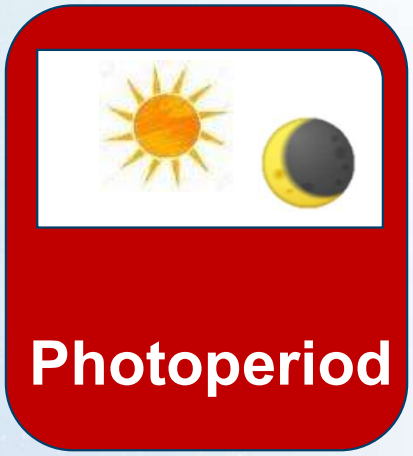
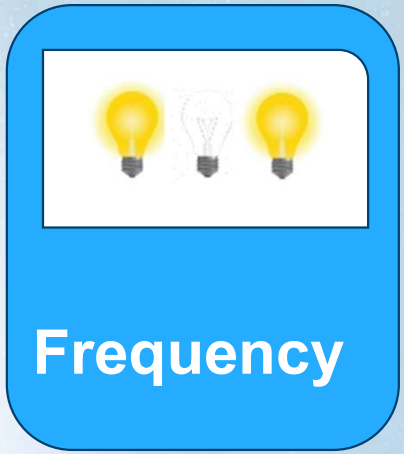
H&N International GmnH

4 Features of Light





In nature, production is seasonal

When will grain be available for my chicks?

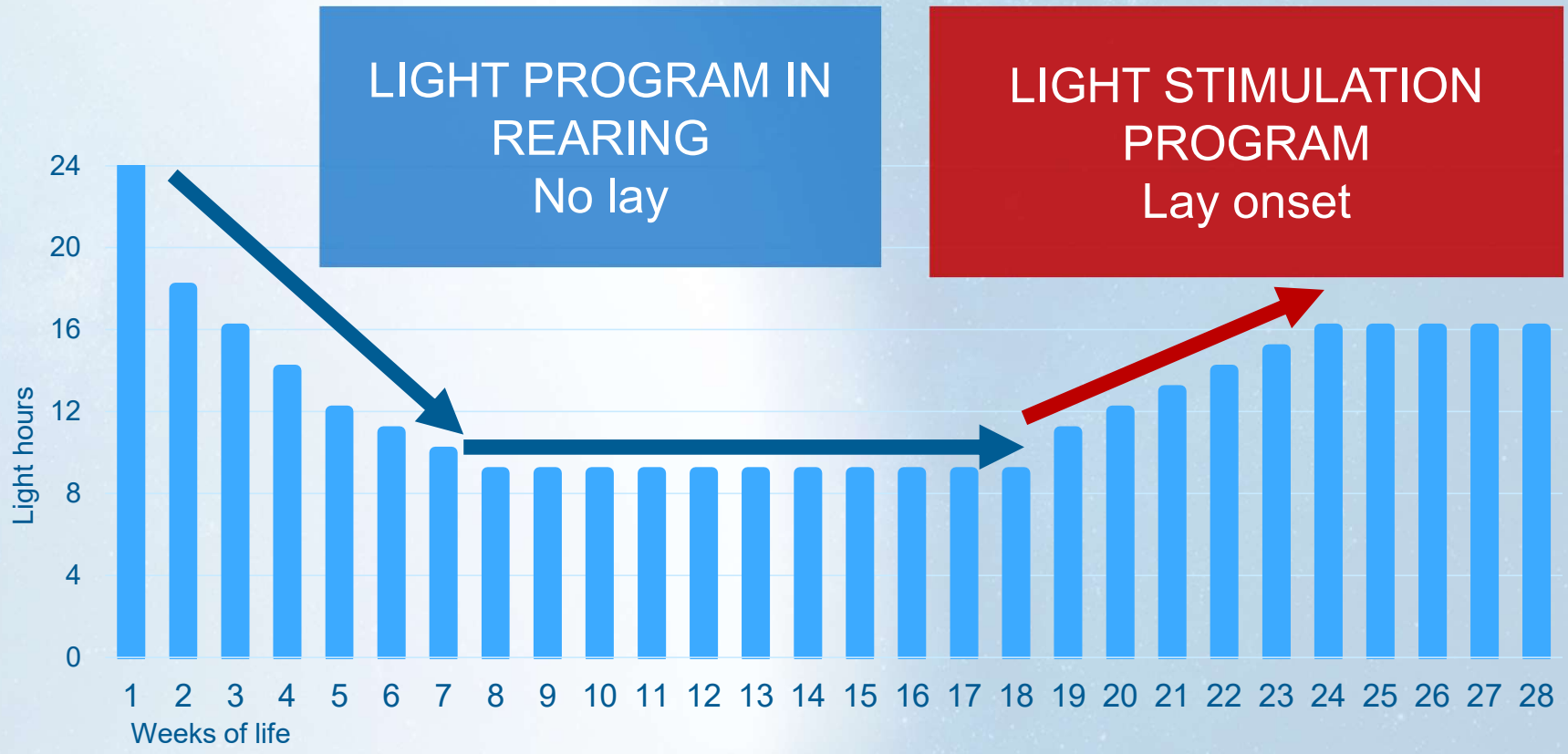
In spring and summer!

INCREASED PHOTOPERIOD
Lay stimulation

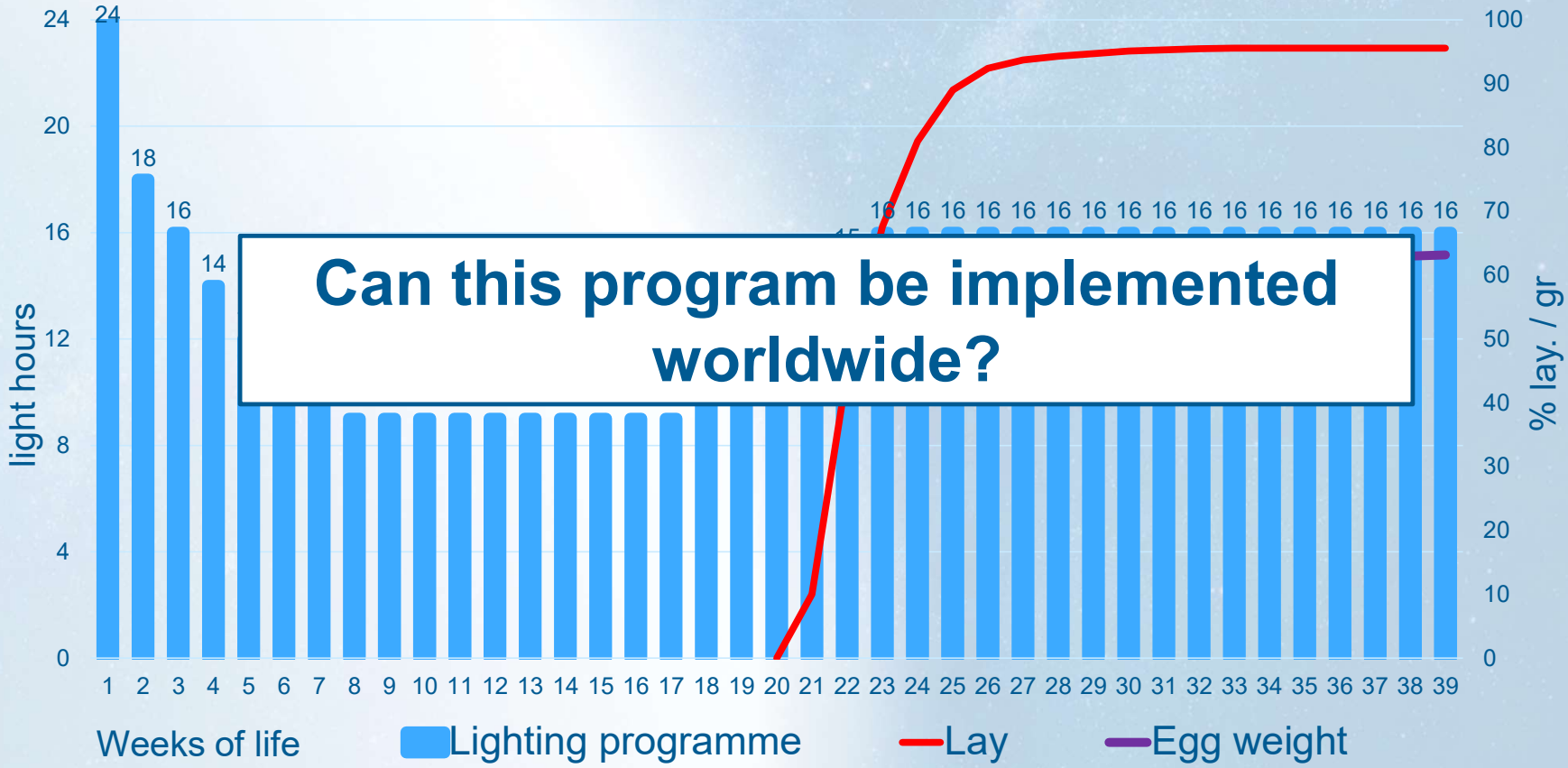
DECREASE IN PHOTOPERIOD
No lay

On farms, production is scheduled

Light Programs - Deseasonalization of egg production



Recommended lighting program

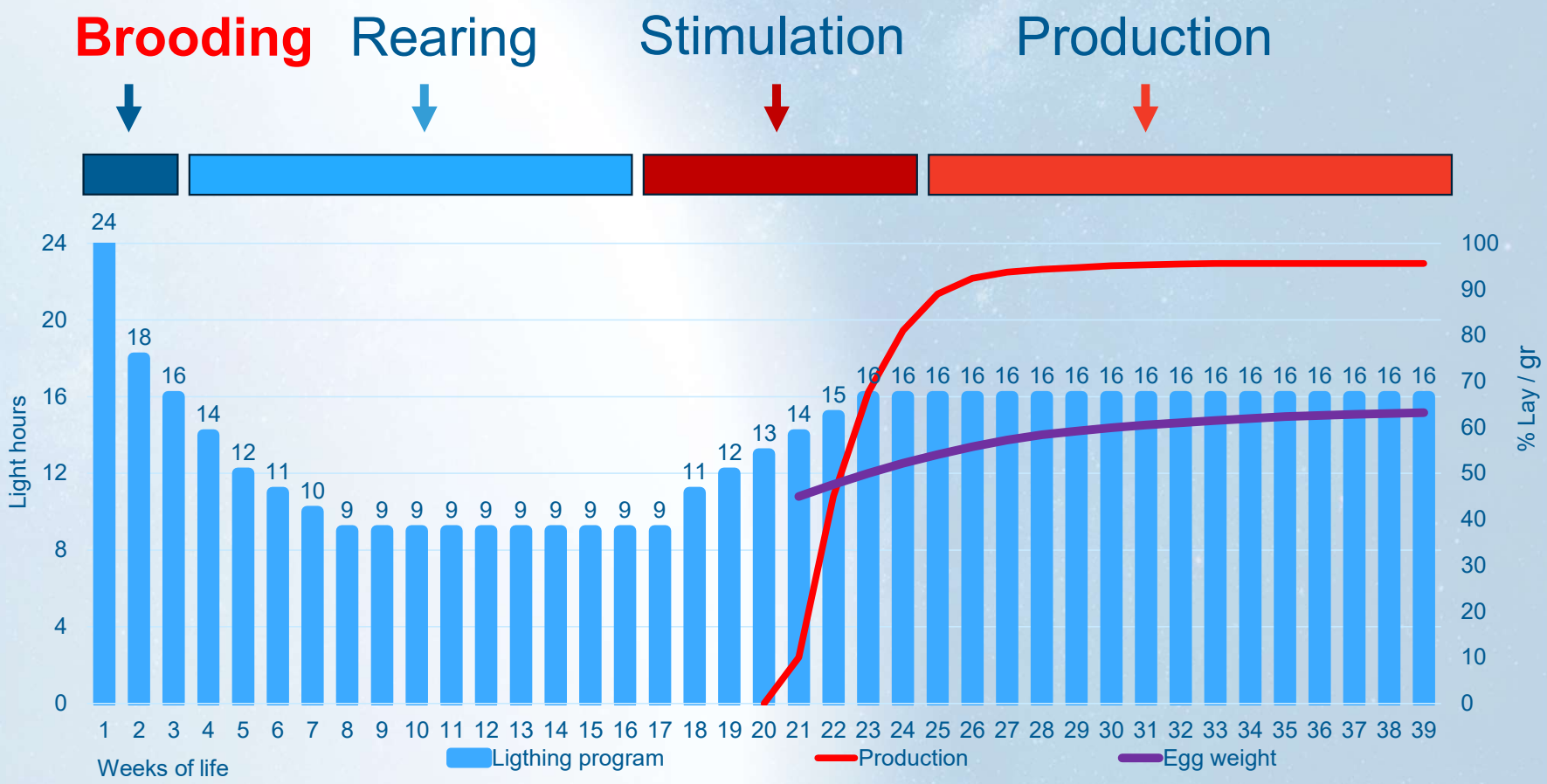


The same program cannot be used all over the world

1. Natural light effect

2. Possibility to adjust the egg weight according to market needs

Stages in a lighting program

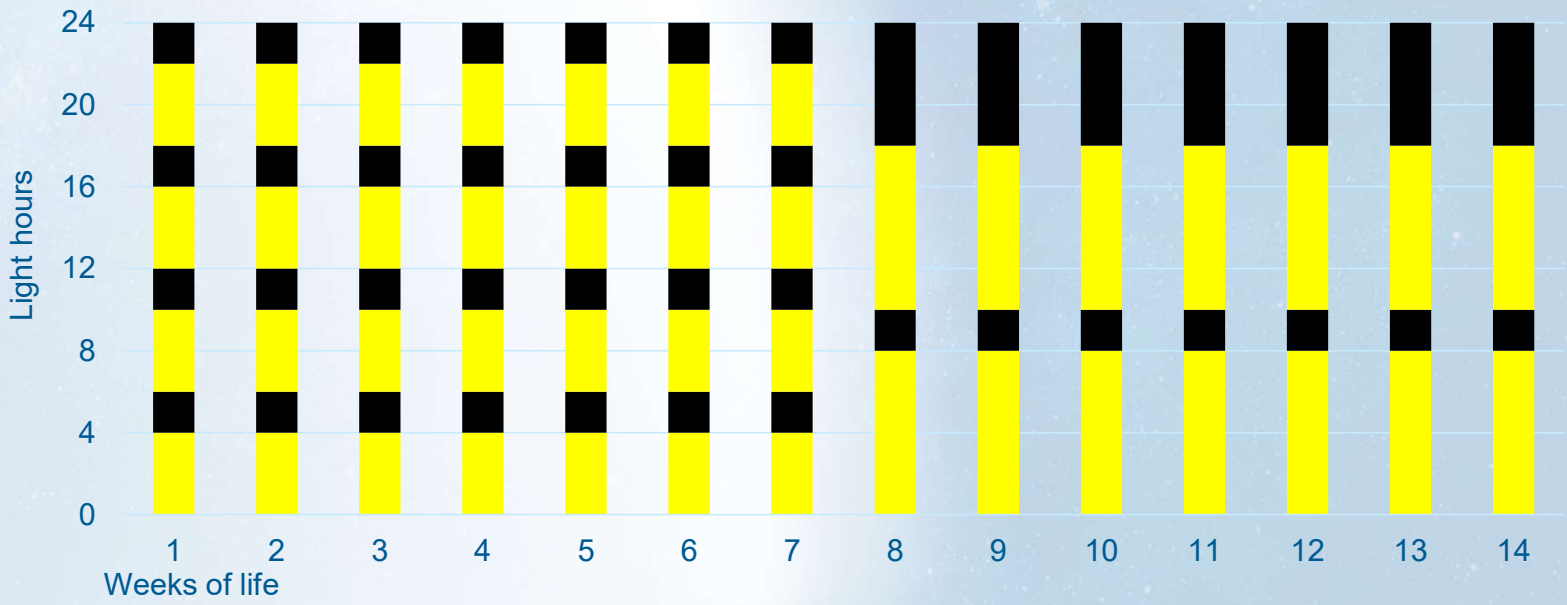


Lighting programs for brooding

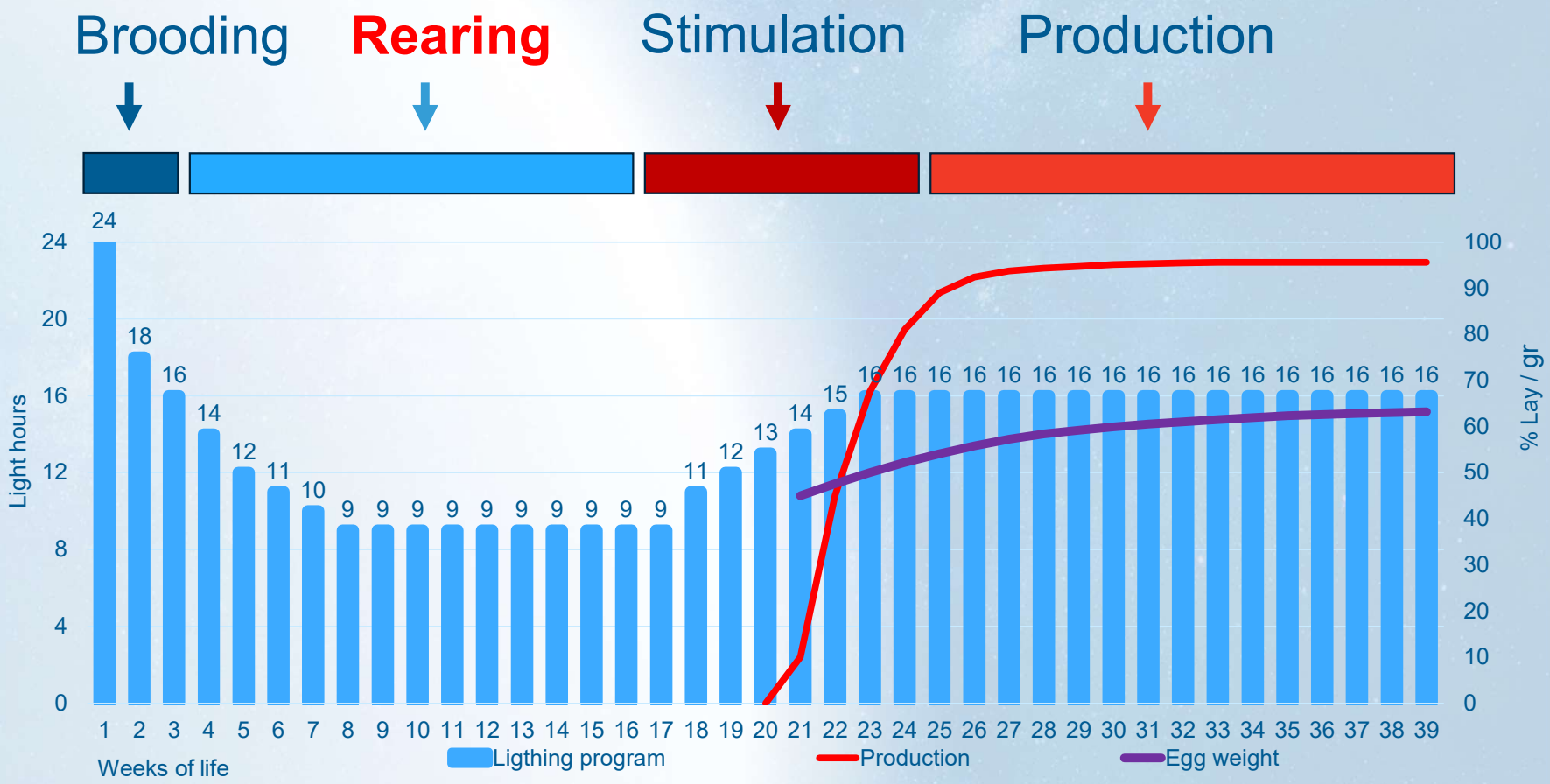
INTERMITTENT PROGRAM

- Better chick activity
- Better flock visualization
- Less mortality, higher BW at d7

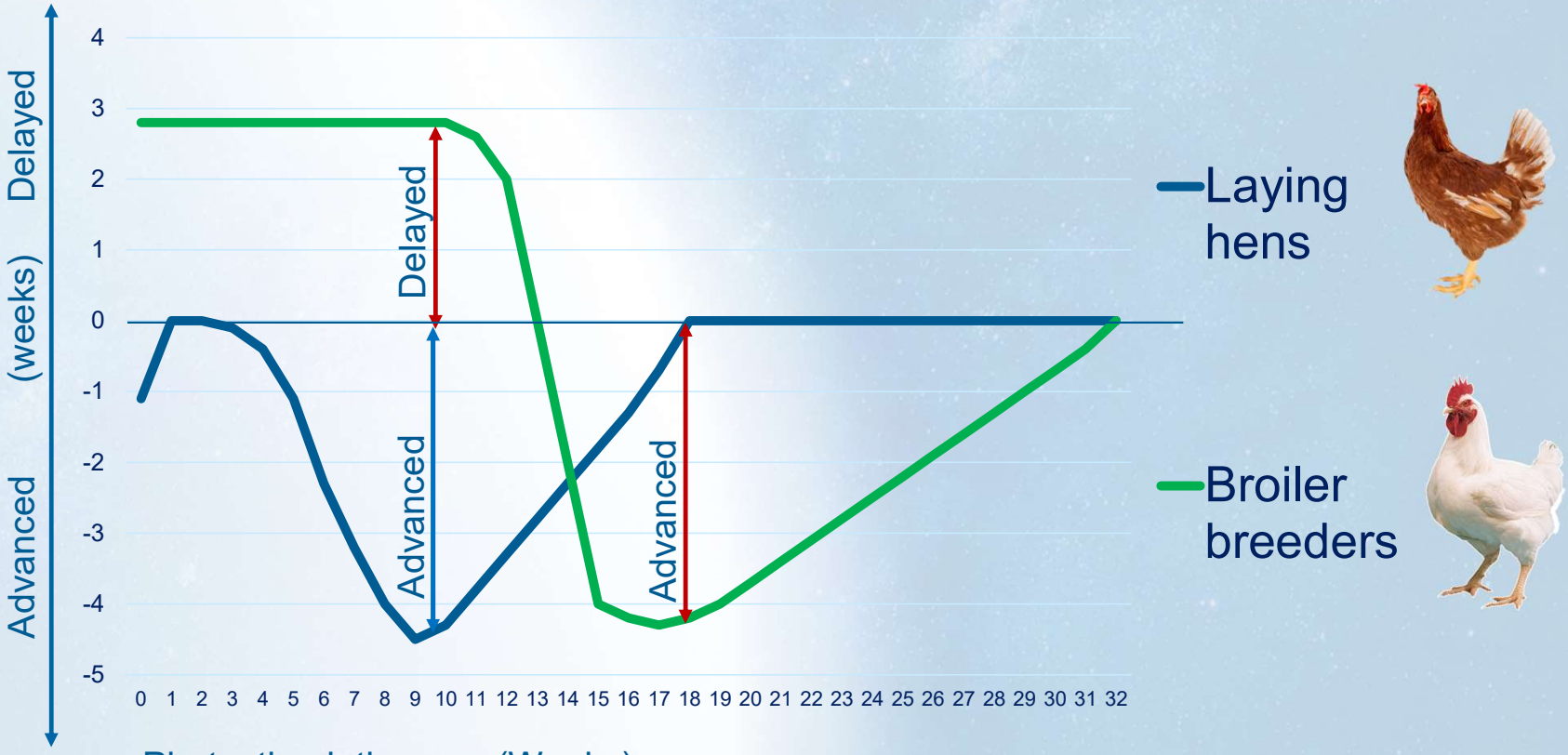
1st week: 4L:2D:4L:2D: 4L:2D:4L:2D
2nd week: 8L:2D:8L:6D



Stages in a lighting program

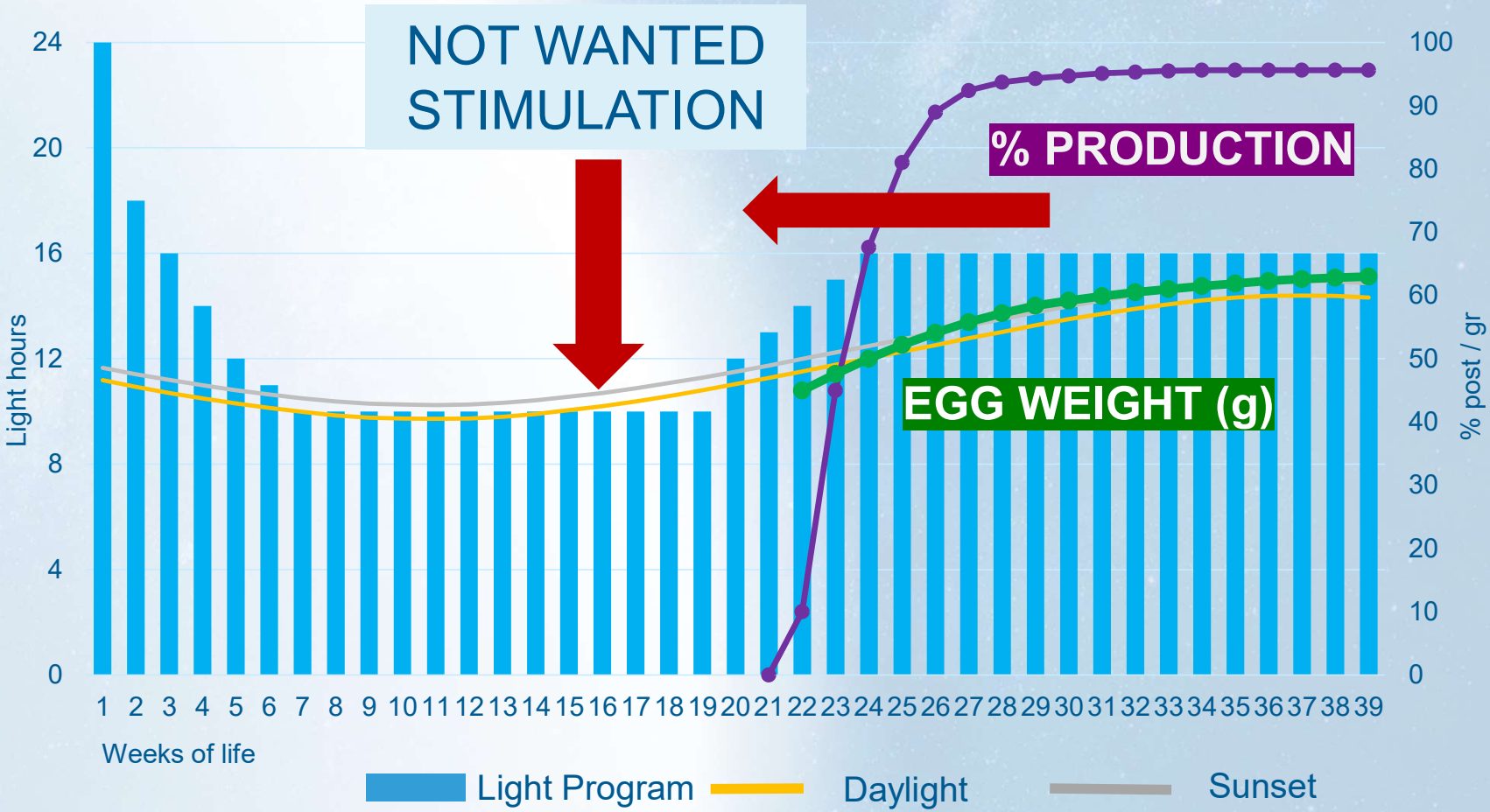


Effect of photostimulation during rearing



Fountain:
P. Lewis 2011

Natural light interference



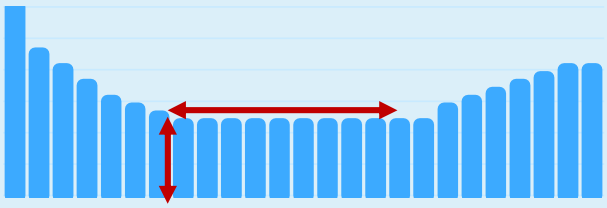
Designing a rearing lighting program

1. Determine if your house is Lightproof

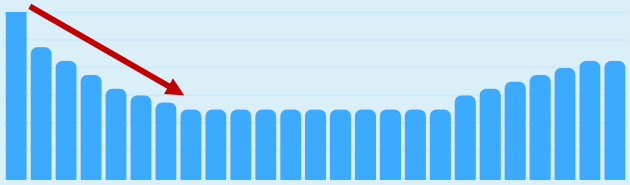
Or

2. Consider the limitation on the lighting program due the house

3. Set the lighting program bottom



4. Set the stepdown to the lighting program bottom



1. Determine if your house is Lightproof

Source: H&N International

Source: H&N International

Source: H&N International

And now?

View of the interior of a house

Lights Off

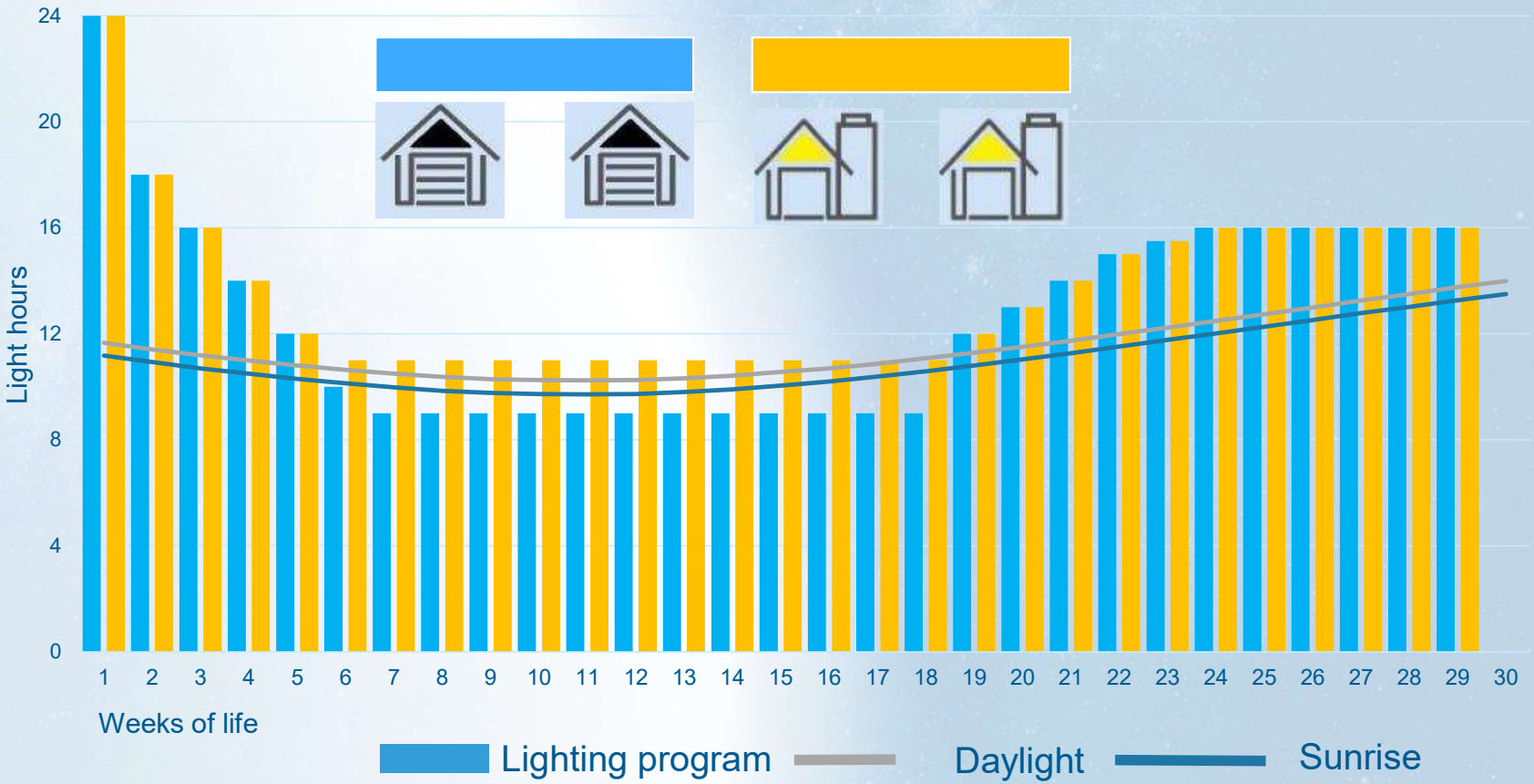
Ventilation on

Less than 3 lux

2. Limitations due to the type of house

REARING	PRODUCTION	LIMITATIONS
		None
		There is no limitation during the period but the photoperiod in the transfer must coincide with the natural length of the day
		The bottom of the lighting program must be greater than the maximum length of the natural day in the week of scheduled for stimulation.
		

Open rearing house / Open production house

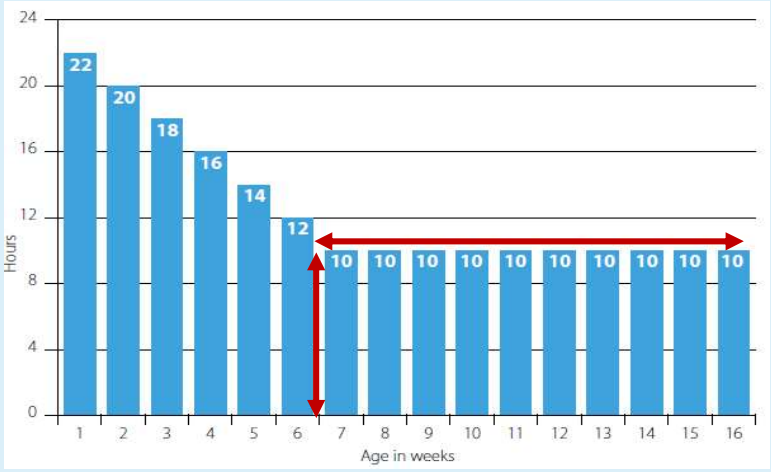


3. Set the lighting program bottom

Cage- free choice

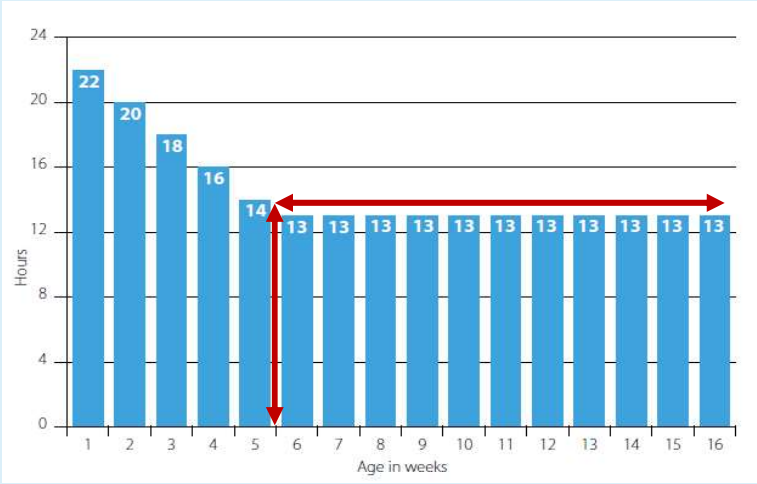
SHORT PROGRAM (9-11 hours)

- Easier stimulation
- Feed intake in fewer hours



LONG PROGRAM (12-14 hours)

- More time for feed intake



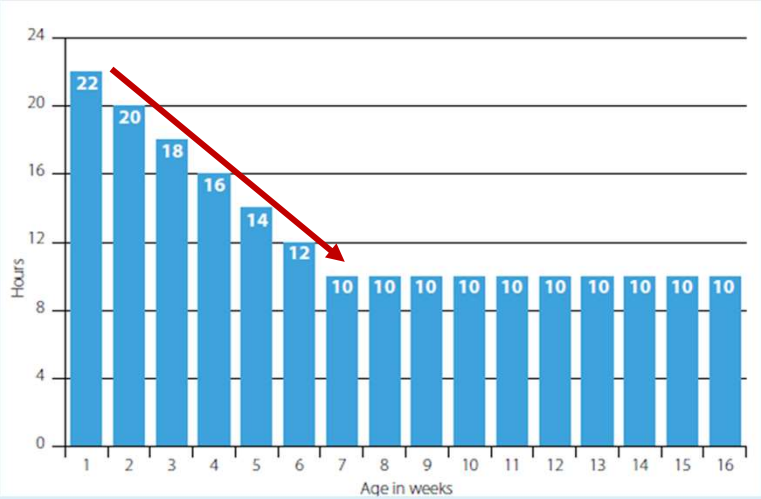
4. Set the stepdown to the lighting program bottom

Cage- free choice

QUICK STEPDOWN

(-2 Hours/week)

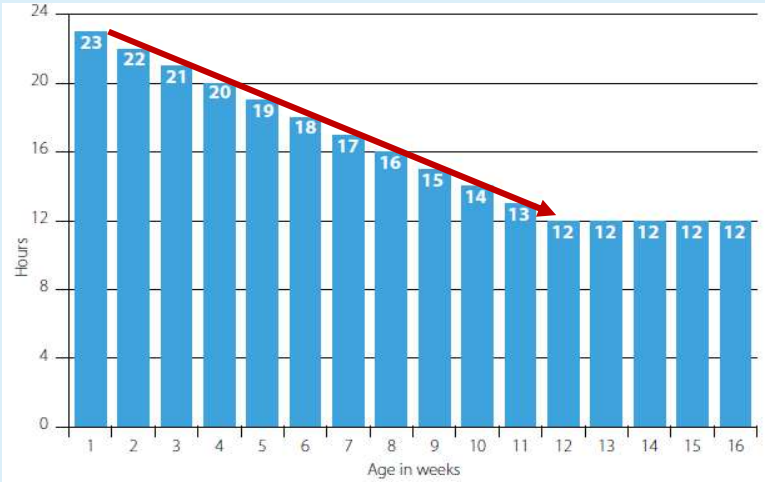
- Increased sensitivity to light
- Faster start to production



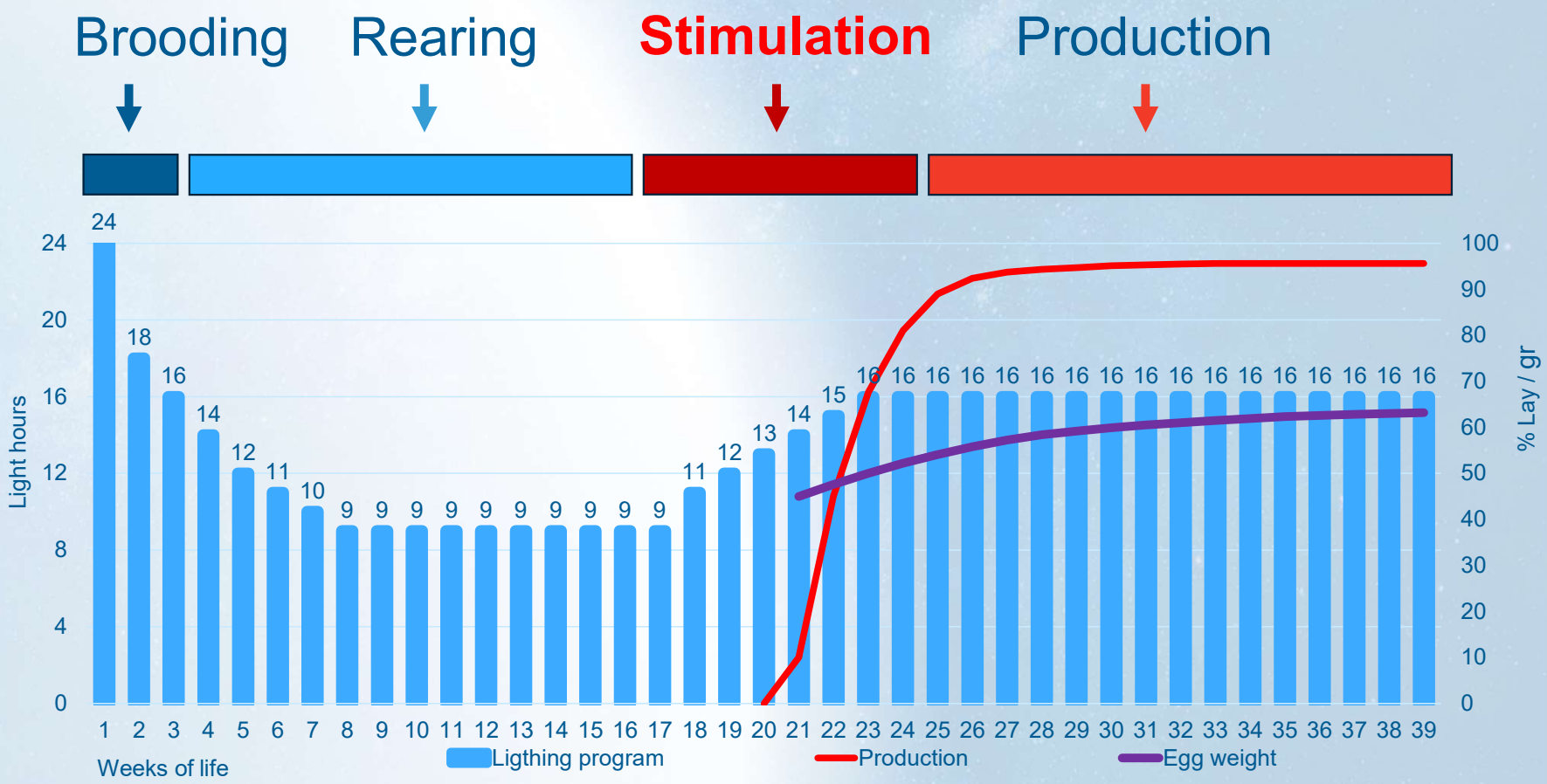
SLOW STEPDOWN

(-1 Hours/week)

- Larger egg size
- More time for feed intake



Stages in a lighting program



What stimulates the hens to start production?

Period of exposure to increasing photoperiod

Birds reach maturity weight

A key choice for the flock

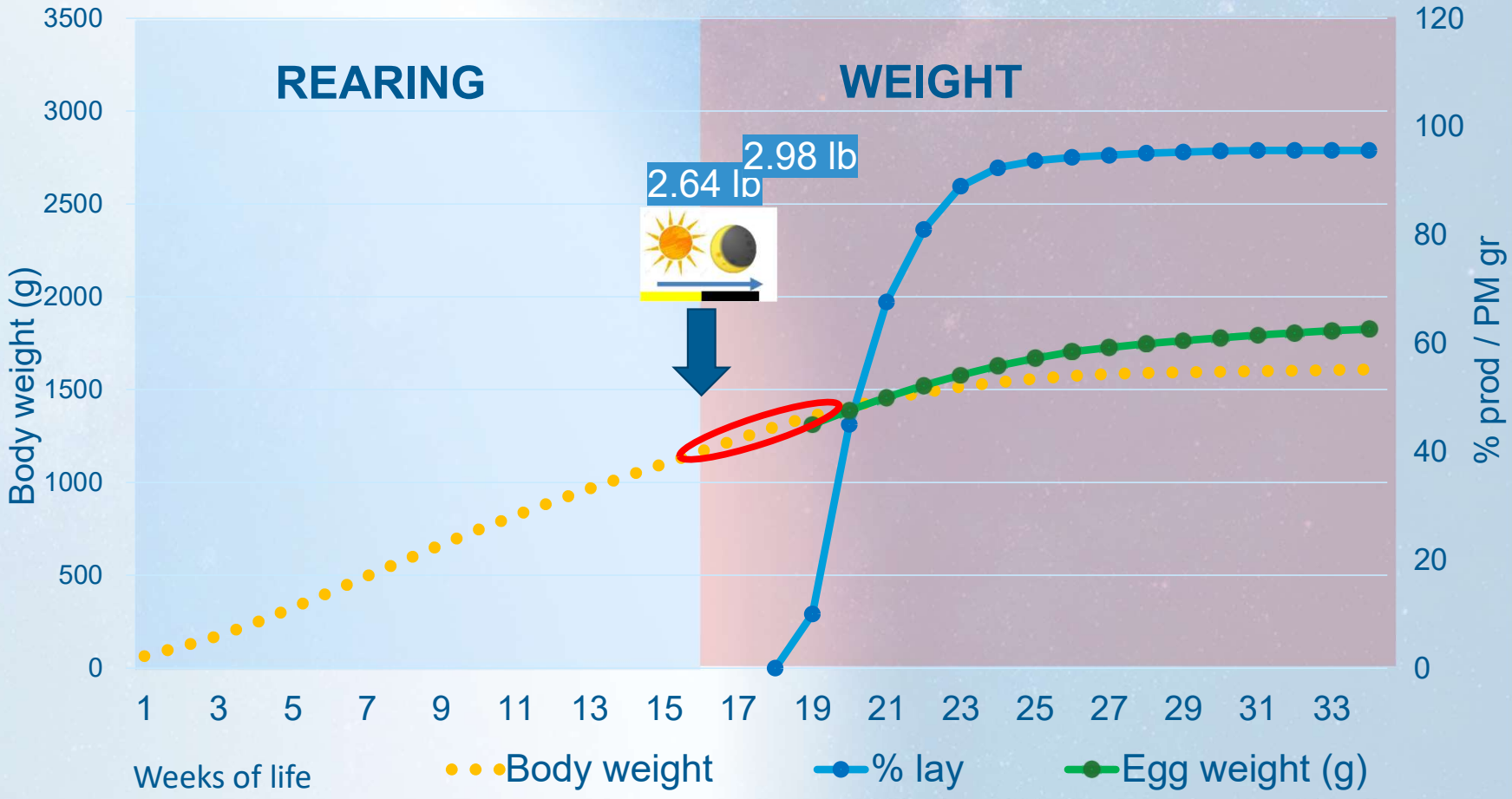
Egg mass =
Eggs number x average egg weight

Age at stimulation
Weight at stimulation

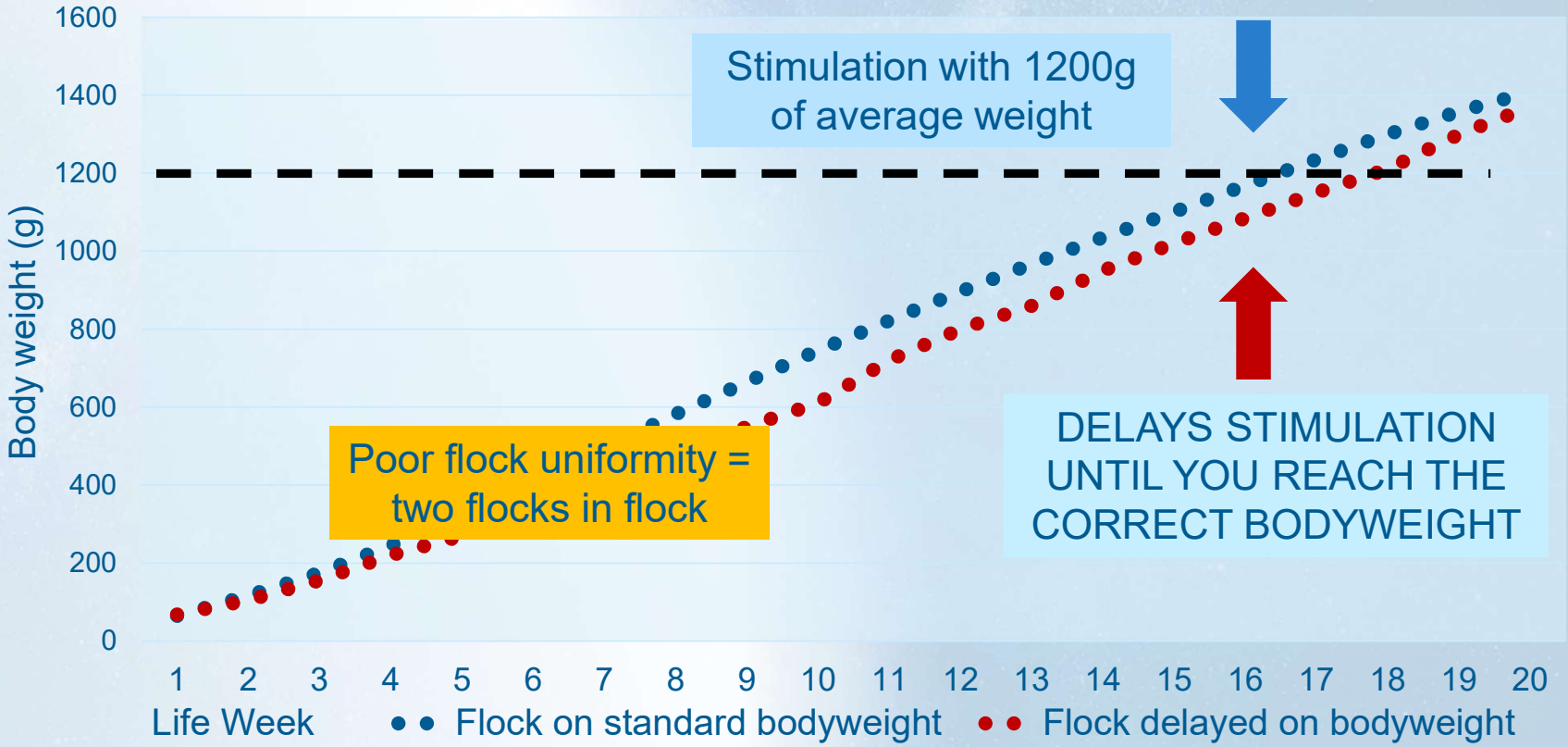
Egg number

Egg weight

What Really Matters: WHEN?



Bodyweight stimulation

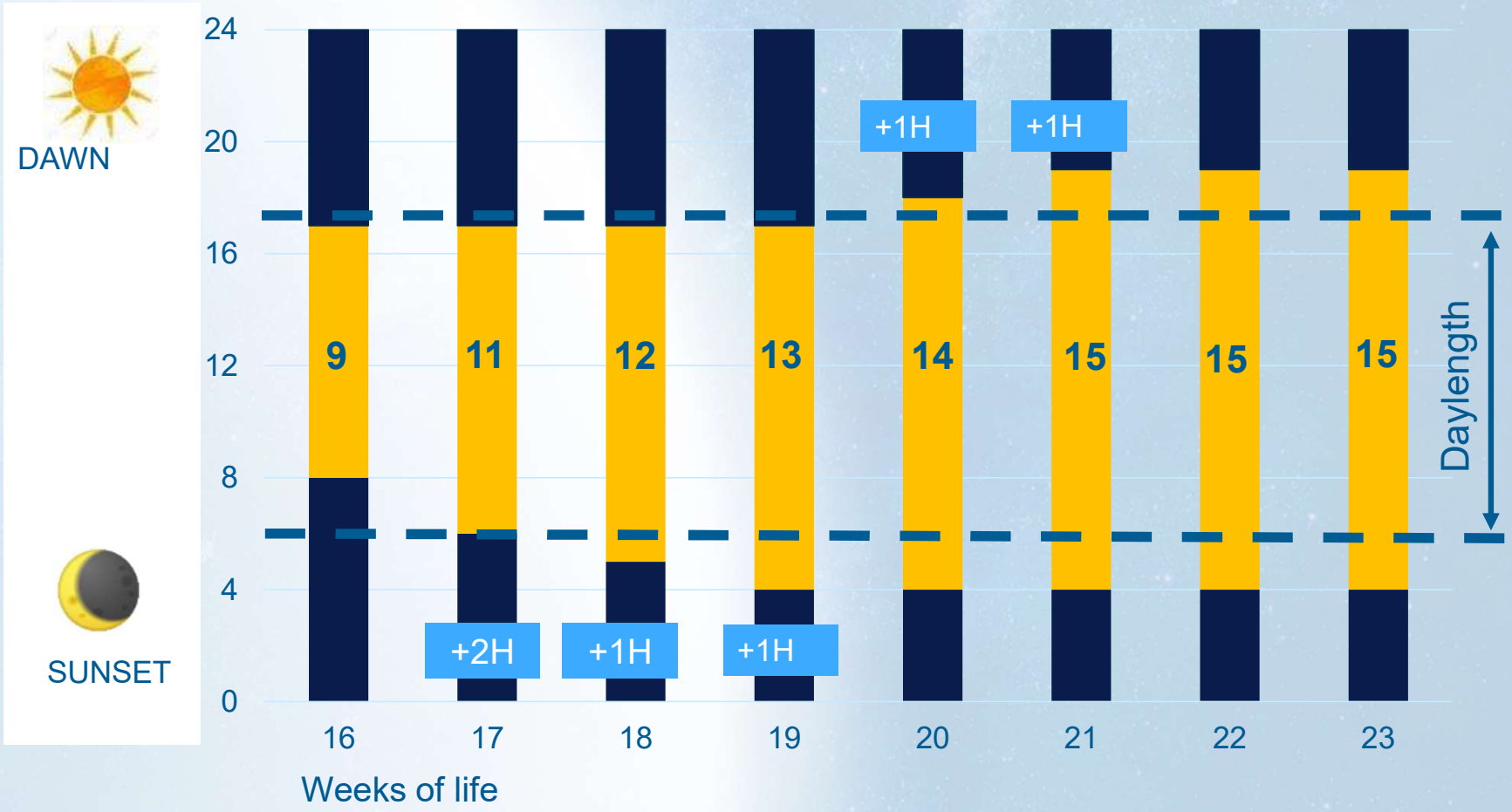


Body weigth at lighting stimulation

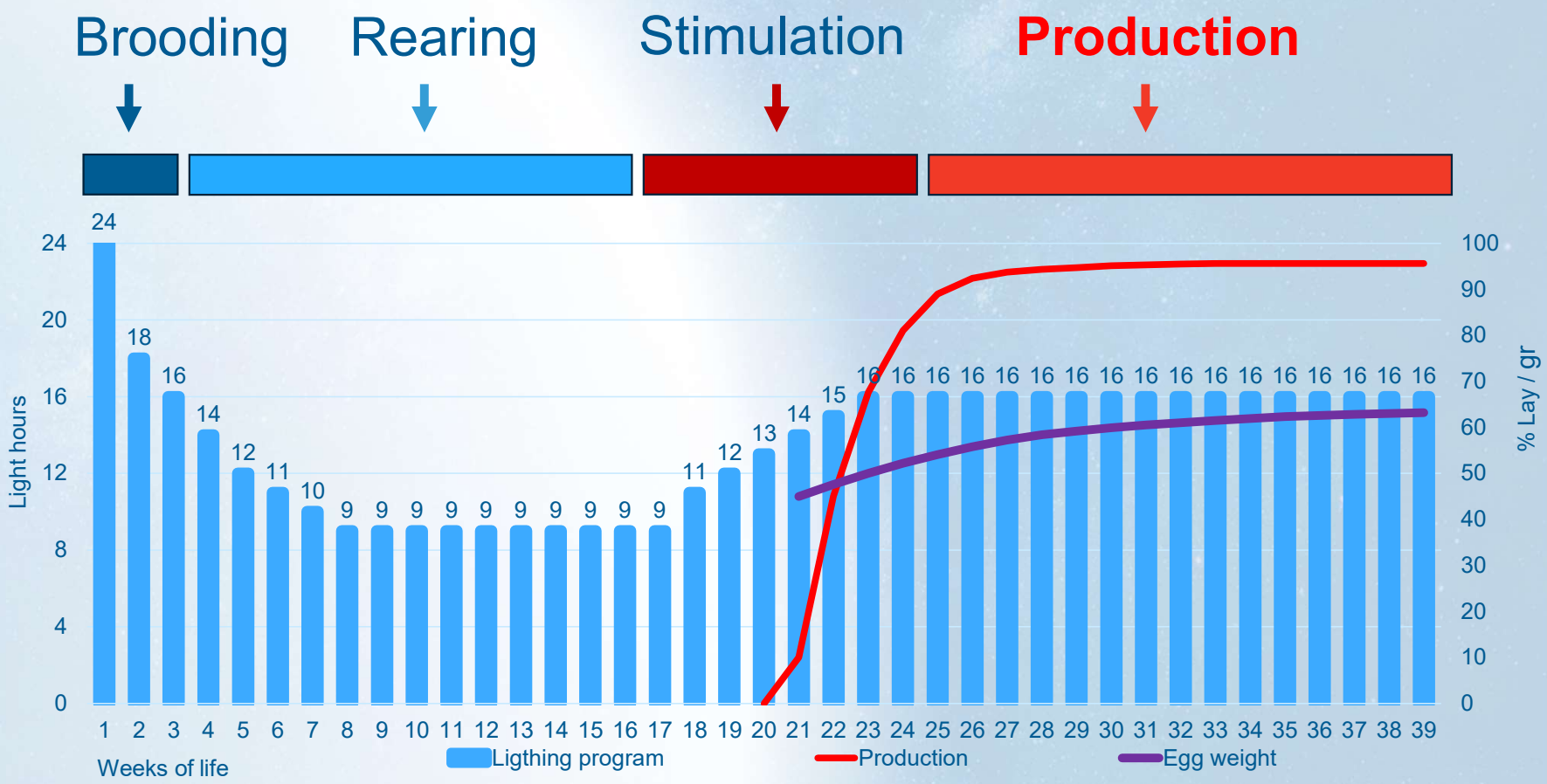
General recommendation for United States

2.8 pounds
(17 weeks)

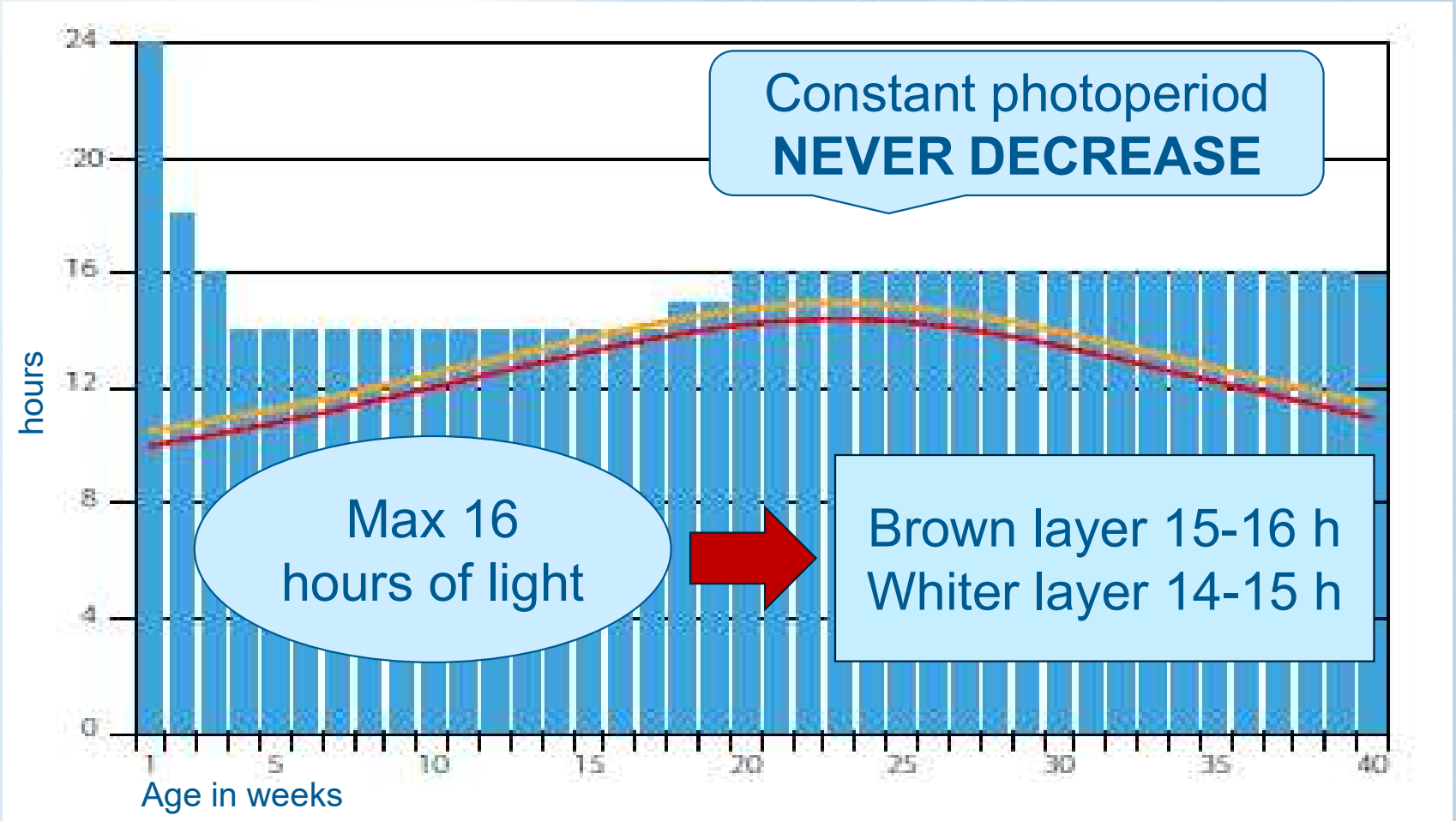
How to do lighting stimulation



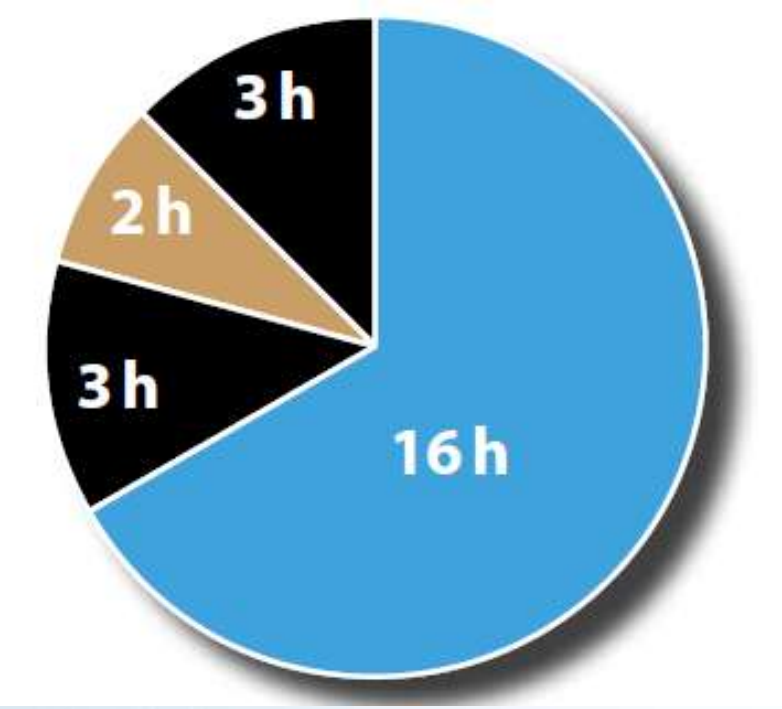
Stages in a lighting program



Light program in production



Midnight Snack

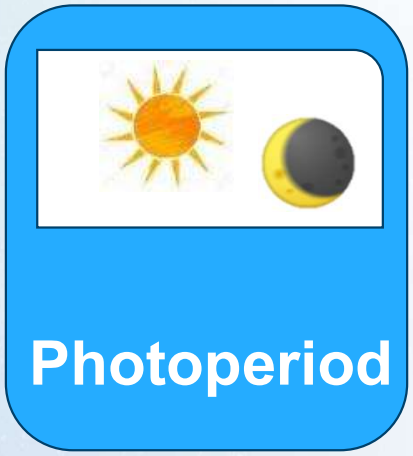


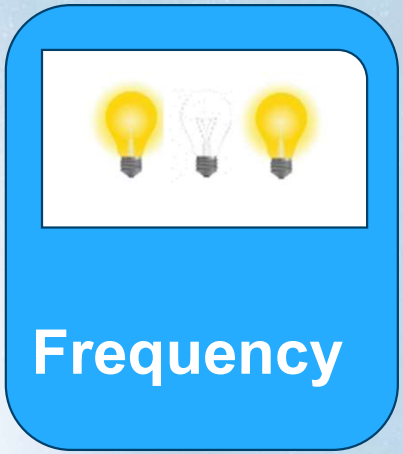
ADVANTAGES

- Increased feed intake
- Improvements in the quality of the shell
- Decreases bone decalcification

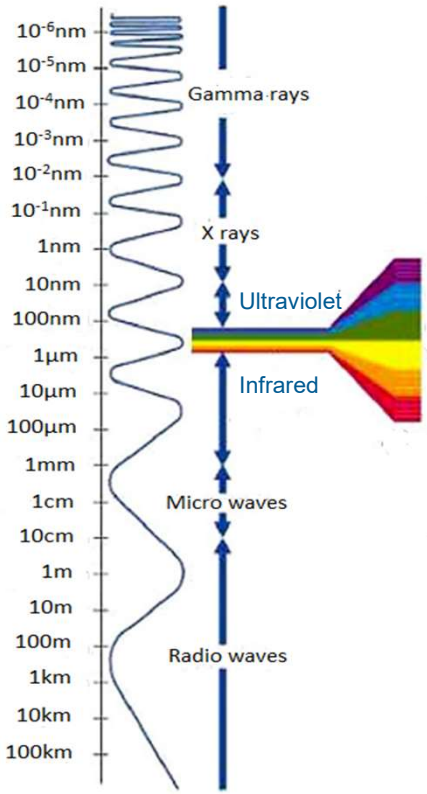
Not easy implementation in aviary systems

4 Features of Light

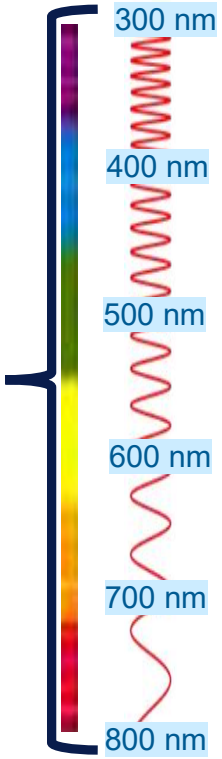


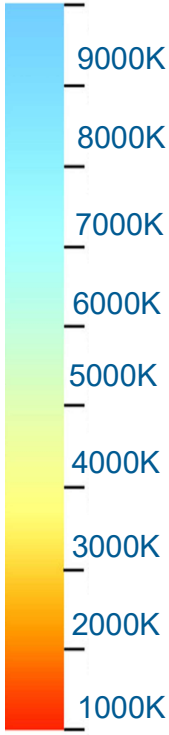


The Nature of Light



Light
= perceptible part of the electromagnetic spectrum

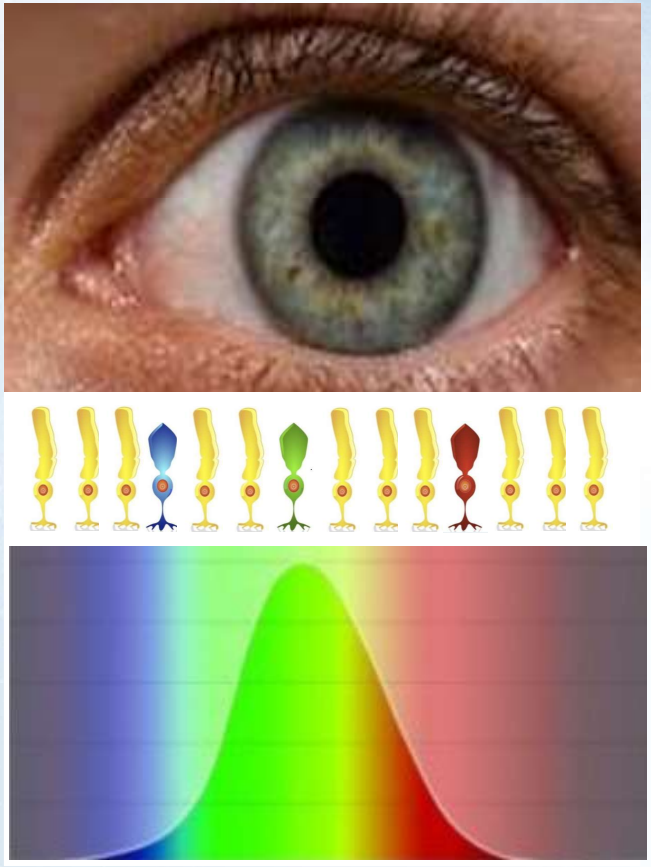


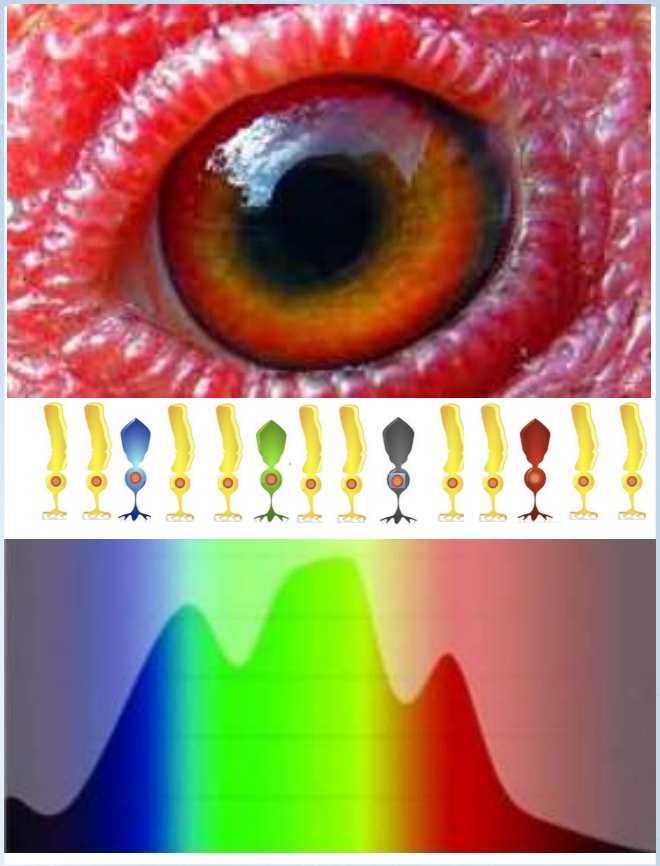


The color of the light depends on the wavelength of the radiation

But it is referred to Kelvin

The Photopic Vision Spectrum

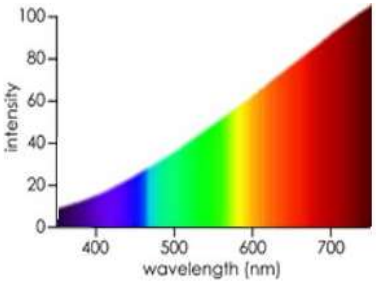




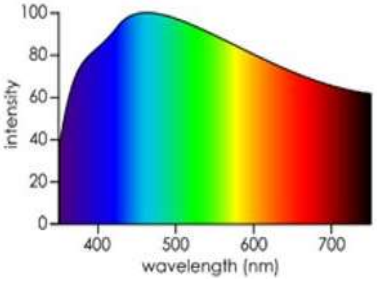
Color of light emitted by different sources

SUNLIGHT

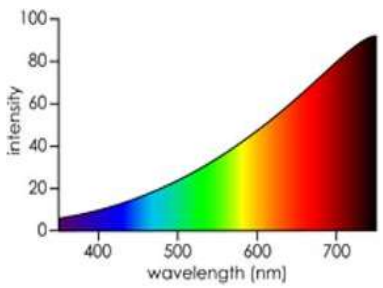
Sunset



Noon

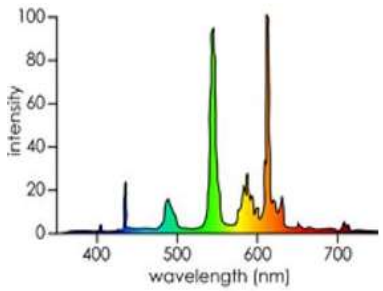


INCANDESCENT

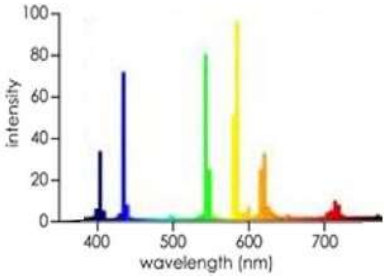


FLUORESCENT

Warm

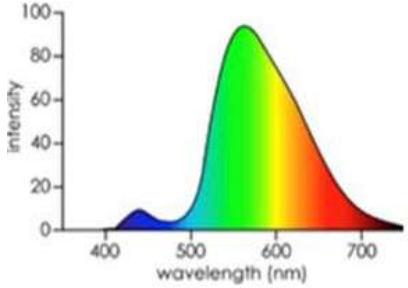


Cold

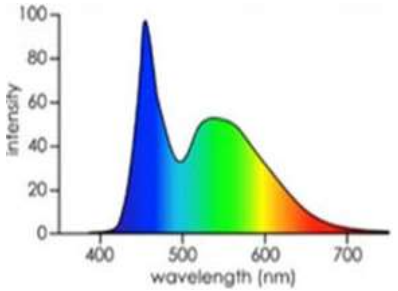


LED

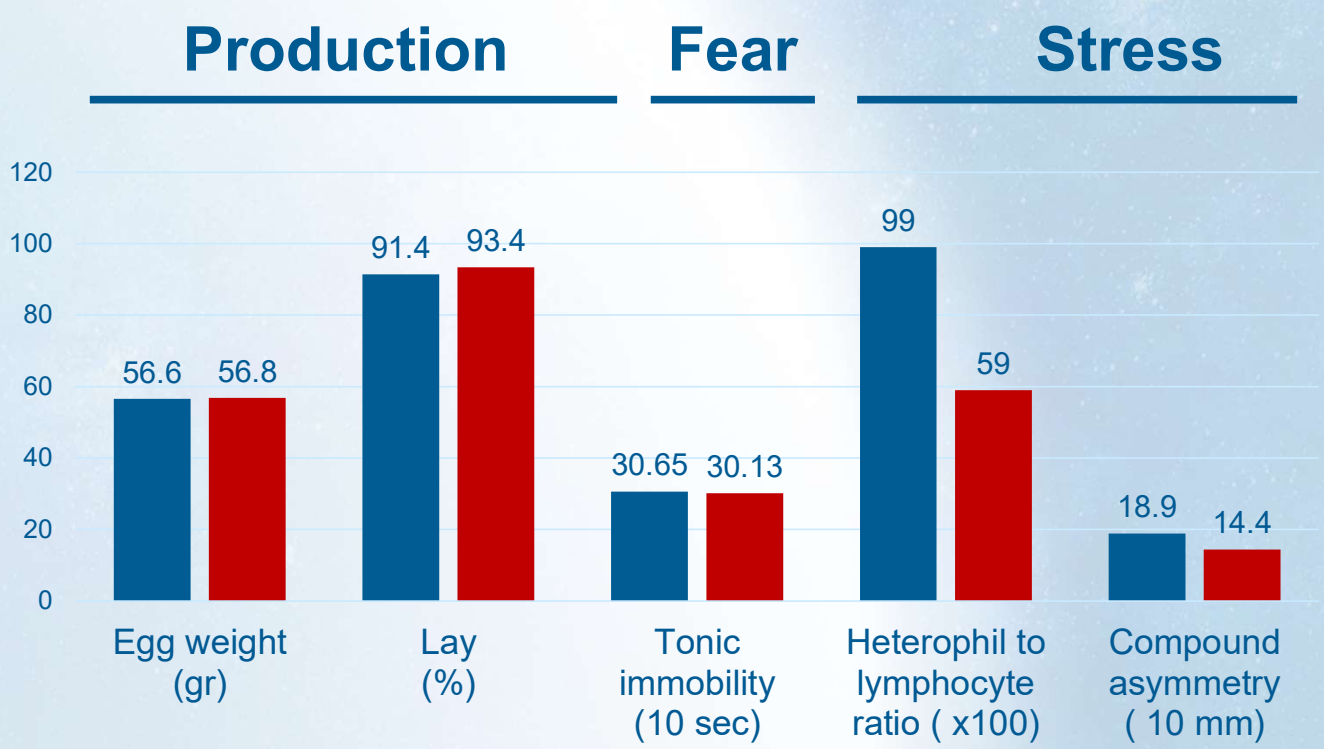
Warm

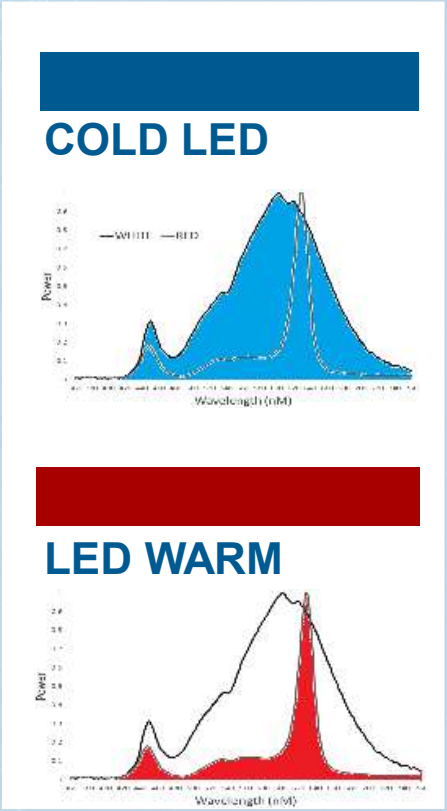


Cold



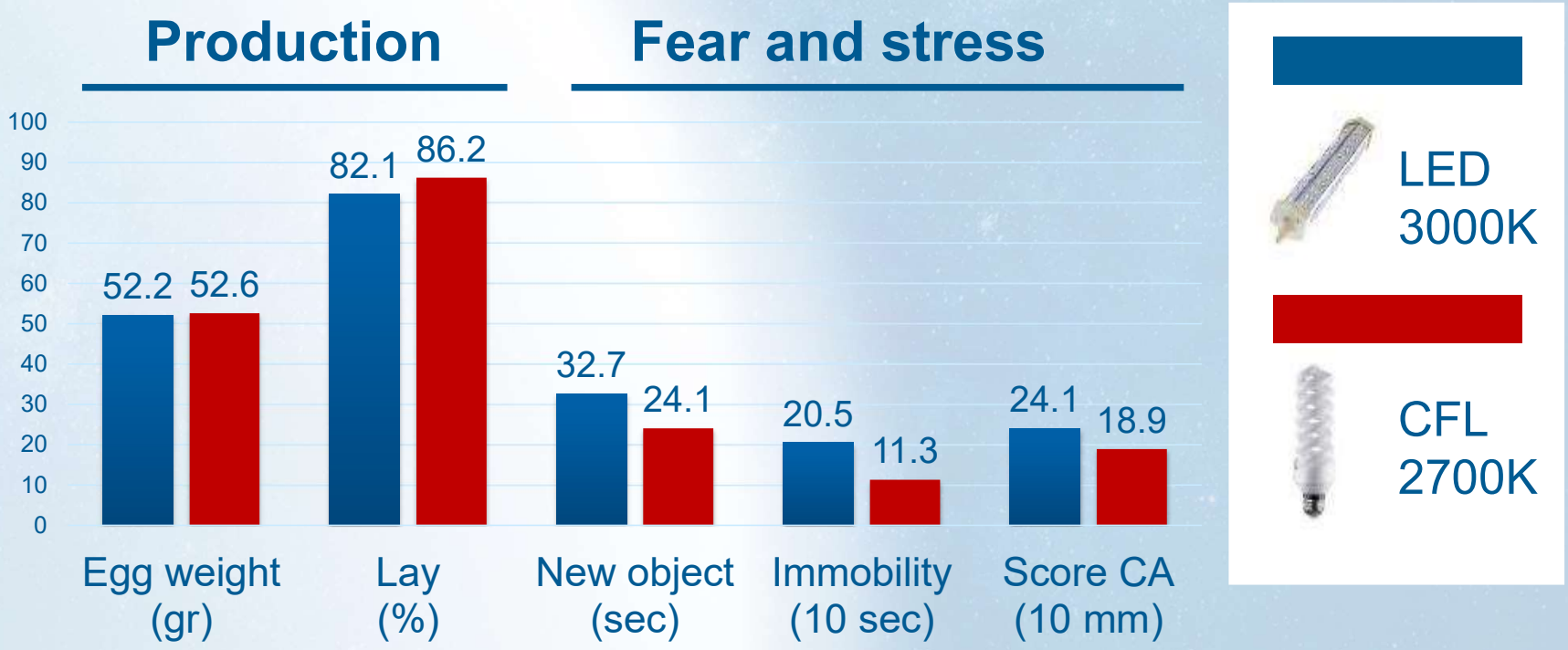
White hens exposed to different light colors between 17 and 72 weeks of age





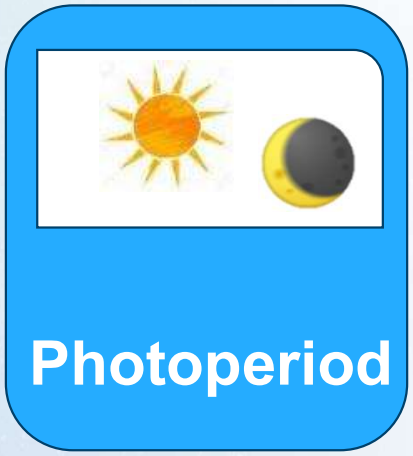
Source:
Archer 2019

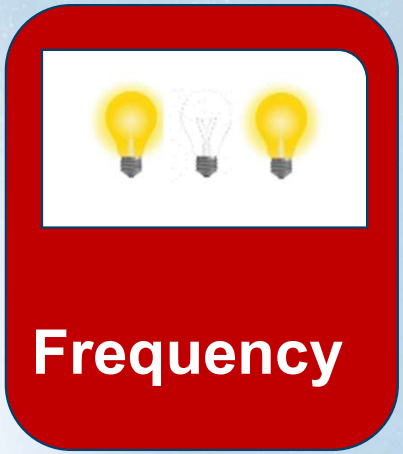
White hens exposed to different light sources between 21 and 31 weeks of age



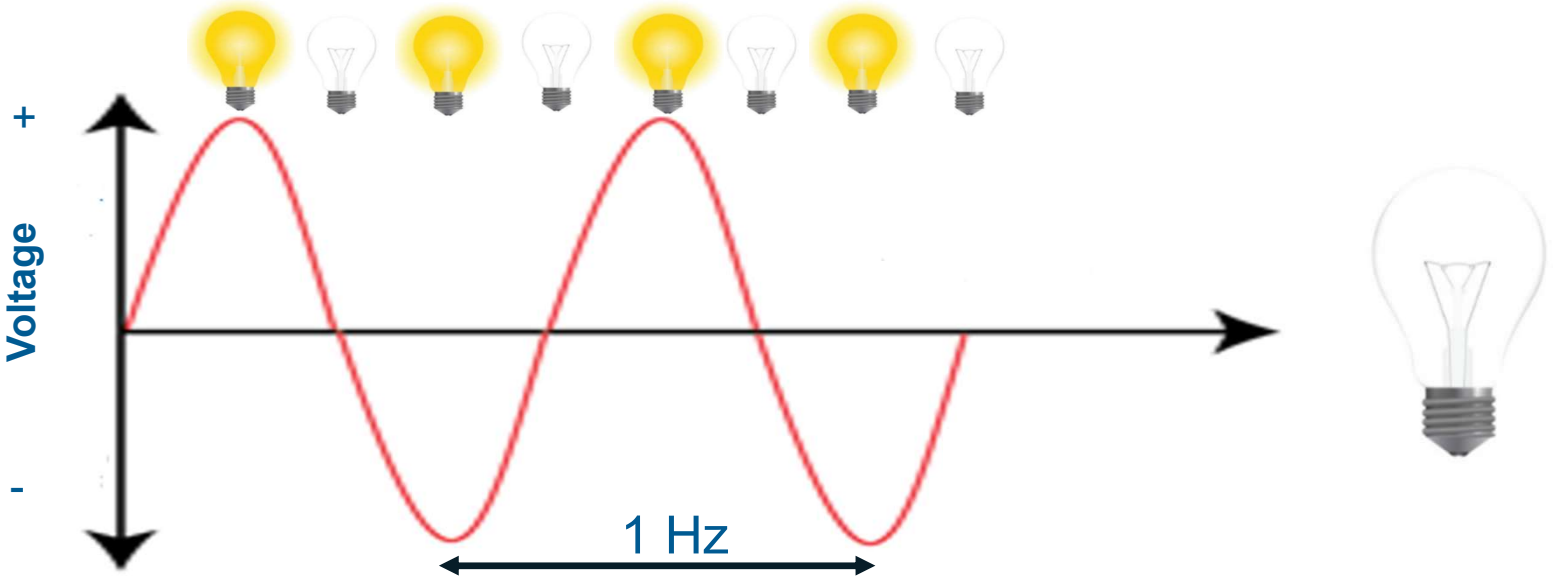
Sourcer:
Archer 2017

4 Features of Light





Light frequency



Due to alternating current, bulbs do not produce constant light but discontinuously.

Vision frequency and retinal uptake

24 -30 frames per second

150 -220 frames per second

Stress caused by the flickering effect

24 -30 images per second

150 -220 images per second

Light emitted from different sources

SUNLIGHT

Constant

INCANDESCENT

(60Hz) Constant

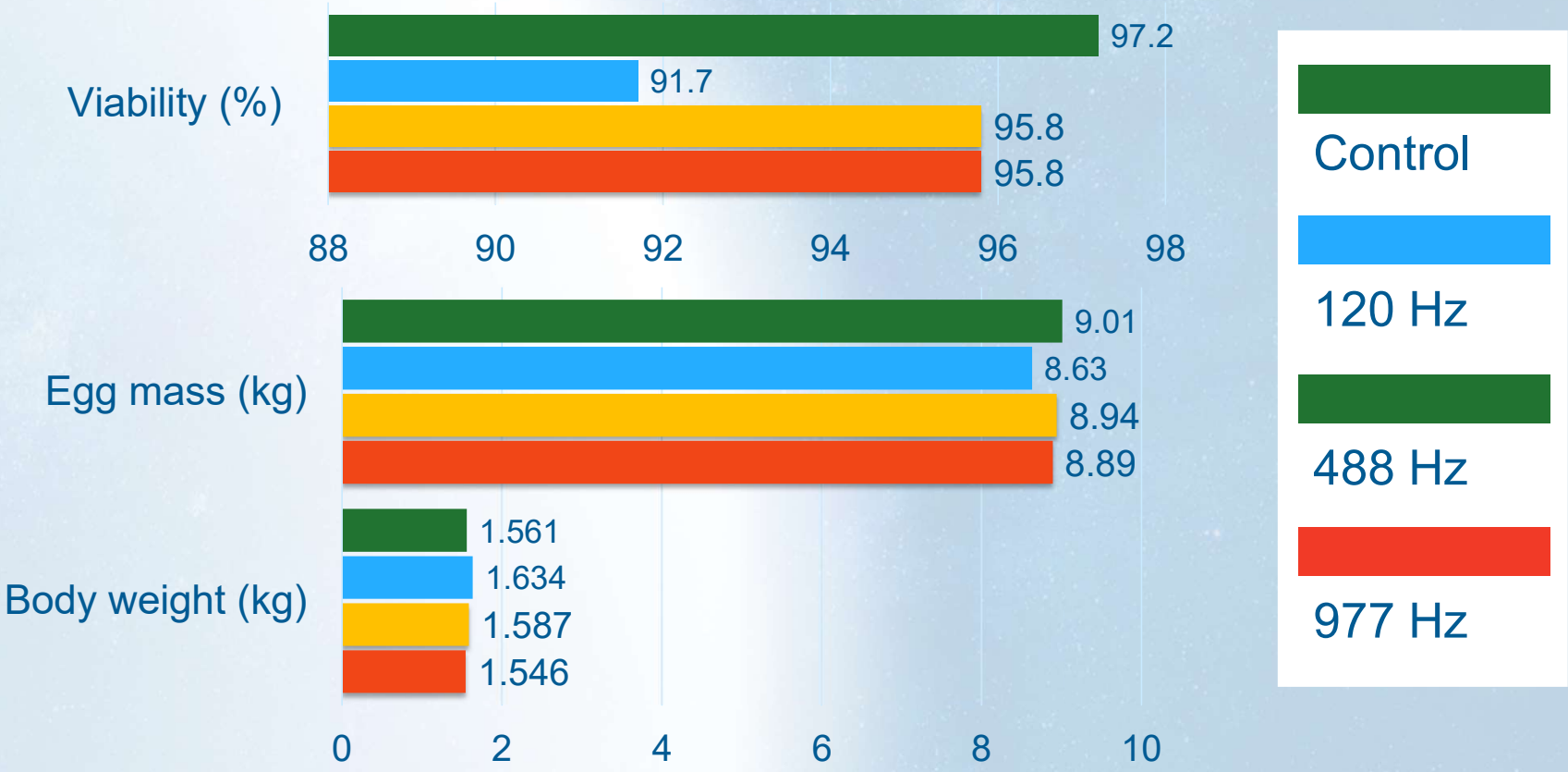
FLUORESCENT

60 Hz – 2000 Hz

LED

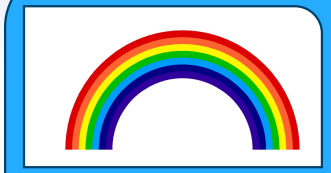
60Hz – Constant

White hens exposed to different light frequencies up to 46 weeks of age



Source: Kavtarashvili 2022

Types of Posture Bulbs



Color

Frecuencia

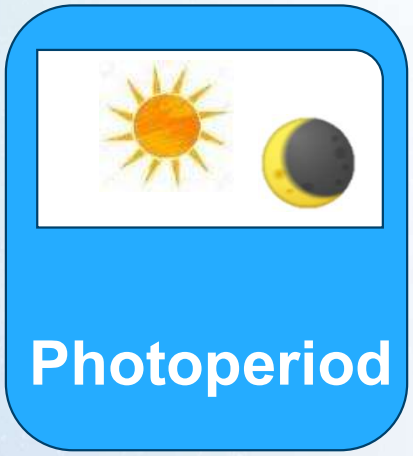
3500 K

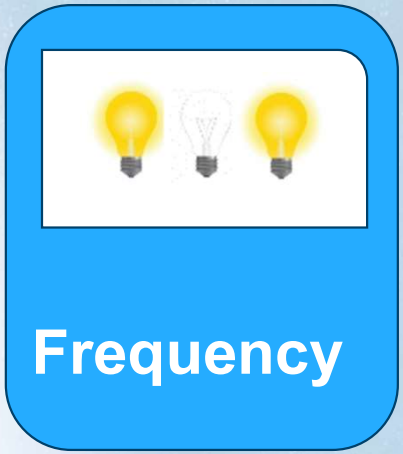
Flicker-free
(>200 Hz)

2800 K

Flicker-free
(>200 Hz)

4 Features of Light

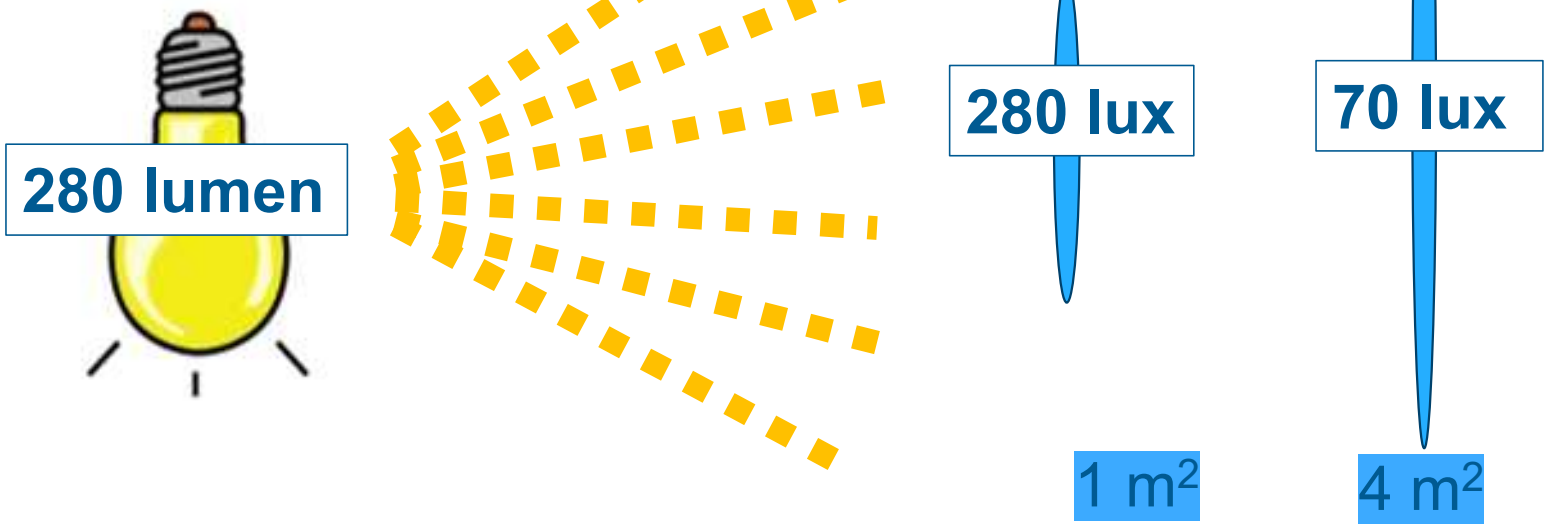




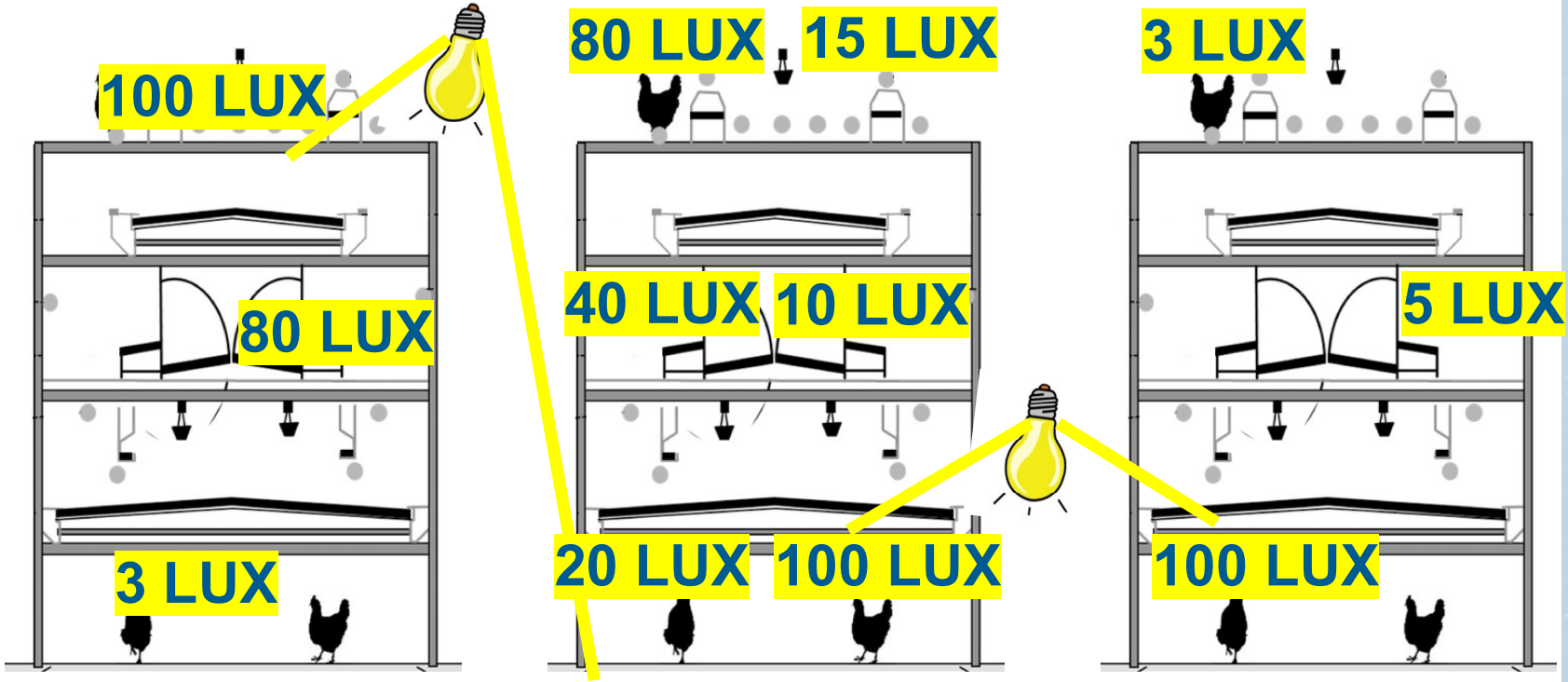
Definition of light intensity

LIGHT INTENSITY
Lumen

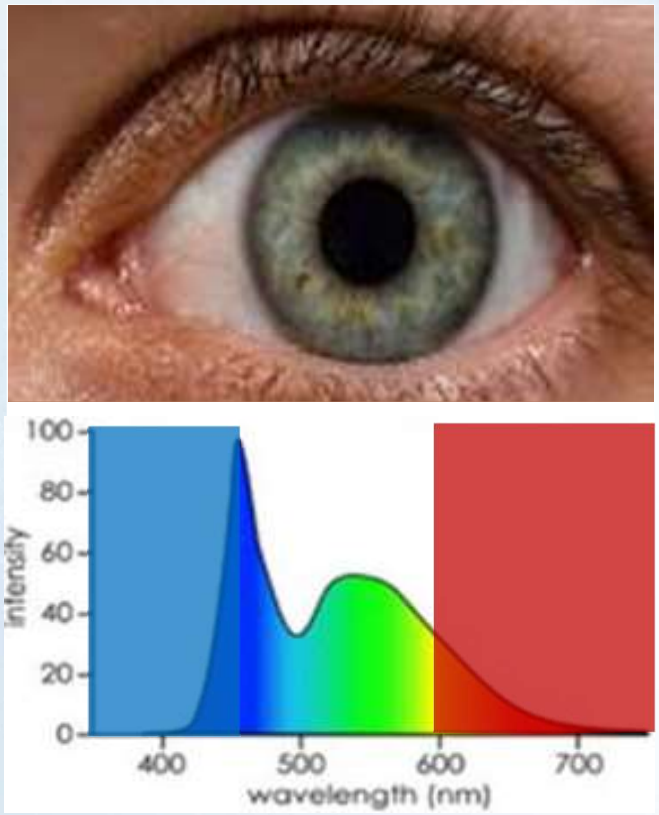
ILLUMINATION
Lux = Lumens/m^2



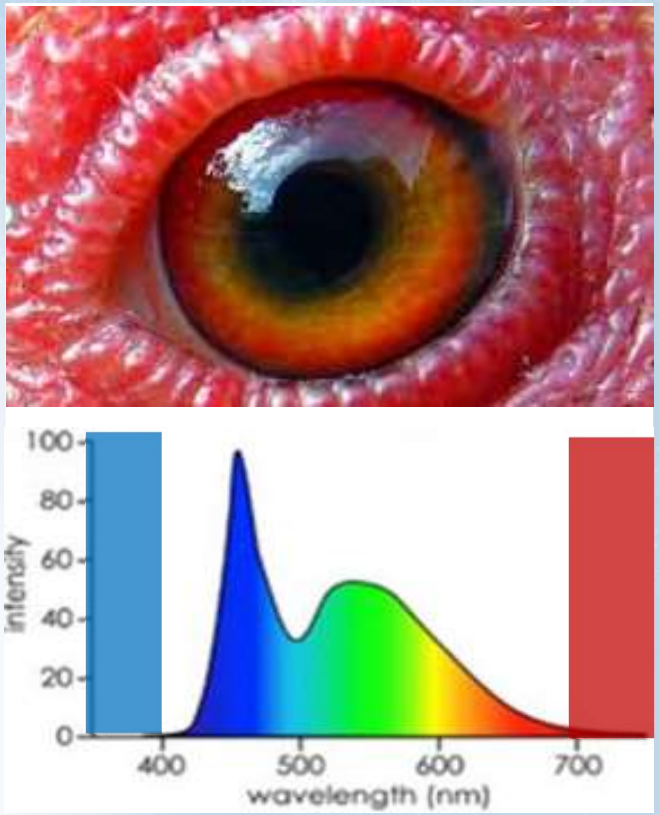
Ligth intensity is not homogeneous feature



The Photopic Vision Spectrum & Intensity

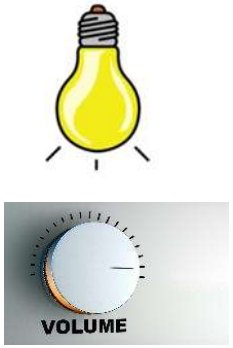


Lux

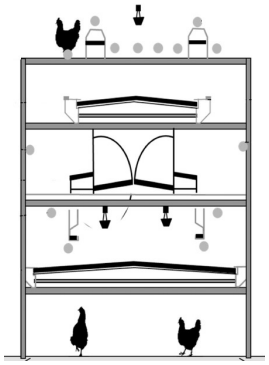


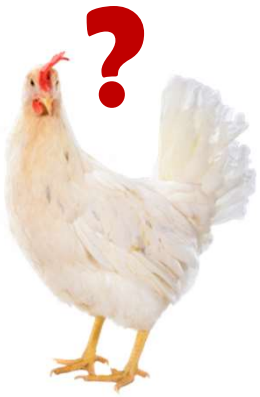
C-Lux

Effect of light intensity on hens



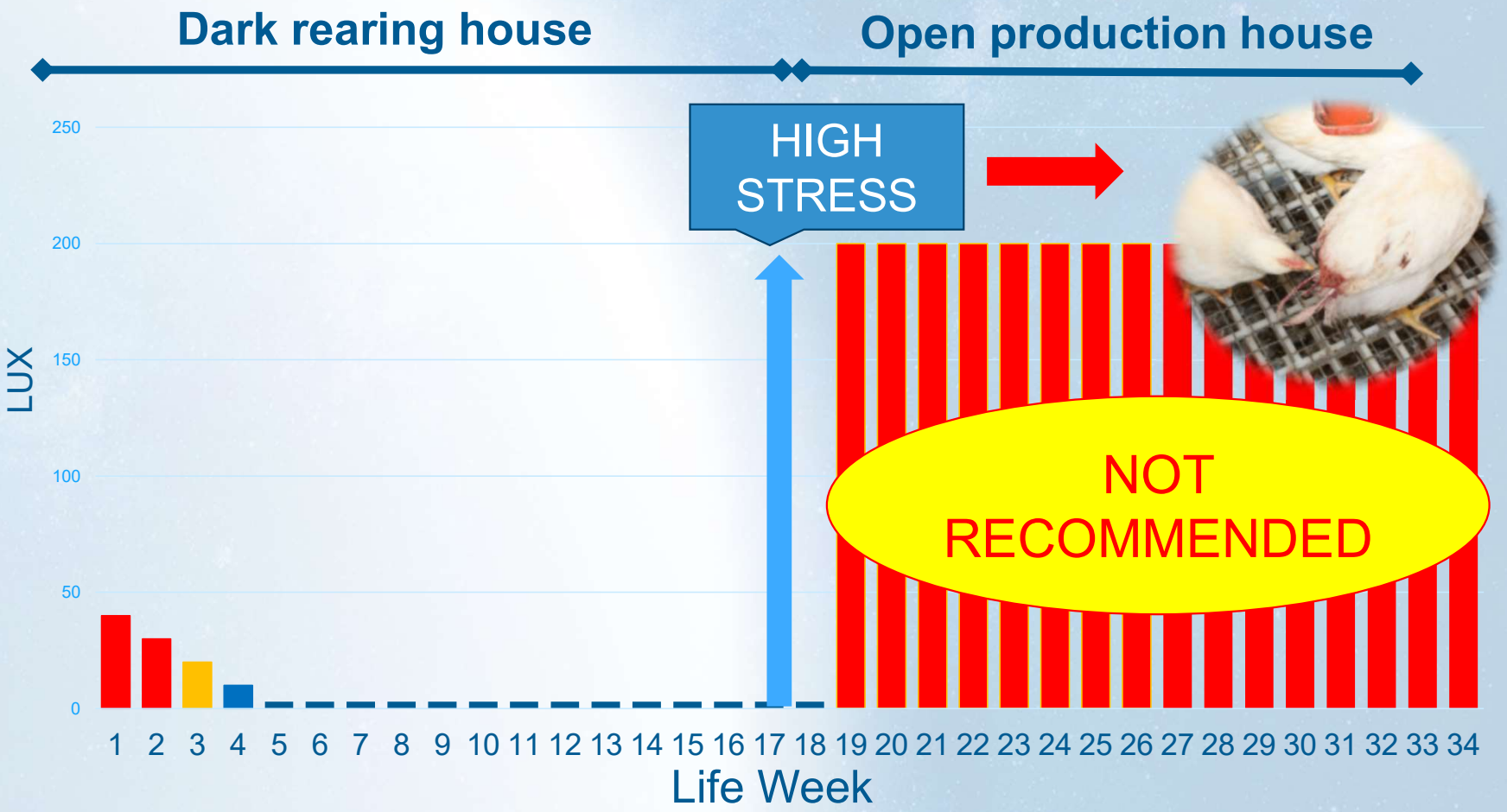
Light intensity acts as a volume control for bird activity



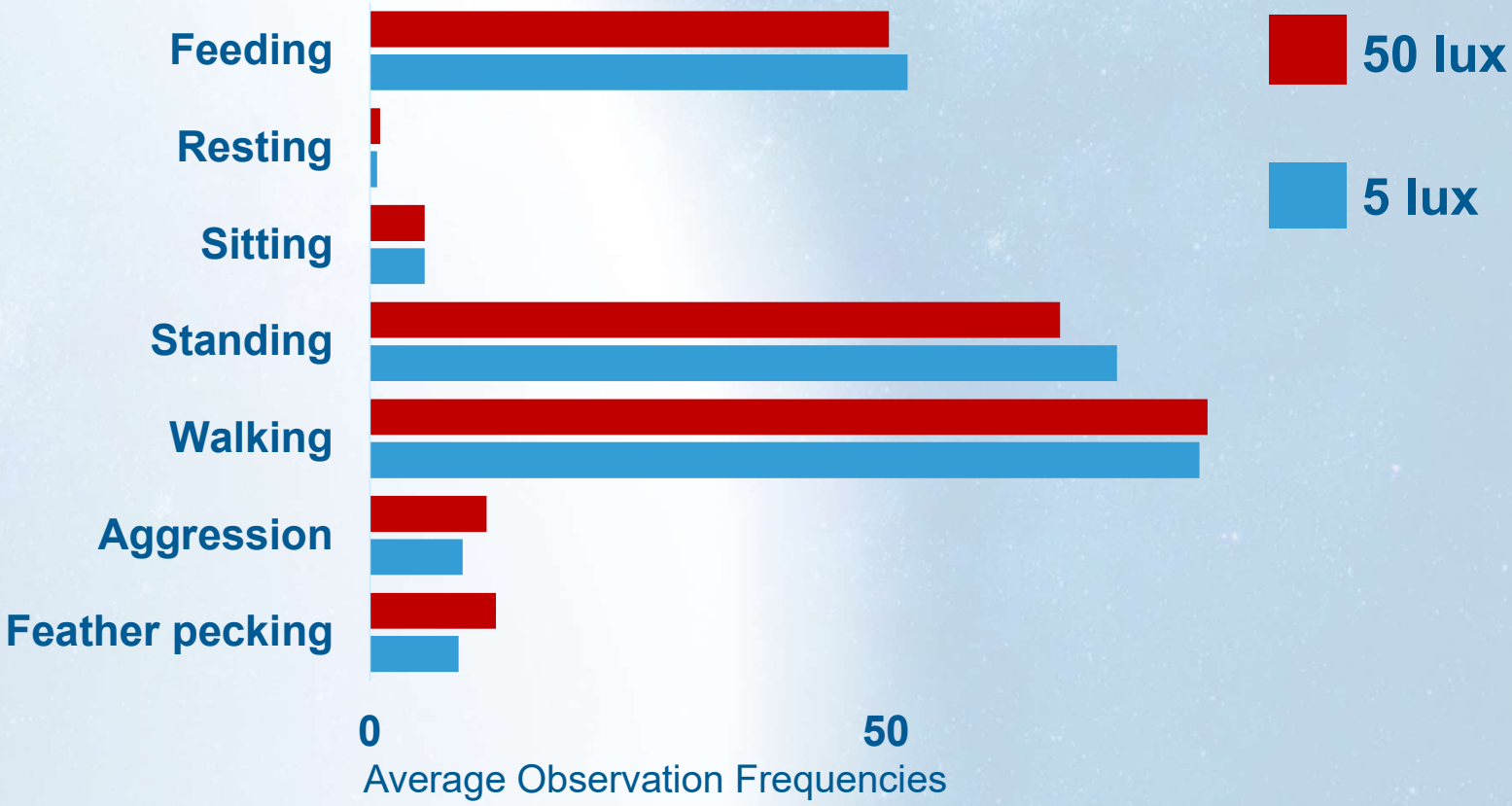


Light intensity can attract or repel birds from an area

Avoiding sharp increases in light intensity



Frequency of observation of behaviors in brown hens in cages



Source::
Mohammed 2009

Intensity of the different light sources

20000 -100000 lux

200 -10000 lux

? Lux

Source: distance and lumens

Dealing with the intensity of natural light

Source: H&N International

Sunlight rays entering directly into the house

Source: H&N International

Irregular sunlight distribution in the house

Controlling the intensity of light

STEP 1: Moving to work with semi-dark houses

Shades

Source: H&N International

Light Traps

Source: H&N International

Being able to decide the intensity of the light indoors of the house

Controlling the intensity of light

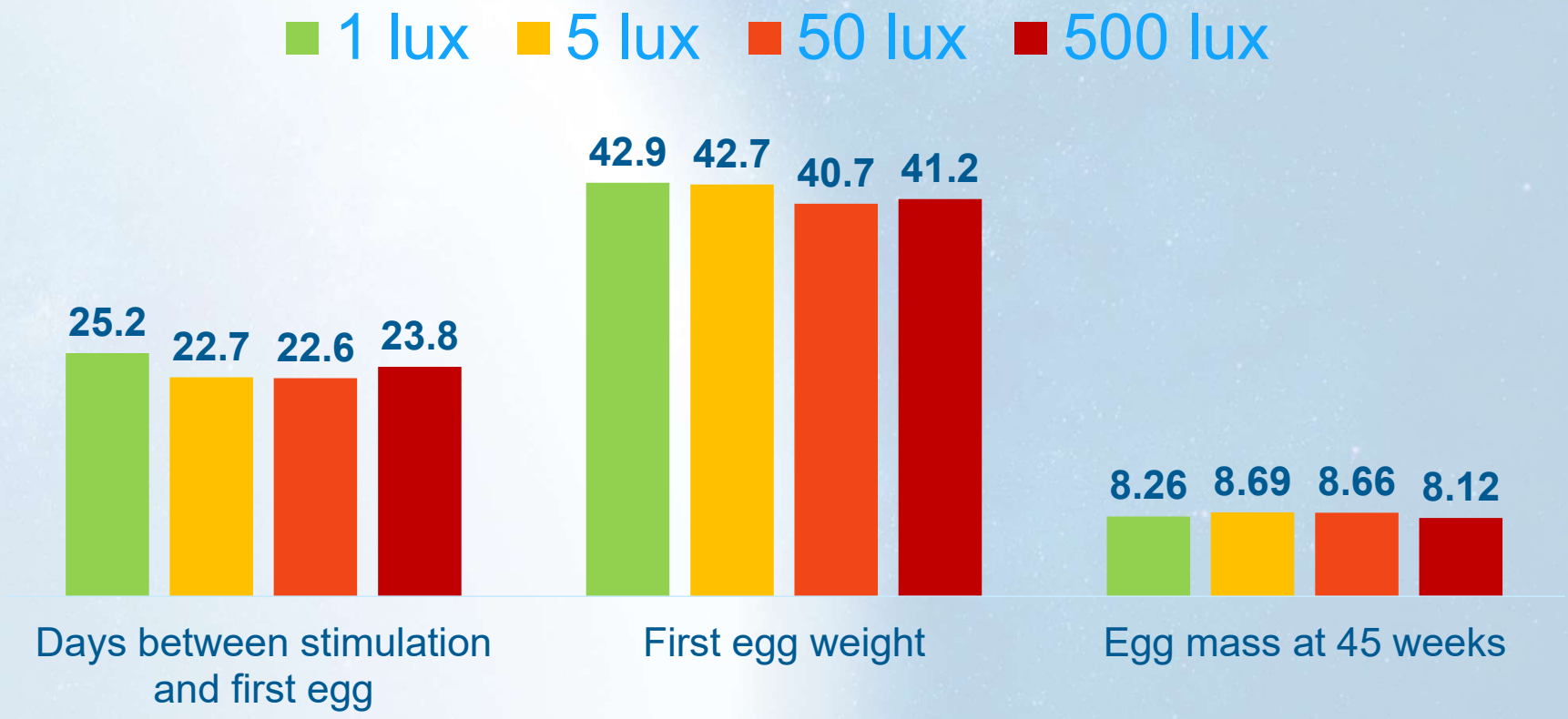
STEP 2: Be able to measure light intensity

Source: H&N International

Source: H&N International

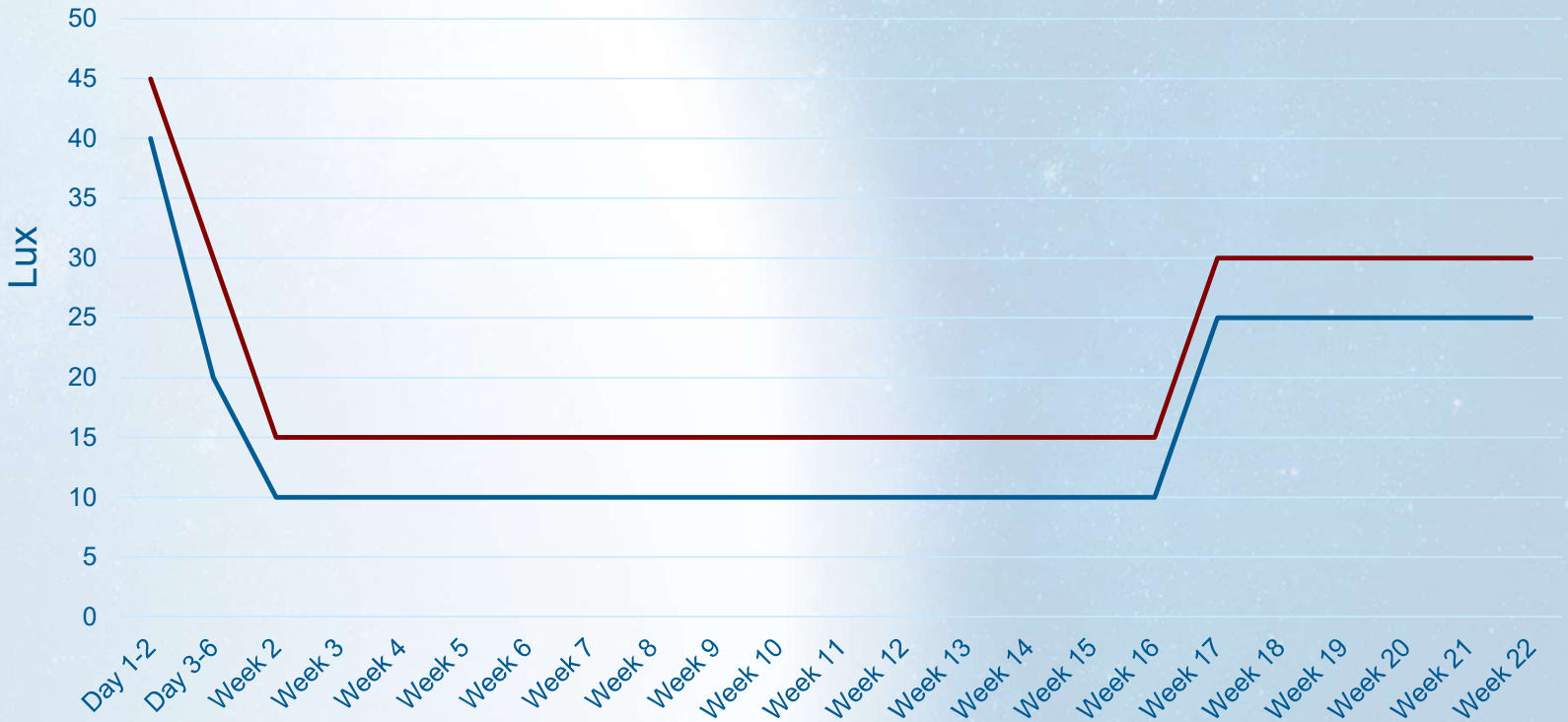
Measure intensity at slat levels or in the corridor without shadow interference

4 different layer breeds stimulated at different light intensity

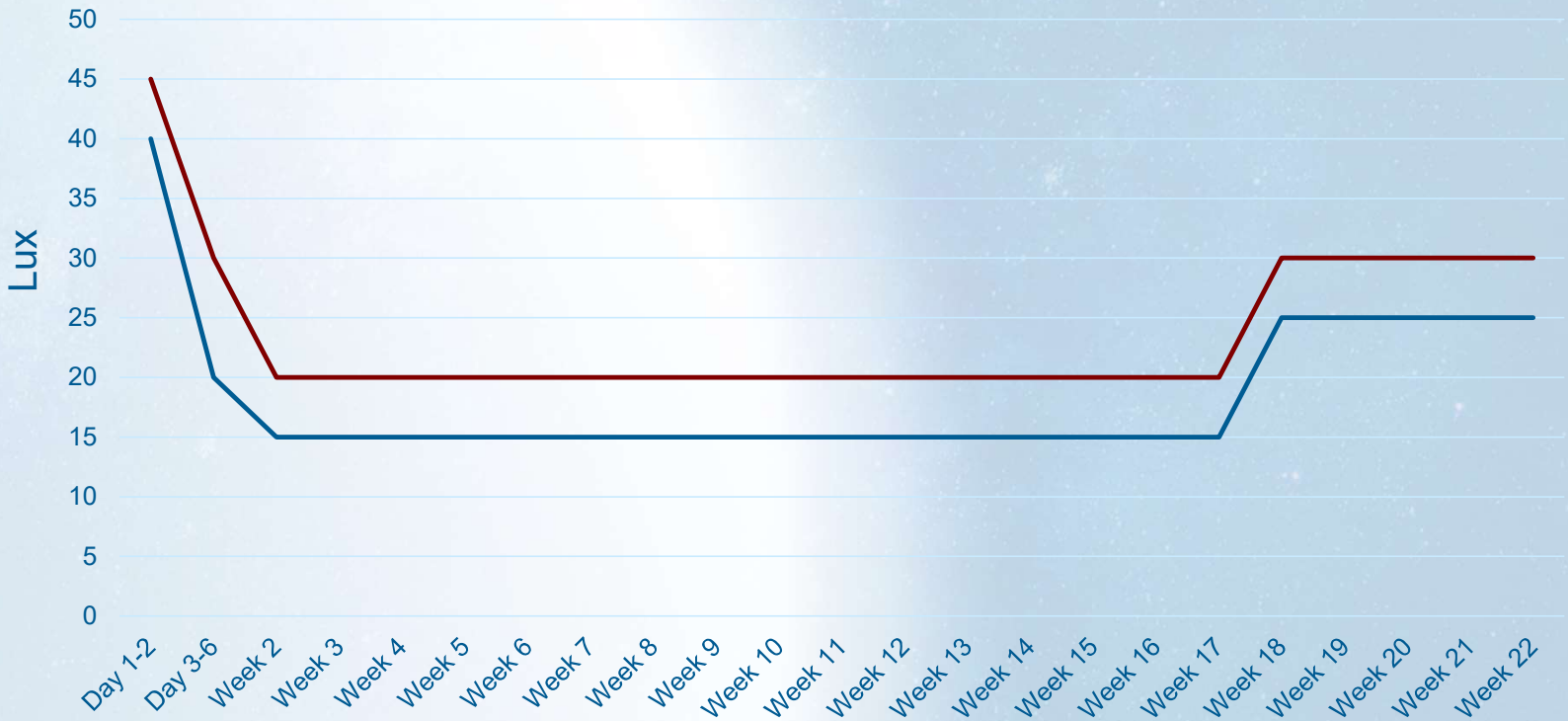


Source
Remena 2001

Minimum lighting intensity ideal for white layers

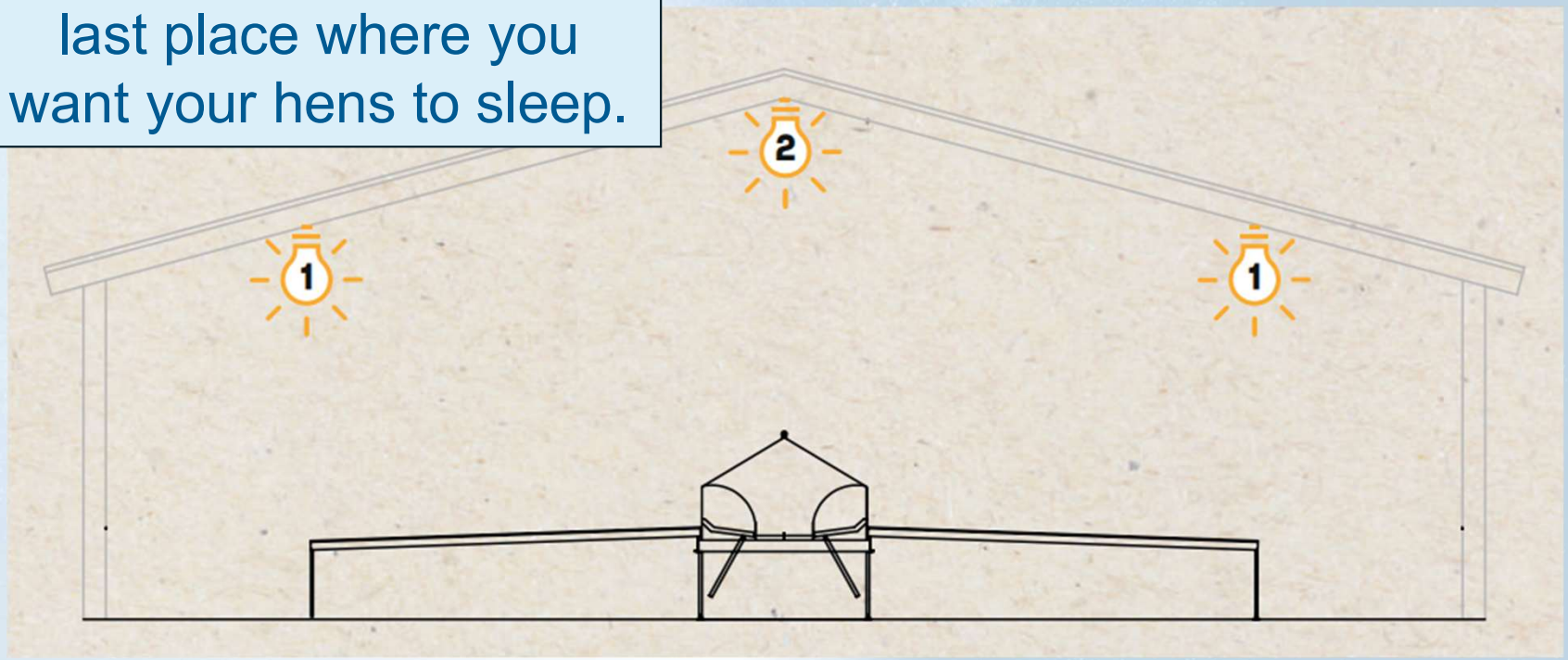


Minimum lighting intensity ideal for brown layers

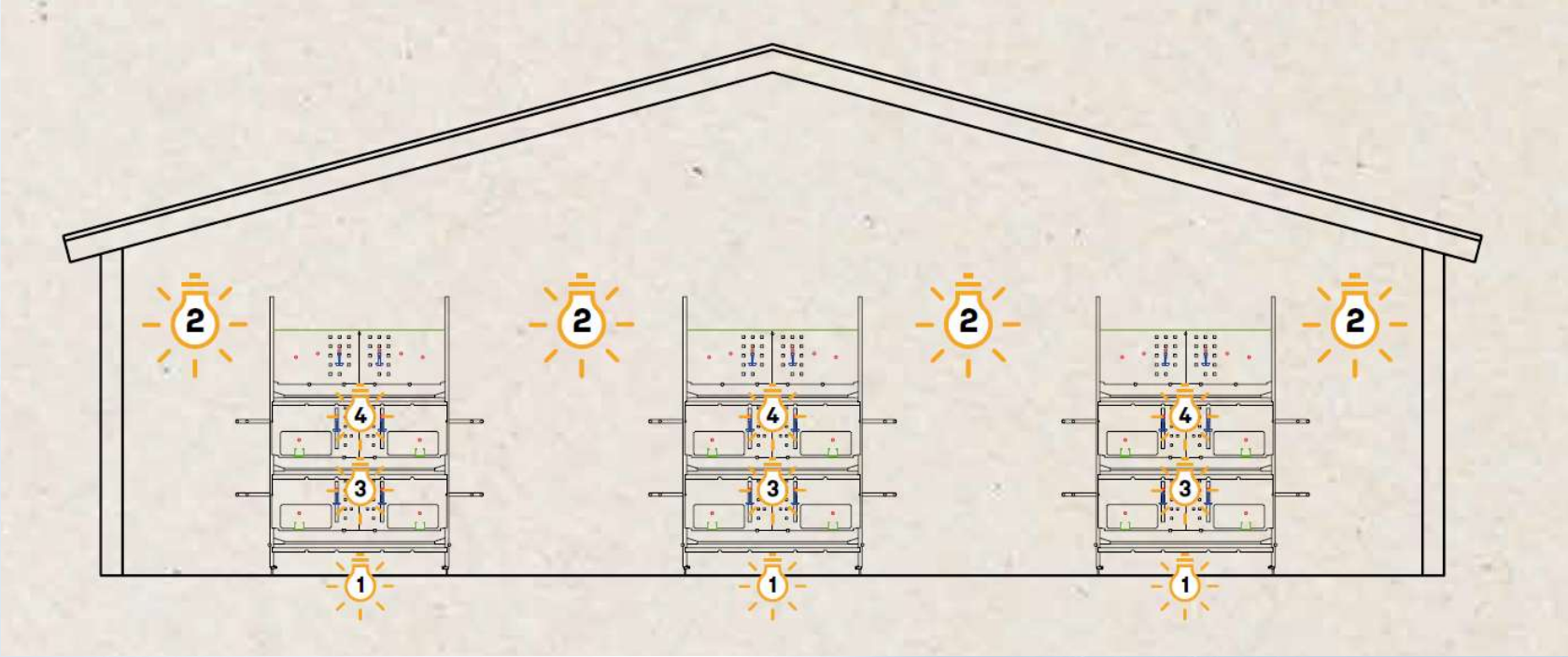


Progressive lighting off in floor systems

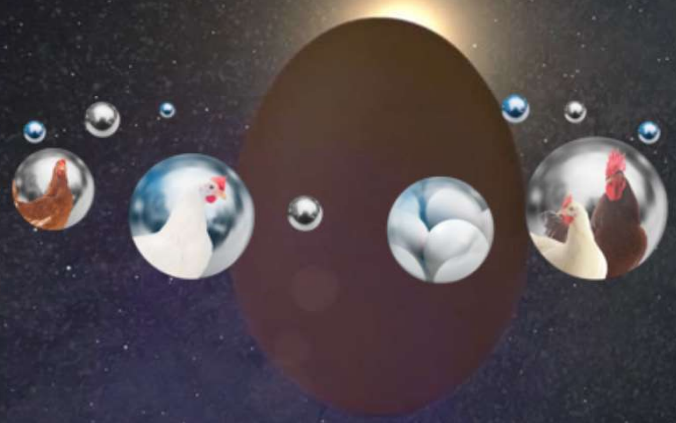
Lower the intensity in the last place where you want your hens to sleep.



Progressive lighting off in aviary systems



Thank you for your attention



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