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# **HEAT AND DISEASE PROBLEMS IN THE TROPICS**

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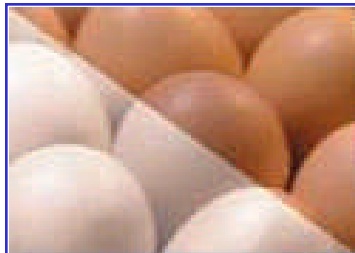


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# **EFFECT OF HEAT**

## **MANAGEMENT IN WARM CLIMATES**

### **REARING PERIOD AND PRODUCTION PERIOD**





## EFFECT OF HEAT



**INCREASE IN EXTERNAL TEMPERATURE**



**REDUCTION IN HEAT LOSS**



**THERMOREGULATION MECHANISM BROUGHT INTO OPERATION**



**INCREASE IN BODY TEMPERATURE**



**DIRECT EFFECT**

**Increase the rate of loss**



**INDIRECT EFFECTS**

**Reduce the production of  
HEAT**



## EFFECT OF HEAT



- **DIRECT EFFECT**
- Increase in external temperature
- Hold wings wide open
- Increase in water consumption
- Increase in respiratory rhythm
- **INDIRECT EFFECT**
- Reduction in activity
- Reduction in production of extra heat
- Reduction or cessation of feed intake
- Reduction of protein synthesis

**THE FACTOR LIMITING GROWTH OR PRODUCTION IS ENERGY INTAKE**



## INFLUENCE OF HEAT IN REARING PERIOD



### EFFECT OF HEAT :

- REDUCTION IN FEED CONSUMPTION
- NEGATIVE EFFECT ON GROWTH
- DELAY IN THE ON SET OF EGG PRODUCTION
- IN THE ABSENCE OF PHOTOSTIMULATION, THE AGE AT START OF LAY IS DETERMINED BY BODYWEIGHT .



## INFLUENCE OF TEMPERATURE



### Influence of the temperature and the feed energy level on growth in rearing

Temperature/ Energy	Body weight at different ages (g)				
	28 days	56 days	98 days	126 days	de 56-126
18°C - 2500 kcal	240	601	1145	1398	797
18°C - 3000 kcal	260	650	1173	1434	784
Average 18°C	250	626	1159	1416	791
30°C - 2500 kcal	234	591	1049	1266	675
30°C - 3000 kcal	247	559	1002	1218	659
Average 30°C	241	575	1025	1242	667

Leghorn

Leeson S., and J.D. Summers -1997

REDUCTION OF GROWTH WITH AN INCREASING TEMPERATURE

LOW INFLUENCE OF ENERGY LEVEL



## INFLUENCE OF STEP DOWN LIGHTING PROGRAMME ON GROWTH



Age	Lighting duration (hours / day)	
From 4 - 7 days	20	20
2 <sup>nd</sup> week	16	16
3 <sup>rd</sup> week	12	15
4 <sup>th</sup> week	8	14.5
5 <sup>th</sup> week	8	14
6 <sup>th</sup> week	8	13.5
7 <sup>th</sup> week	8	13
8 <sup>th</sup> week	8	12.5
B.W at 56 days (g)	678	731 (+ 8%)

24è R.S.T. Eikelborn

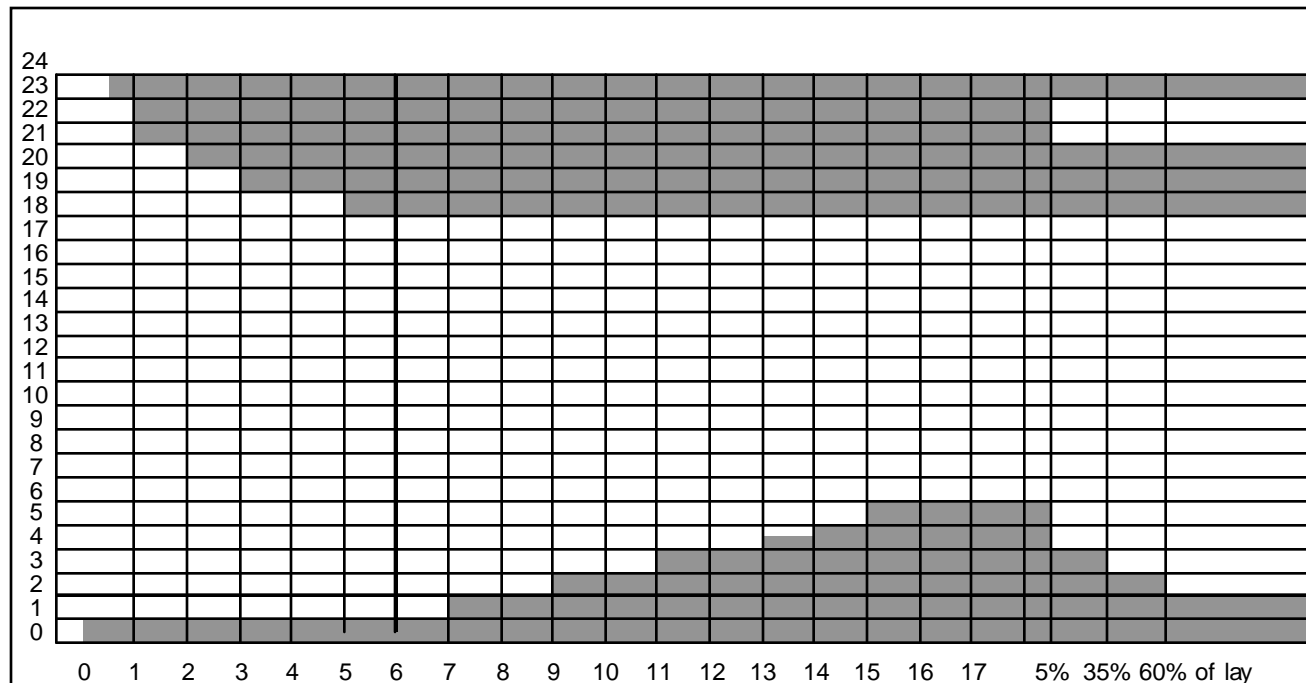
8 % OF GROWTH WITH A SLOW STEP DOWN LIGHTING PROGRAMME



# LIGHTING PROGRAMME



( From 20° north and 20° south latitude )



- Relation between Light duration and Feed intake
- Encourage feed intake during the cooler part of the day



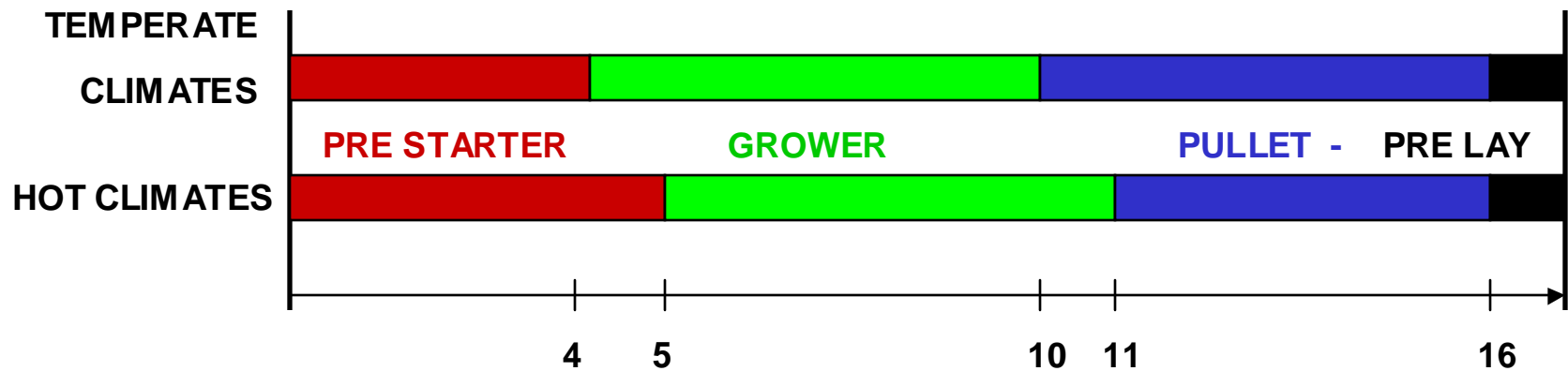
## LIGHTING PROGRAMME IN TROPICAL ZONE



Age	Hours	Intensity (lux)
4 - 7 days	22 h	40
8 - 14 days	20 h	40
15 - 21 days	19 h	40
22 - 35 days	18 h	40
36 - 49 days	17 h	40
50 - 63 days	16 h	40
64 - 77 days	15 h	40
78 - 91 days	14 h	40
92 - 98 days	13 h 1/2	40
99 - 105 days	13 h	40
106 - 112 days	Natural lighting	40
113 - 126 days	Natural lighting	40
Après 127 days	Natural lighting	40
5 % of lay	14 h (+ 2 h)	40
After 35 % of lay	15 h (+ 2 h)	40
After 60 % of lay	16 h (+ 2 h)	40



## FEED SPECIFICATIONS - BROWN EGG LAYERS



- Use a diet in crumb form for the first 5 weeks (similar to a broiler diet)
- After 5 weeks, use a diet in crumb form or meal diet with good grist size
- Starting at 15 weeks, give 2 hours of light during the night when allowed by national rules



## HOT WEATHER IN REARING



- **Lighting :**
  - Use a slow step down lighting programme
  - Give early morning light to encourage feeding during the cooler part of the day
  - Starting at 15 weeks, give 2 hours of light during the night
- **Food Presentation**
  - Use a diet in crumb form for the first 5 weeks (similar to a broiler diet)
  - After 5 weeks, use a diet in crumb form or meal diet with good grist size
- **Feeding timetable**
  - Avoid the build up of fine feed particles by managing the feeder times, in order to reduce in level of feed in the middle of the day
  - Distribute the food 3 hours before lights out
- **Stockmanship**
  - Provide cool drinking water of good bacteriological quality
  - Beak trimming to be correctly managed
  - Weight the bird weekly



## INFLUENCE OF HEAT IN THE PRODUCTION PERIOD



### EFFECT OF HEAT :

- DROP IN THE FEED CONSUMPTION
- NEGATIVE EFFECT ON THE GROWTH
- DELAY IN THE ONSET OF EGG PRODUCTION
- IN THE ABSENCE OF PHOTOSTIMULATION, THE AGE AT START OF LAY IS DETERMINED BY BODYWEIGHT .

### EFFECT OF REDUCED GROWTH :

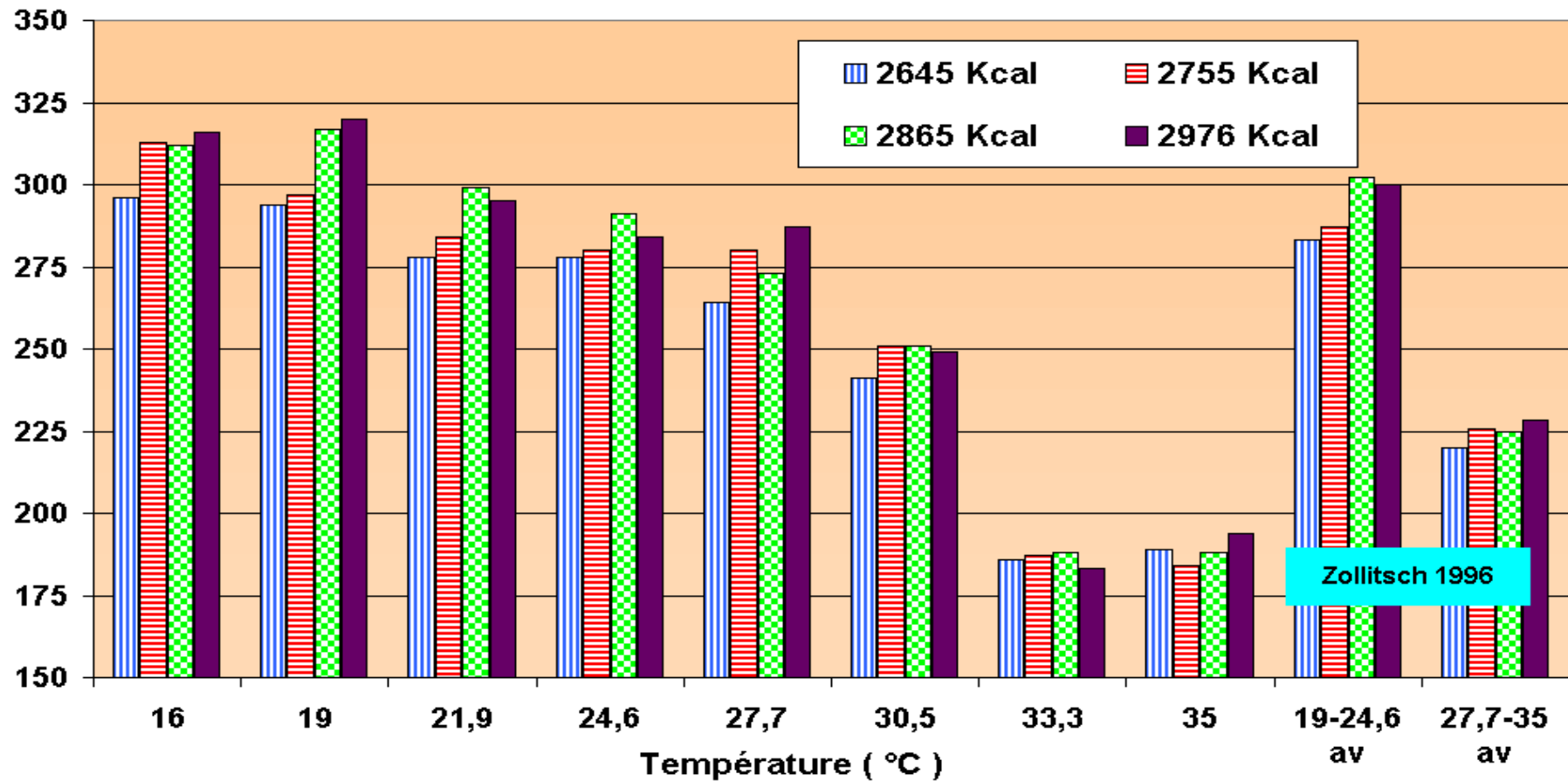
- DROP OF THE LAY AFTER THE PEAK PRODUCTION
- REDUCTION OF THE AVERAGE EGG WEIGHT
- REDUCTION OF PERFORMANCE



# INFLUENCE - FEED ENERGY LEVEL



## Influence of daily Consumption (kcal /day)

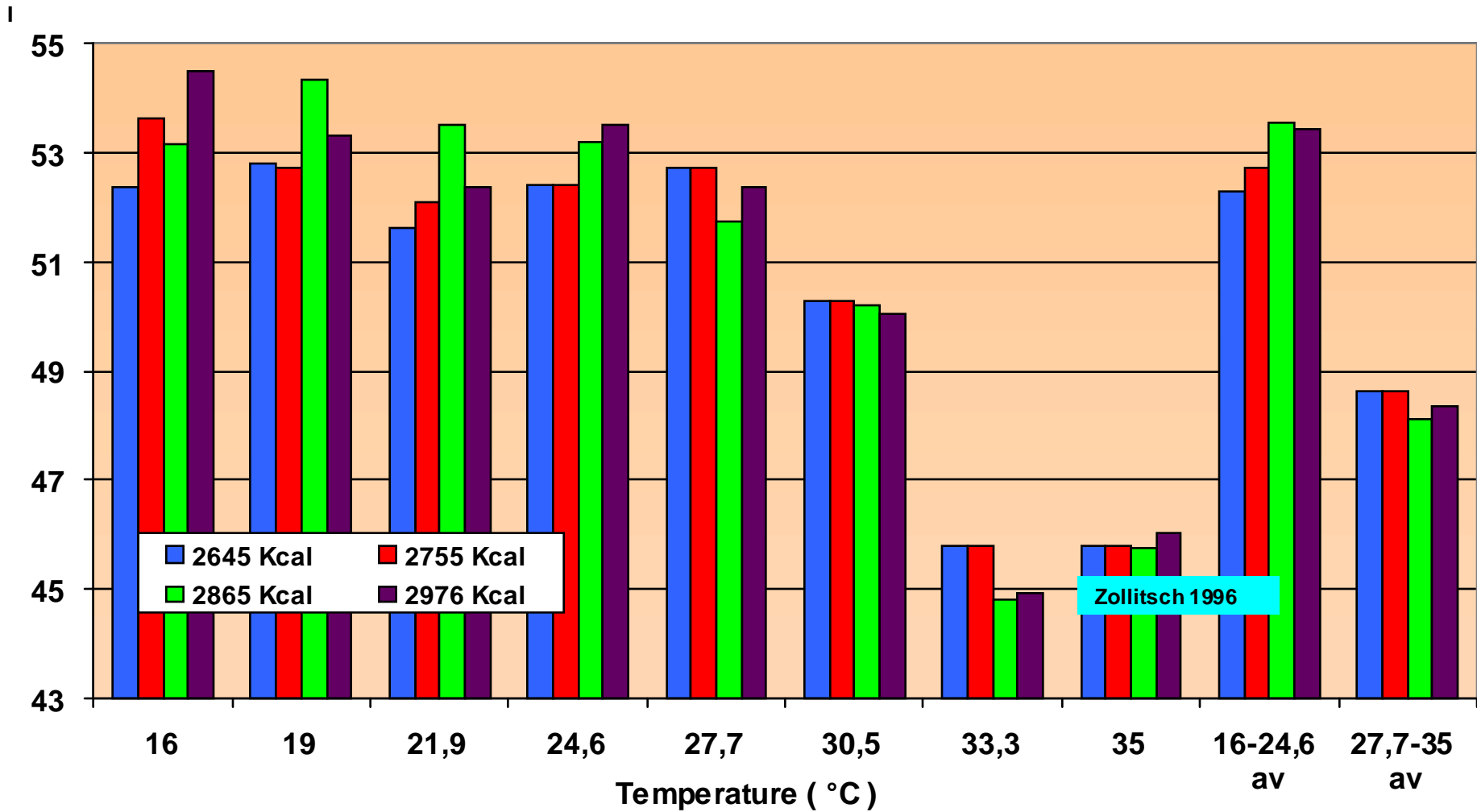




# INFLUENCE - FEED ENERGY AND TEMPERATURE



## Influence on Average Egg Weight from 20 to 36 weeks





## PROBLEMATIC



- **FEW INFLUENCE OF THE FEED ENERGY LEVEL ON :**
  - FEED CONSUMPTION PER DAY
  - GROWTH BODYWEIGHT (BODYWEIGHT AT 36 WEEKS)
  - LEVEL OF THE PRODUCTION BETWEEN 20 AND 36 WEEKS
  - EGG WEIGHT BETWEEN 20 AND 36 WEEKS
- **THEREFORE,**
  - HIGH ENERGY DIET HAS POOR EFFECT
  - THE OBJECTIVE IS TO ENCOURAGE THE HEAT LOSSES



## LEVEL OF HEAT



**Level of Heat (kcal) to Expel by a 1,9 kg bird with a Daily production of 60 g**

<b>Temperature</b>	<b>Requirement (kcal)</b>	<b>Energy in egg</b>	<b>Heat to Expel</b>	<b>Kcal/C° To Expel</b>
<b>19 °C</b>	<b>324</b>	<b>99</b>	<b>225</b>	<b>10.7</b>
<b>22 °C</b>	<b>313</b>	<b>99</b>	<b>214</b>	<b>11.9</b>
<b>25 °C</b>	<b>301</b>	<b>99</b>	<b>203</b>	<b>13.5</b>
<b>28 °C</b>	<b>291</b>	<b>99</b>	<b>192</b>	<b>16</b>
<b>31 °C</b>	<b>280</b>	<b>99</b>	<b>181</b>	<b>20</b>



## HOW TO REDUCE HEAT STRESS ?



- **A- Feeding Technique**
  - Early lighting – (Cool part of the day)
  - Introduce mid-night feeding ( 1 h 30 to 2 h)
  - Use a feed with a good feed grist size
  - Use of limestone size of 2 to 4 mm
  
- **B- In Increasing the Heat Loss**
  - Provide cold water
  - Reduce the inside house temperature
  - Increase heat loss
  - Increase air speed
  - Replenish fresh air frequently



## HEAT EXTRACTION



- The main parameters allowing an increase of heat loss is :
  - ☞ Air speed
  - ☞ Air Temperature
  - ☞ Relative Humidity
- Approximative relation between these 3 parameters could be:
  - ☞ 1°C # 4,5% RH # 0,2m/s



Temperature in° C		Level of feathering	
		100%	50%
Feed consumption (g/j)	23,9	105	112
	33,9	82	91
Egg mass (g/j)	23,9	49,9	49,0
	33,9	<b>39,6</b>	<b>47,3</b>
% lay (%)	23,9	84,3	84,3
	33,9	70	81,4
FCR (g/g)	23,9	2,10	2,29
	33,9	2,07	1,92
Heat production (kcal)	23,9	218	240
	33,9	118	183



## INFLUENCE ON PRODUCTION PERFORMANCE



- **NEGATIVE EFFECT OF HEAT STRESS ON :**
  - EGG WEIGHT: FROM 30°C
  - PERCENTAGE OF LAY : FROM 30°C
  - BODYWEIGHT: FROM 25°C
  - FCR : MINIMUM AT 26-27 °C



## PRODUCTION IN HOT CLIMATES



- **Lighting :**
  - Encourage food consumption during the cooler parts of the day.
  - Give early morning light to encourage feeding during the cooler part of the day
  - Giving 2 hours light during the night from 5 %lay – Midnight Feed.
- **Food Presentation**
  - Use a food of good texture and grist size
  - Supply 70 %of the calcium in granular form
  - Use a protein level to match food consumption
- **Feeding timetable**
  - Distribute 1/3 of the food 2 to 3 hours after "lights-on"
  - Distribute 2/3 of the food approx 6 hours before "lights-out", so that the birds have food available at night and in the morning
  - Avoid an accumulation of fine feed particles by ensuring that the feeders are partially empty in the middle of the day
  - Avoid having the birds digesting feed early in the afternoon
- **Good husbandry**
  - Provide a supply of cool water of good bacteriological quality
  - Weigh the birds regularly/weekly