

93年度廠農衛星牧場合理化經營及  
產銷標準化管理訓練

認識環境因子與  
環境因子對動物熱緊迫的影響

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### 環境因子：乾球溫度

Liquid

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BASIC THERMOCOUPLE CIRCUITRY WITH DISTRIBUTION

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### 環境因子：濕球溫度

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### 環境因子：相對濕度

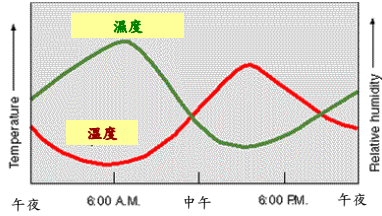
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### 大氣中溫、濕度之一般趨勢

<p><b>HIGH TEMPERATURE</b> 高溫 / 低濕</p> <p><b>LOW HUMIDITY</b></p> <p>白 DAY 天</p>	<p><b>LOW TEMPERATURE</b> 低溫 / 高濕</p> <p><b>HIGH HUMIDITY</b></p> <p>夜 NIGHT 晚</p>
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### 溫度高，濕度低



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### 高濕的環境



低溫高濕的環境



高溫低濕的環境



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### 熱緊迫紓解方法之一



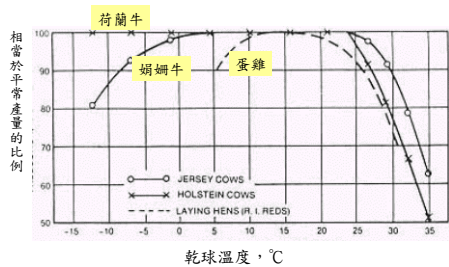
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### 熱緊迫紓解方法之二



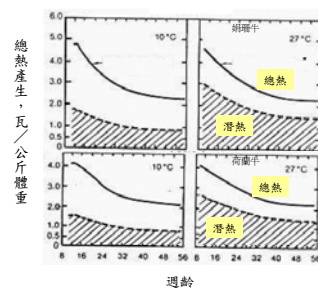
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### 娟珊牛、荷蘭牛與蛋雞之適溫曲線



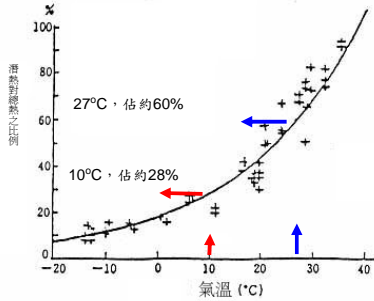
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### 不同週齡與溫度下的總熱產生率以乳牛為例



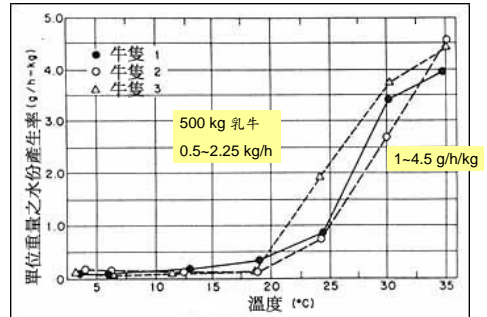
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### 不同溫度下乳牛的 潛熱散失對總熱散失之比例



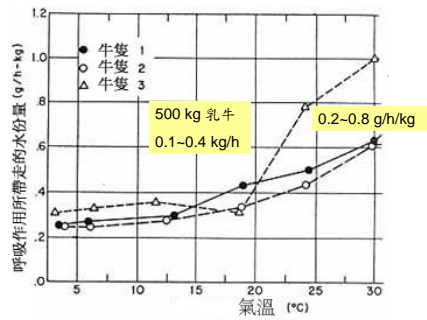
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### 不同溫度下乳牛的 單位重量的水份產生率(排汗/尿)



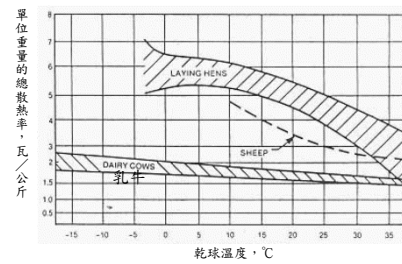
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### 不同溫度下乳牛由於呼吸作用 單位體重所帶走的水分量



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### 常溫範圍蛋雞、綿羊與乳牛 每公斤體重的總散熱率

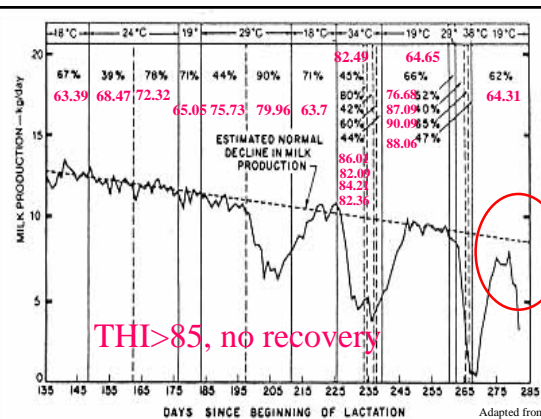


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### 濕度對泌乳量的影響

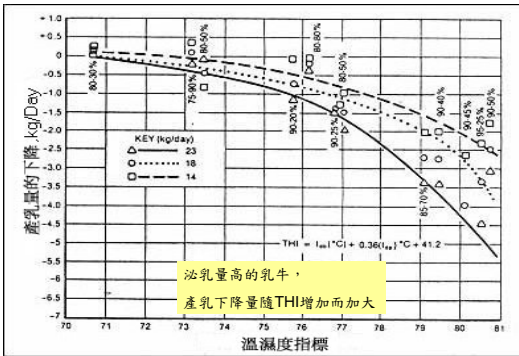
氣溫 (°C)	相對濕度 (%)	荷蘭牛	娟珊牛
24	38	100	100
24	76	96	99
34	46	63	68
34	80	41	56

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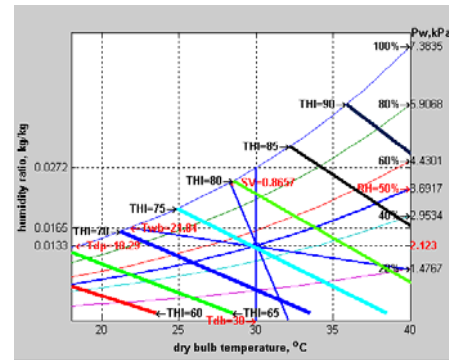
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### 溫濕度指標(THI)與影響產乳下降量的關係

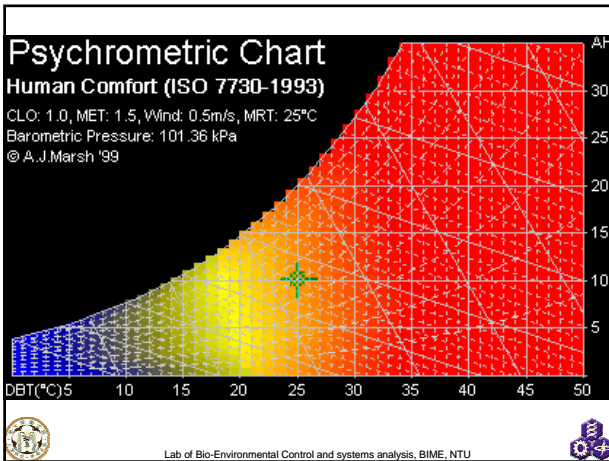


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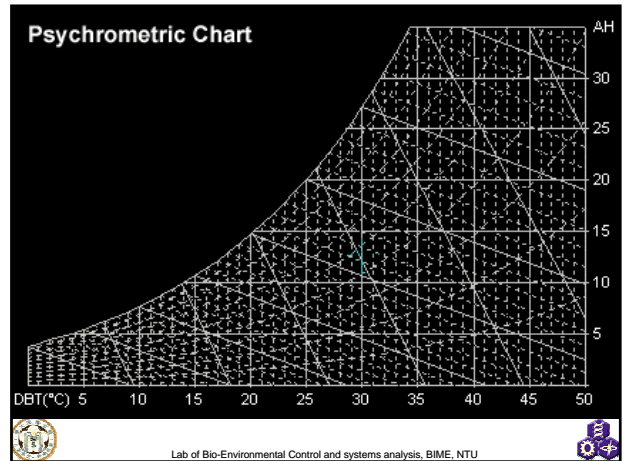
### THI lines on Psychrometric chart



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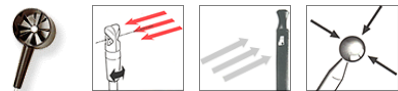
### 風速對泌乳量的影響

風速	10°C		26.7°C		35°C	
	荷蘭牛	娟珊牛	荷蘭牛	娟珊牛	荷蘭牛	娟珊牛
0.18	100%	100	85%	100	63%	74
2.44	100	100	95	100	79	94
4.02	100	100	95	100	79	94

風冷效應 Wind Chill Effect

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### 風速量測



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### 熱緊迫紓解方法之三



Forced Ventilation



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### 熱緊迫紓解方法之四：蒸發冷卻



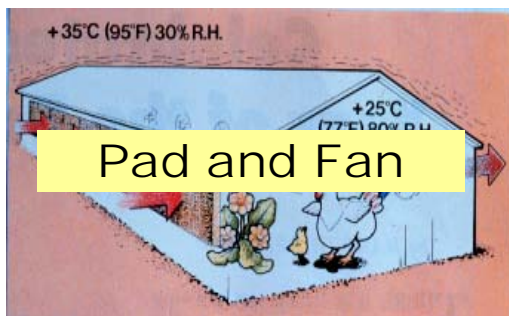
Fogging and Fan



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### 熱緊迫紓解方法之五：蒸發冷卻



Pad and Fan



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### 熱緊迫紓解方法之六

- 遮蔭



Shading



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### 輻射熱對泌乳量的影響

輻射熱	7.2°C		21.1°C		26.7°C	
cal/cm <sup>2</sup> /min	荷蘭牛	娟珊牛	荷蘭牛	娟珊牛	荷蘭牛	娟珊牛
0.2 (陰天)	100	100	100	99	92	94
0.42 (一般)	100	100	93	95	77	93
0.6 (晴天*)	100	100	90	97	69	87
0.84 (大晴天)	100	100	88	95	57	79

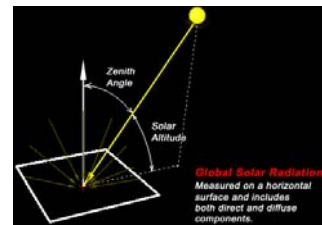
\* 0.6 cal/cm<sup>2</sup>/min = 6 kcal/m<sup>2</sup>/min = 420 W/m<sup>2</sup>



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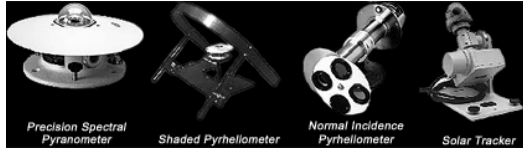
### 總太陽能=直射+散射



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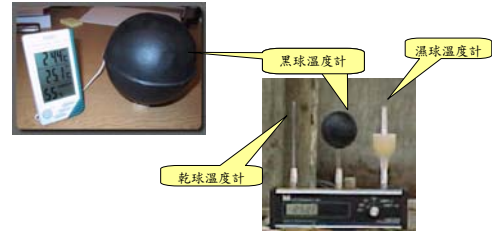


## 太陽能量測



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## 黑球溫度



黑球溫度計增加了輻射與風速因子的綜合考量

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