

Extension  
UNIVERSITY OF WISCONSIN-MADISON

**DAIRY WORKERS'**

TRAINING MODULE **2**

**REPRODUCTIVE SKILLS**

Heat Stress

DAIRY WORKERS

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### What is heat stress?

When a cow's ability to dissipate heat is exceeded by heat generated from metabolic heat production and heat gain from environmental sources

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### Thermoneutral zone

Temperature Heat stress

Optimal temperature: 55 to 65 °F

Comfort zone: 41 to 77 °F

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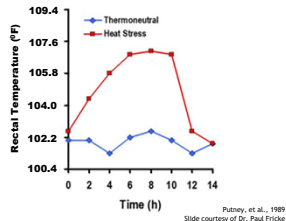
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## Effects of heat stress on body temperature



Putney, et al., 1989  
Slide courtesy of Dr. Paul Frickel

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## Heat stress & the temperature humidity index (THI)

Air Temperature (°F)	Relative Humidity (%)																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
65	61	61	62	62	62	62	62	62	63	63	63	63	64	64	64	64	64	65	65	65	65
70	63	64	64	64	65	65	65	66	66	66	67	67	67	68	68	68	69	69	69	70	70
75	66	66	67	67	68	68	68	69	69	70	70	71	71	72	72	73	73	74	74	75	75
80	68	69	69	70	71	72	72	73	73	74	74	75	76	76	77	78	78	79	79	80	80
85	70	71	72	72	73	74	75	75	76	77	78	78	79	80	81	81	82	83	84	84	85
90	72	73	74	75	76	77	78	79	79	80	81	82	83	84	85	86	86	87	88	89	90
95	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
100	77	78	79	80	82	83	84	85	86	87	88	90	91	92	93	94	95	97	98	99	100
105	79	80	82	83	84	86	87	88	89	91	92	93	95	96	97	99	100	101	102	104	105
110	81	83	84	86	87	89	90	91	93	94	96	97	99	100	101	103	104	106	107	109	110

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## Signs of heat stress

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## Signs of heat stress

- **Moderate signs (80-90 °F & 50-90% humidity)**
  - Rapid, shallow breathing
  - Profuse sweating
  - 10% decrease in feed intake & milk production
- **Severe signs (90-100 °F and 50-90% humidity)**
  - Open mouth breathing with panting
  - Tongue hanging out
  - 25% decrease in milk production



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## Breathing rate indicator of heat stress

Breathing Rate	Heat Stress Category
25-50 breaths per minute	Normal
Over 60 breaths per minute	Alert
Over 100 breaths per minute Panting, drooling, tongue out, or any combination	Danger

Source: Animal Handling During Heat Stress, UW-Madison Division of Extension



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## Estrus and heat stress



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## Estrus expression is reduced

- Decreased amount of blood hormones
- Reduced estrus events:
  - Shorter in length
  - Intensity reduced
- Reduced physical activity

Heat stress  
Image source: Adapted from MSD Partners in Reproduction

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## Estrus detection during heat stress

- Greater attention to primary and secondary signs of estrus
  - “Friendly” behavior
  - Eat less
  - Abundant, cohesive clear mucus discharge
  - Swollen and/or red vulva
  - Dirty flanks & roughed tail head
- Use of estrus detection aids is important

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## Estrus detection aids

**70% of standing events occur from 6 pm to 6 am**

- Tailhead paints, chalk, and patches
- Activity monitoring technology
- Synchronization programs

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# Fertility and heat stress



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## Heat stress impact on cow fertility

- Egg development
  - Impaired selection of dominant follicle
  - Larger pre-ovulatory follicles and delayed ovulation
  - Increased number of dominant follicles
  - Reduced conception rates

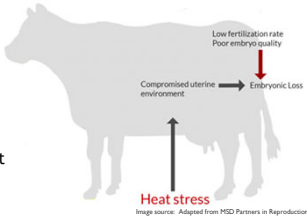



Image source: Adapted from MSD Partners in Reproduction

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## Heat stress and the bull

**Negative impacts**

- Semen quality
- Sperm development
- Libido



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## Rate and growth of embryo

- Uterine environment
  - Decreased blood flow
  - Increased uterine temperature
  - Prostaglandin secretion
- Heat stressed embryos may develop slower
  - Development may not be advanced enough by day 17 to prevent CL regression, resulting in early embryonic loss

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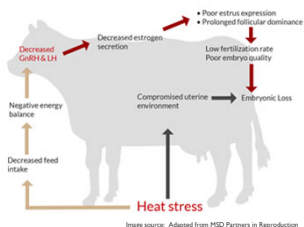
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## Impact of heat stress on reproduction

- Decreased feed intake and energy balance
- Decreased amount of blood hormones
- Lower fertility
- Increased embryonic loss



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The cover features the University of Wisconsin-Madison logo on the left. On the right, a photograph shows a cow lying down in a stall, appearing to be in distress. The text on the cover includes: 'Extension UNIVERSITY OF WISCONSIN-MADISON', 'DAIRY WORKERS' TRAINING MODULE 2', 'REPRODUCTIVE SKILLS', and 'Heat Stress'. At the bottom right, there is a logo for 'DAIRY WORKERS' featuring a silhouette of a cow and a person.

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