What Dairy Managers Need to Know About Heat Stress

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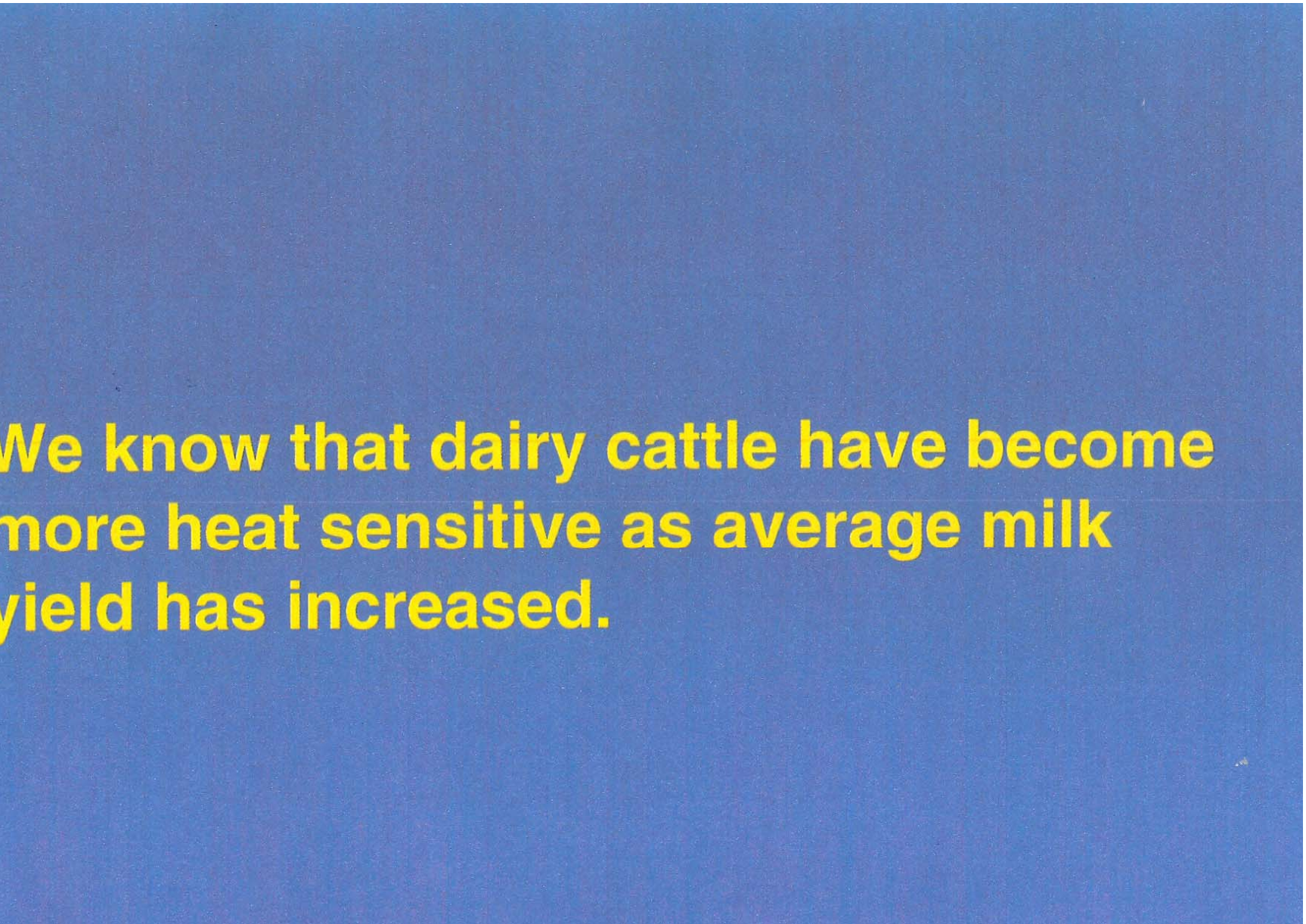
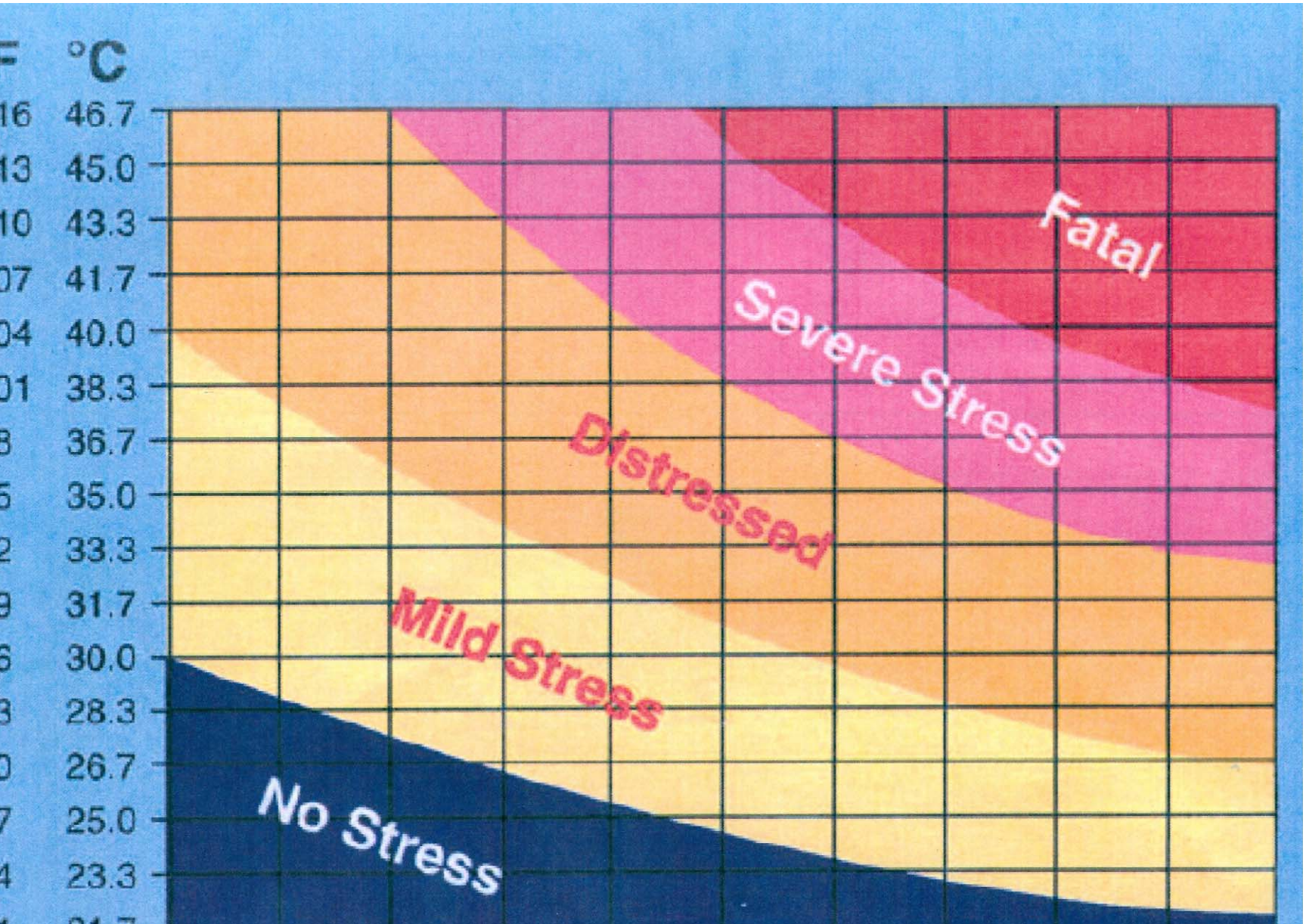

We know that dairy cattle have become
more heat sensitive as average milk
yield has increased.


°C
46.7
45.0
43.3
41.7
40.0
38.3
36.7
35.0
33.3
31.7
30.0
28.3
26.7
25.0
23.3
Fatal
Severe Stress
Distressed
Mild Stress
No Stress

We know that heat stress is a major cause of production losses in the dairy industry

- Milk
- Reproduction
- Replacement cost

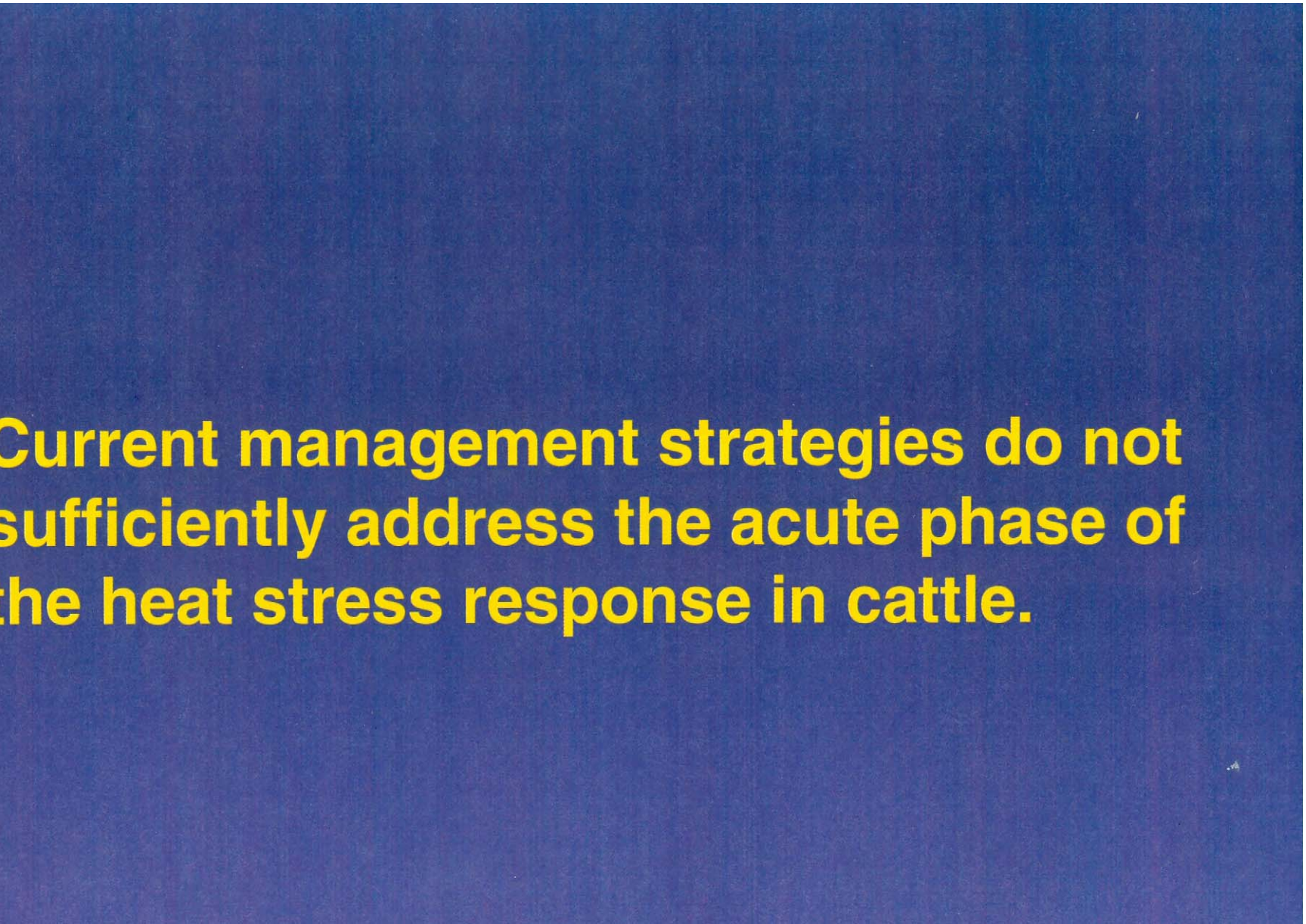
We know that dairy cattle have become more heat sensitive as average milk yield has increased.

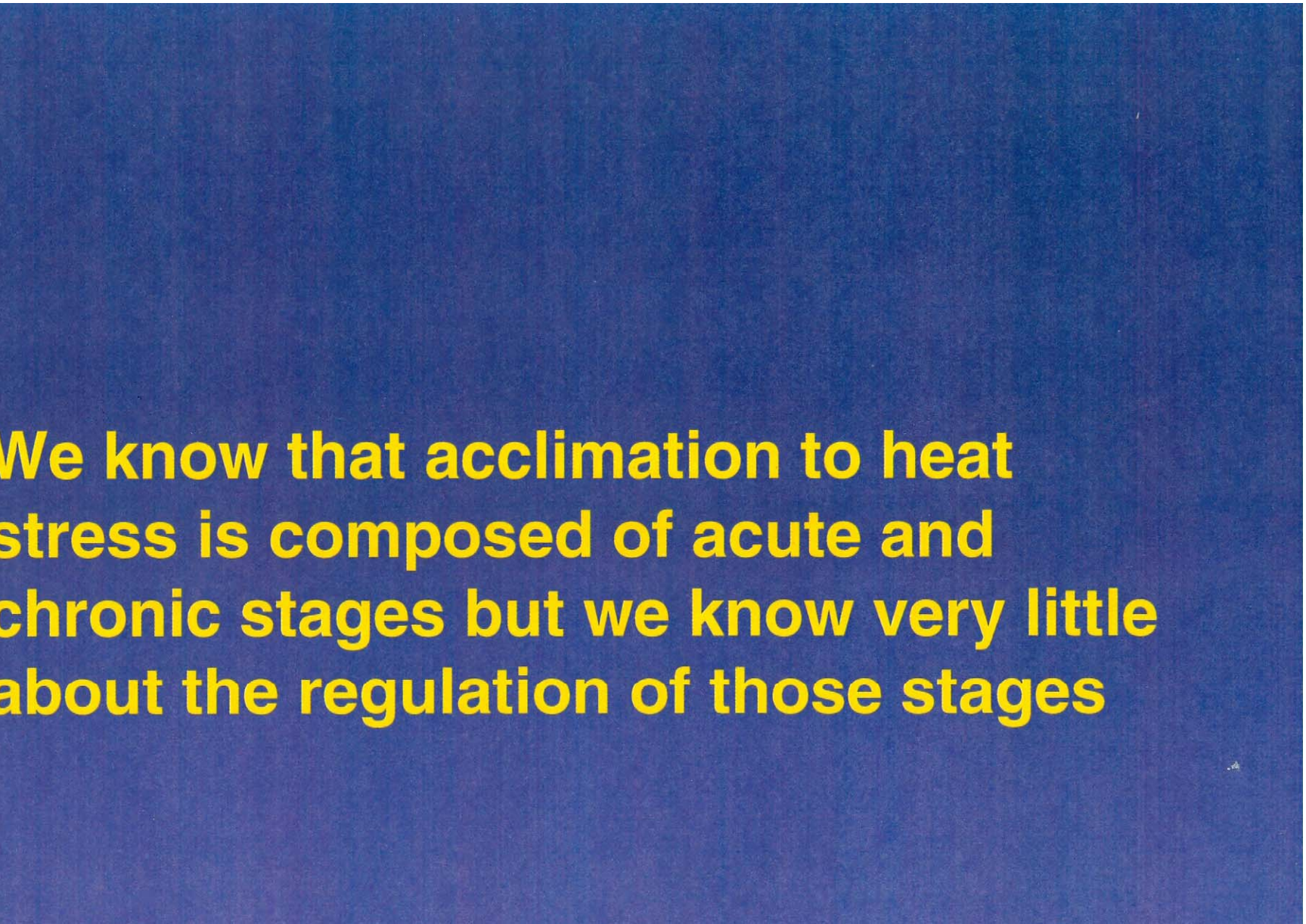
Production and Heat Output

Since 1950, heat production per cow
has increased an average of 30 MJ or
28,000 Btu/day in the Holstein breed

This requires reevaluating the
relationship between ambient
temperature, milk yield and thermal
stress level in cattle

We believe that current estimates of heat load, such as the Temperature Humidity Index (THI), are underestimating the effects of heat stress on dairy cattle


Current management strategies do not
sufficiently address the acute phase of
the heat stress response in cattle.


We know that acclimation to heat stress is composed of acute and chronic stages but we know very little about the regulation of those stages

Acclimation is Biphasic

Short term heat acclimation (STHA)

Long term heat acclimation (LTHA)

How is metabolism integrated?

Missouri Study

48 lb of milk per day had an average
BTU of 4900 per hour

72 lb of milk per day had an average
BTU of 6400 per hour

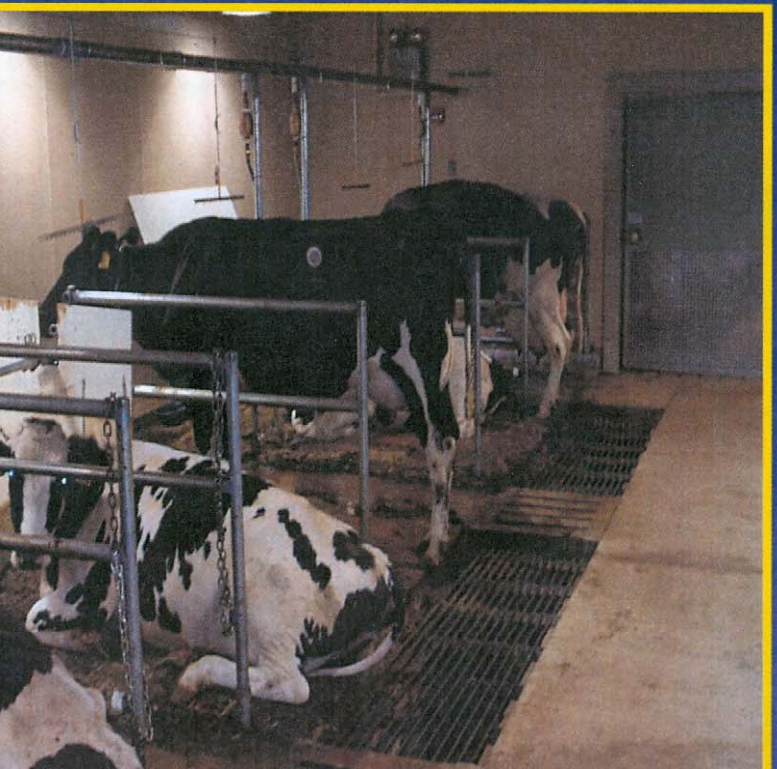
100-150 lb of milk per day average ???

Dr. Berman
Hebrew University – Israel

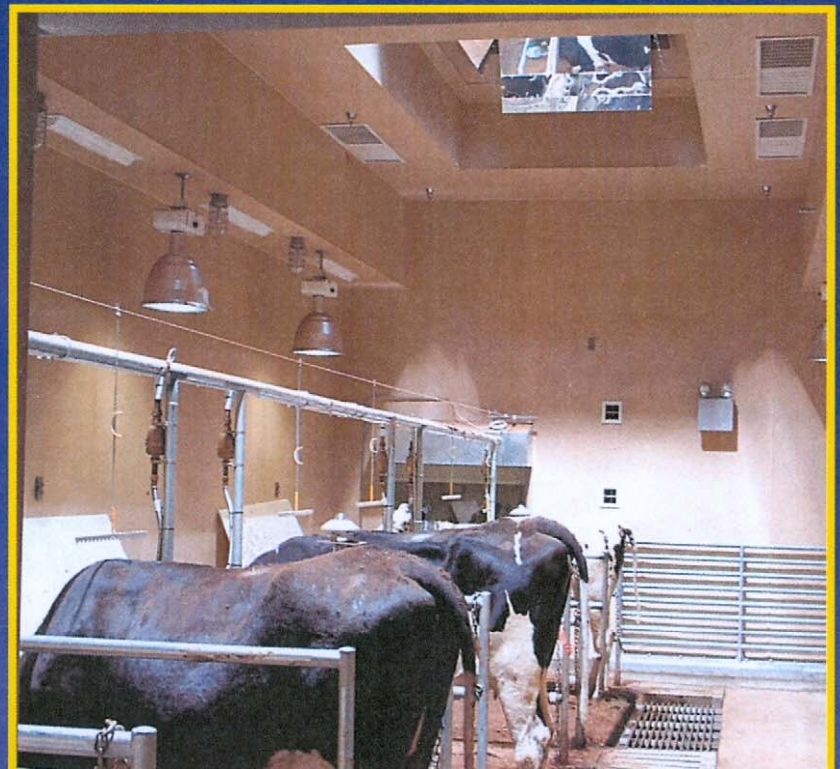
Cows producing over 99 lb of milk per day have a higher thermal stress of 9°F when compared to 77 lb cows.

Environmental/Metabolic Chambers

Heat Stress



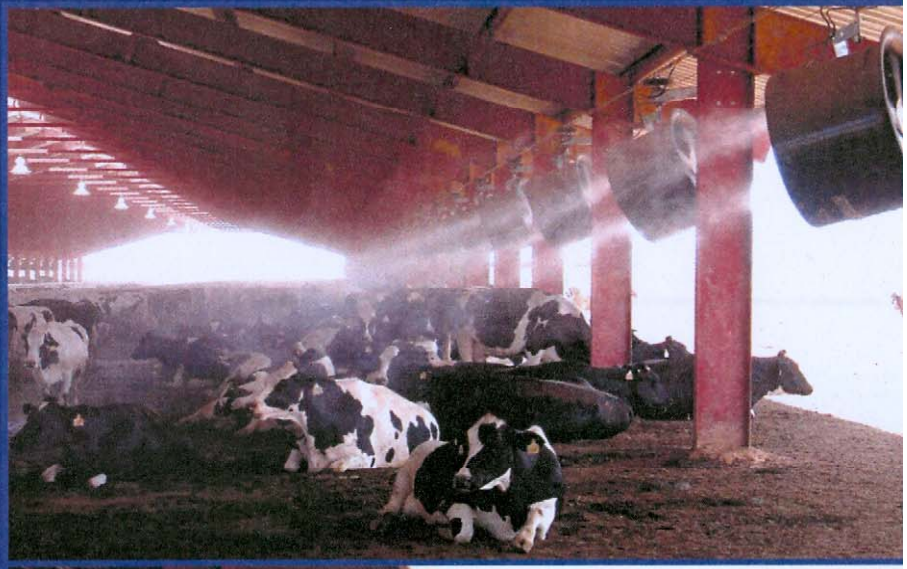
Heat Stress + Solar Radiation



When do you need to cool heat-stressed cows?

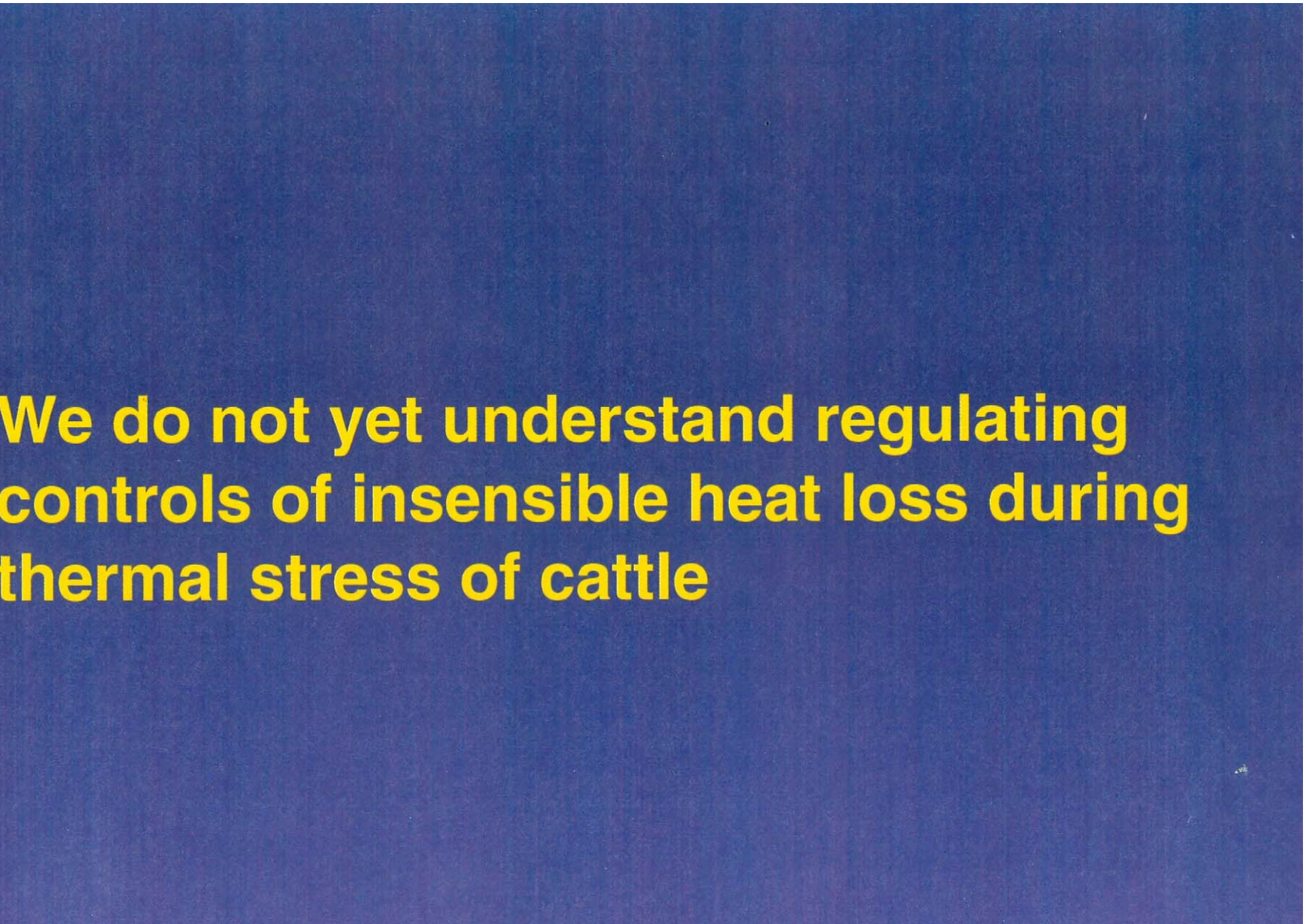
- When there are 24-48 hours of stress above THI 72?
- When there are more than 8-9 hours per day above THI 72?

Management Strategies



Minimize heat gain

Maximize heat loss

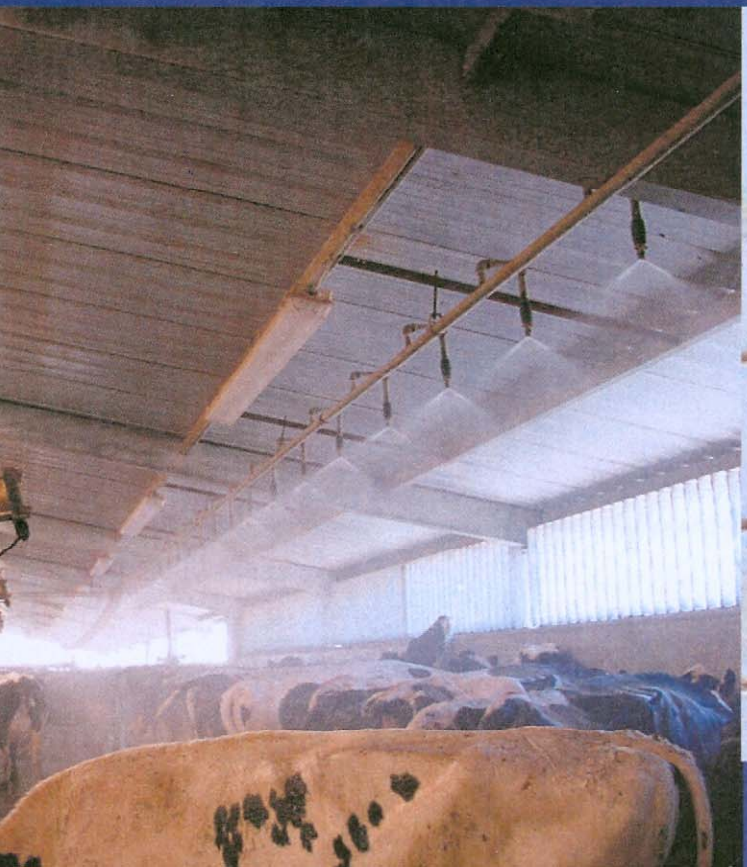

We do not yet understand regulating controls of insensible heat loss during thermal stress of cattle

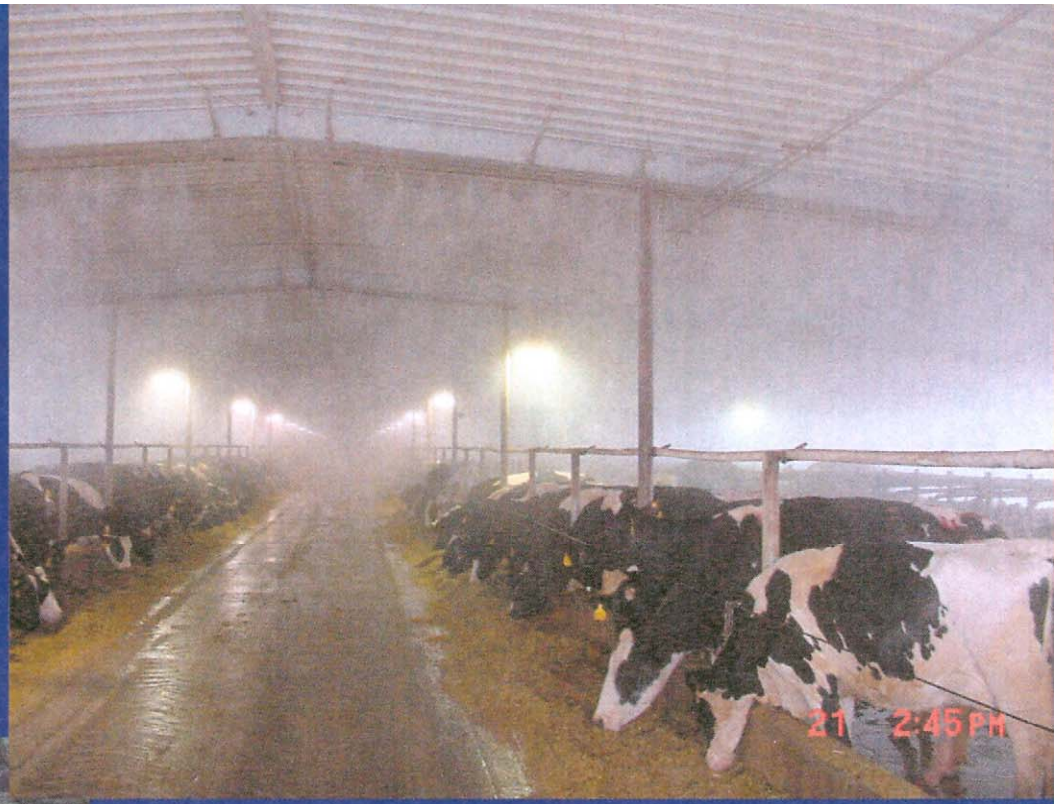
Acclimation

Understanding metabolic integration
during acclimation to thermal stress
has high potential return on investment
Somatotropin, Prolactin, Thyroid
Hormones, Mineralcorticoids,
Glucocorticoids and possibly Insulin
are involved

f you can see your shadow, spend more money!!!

Exit Lane Soakers

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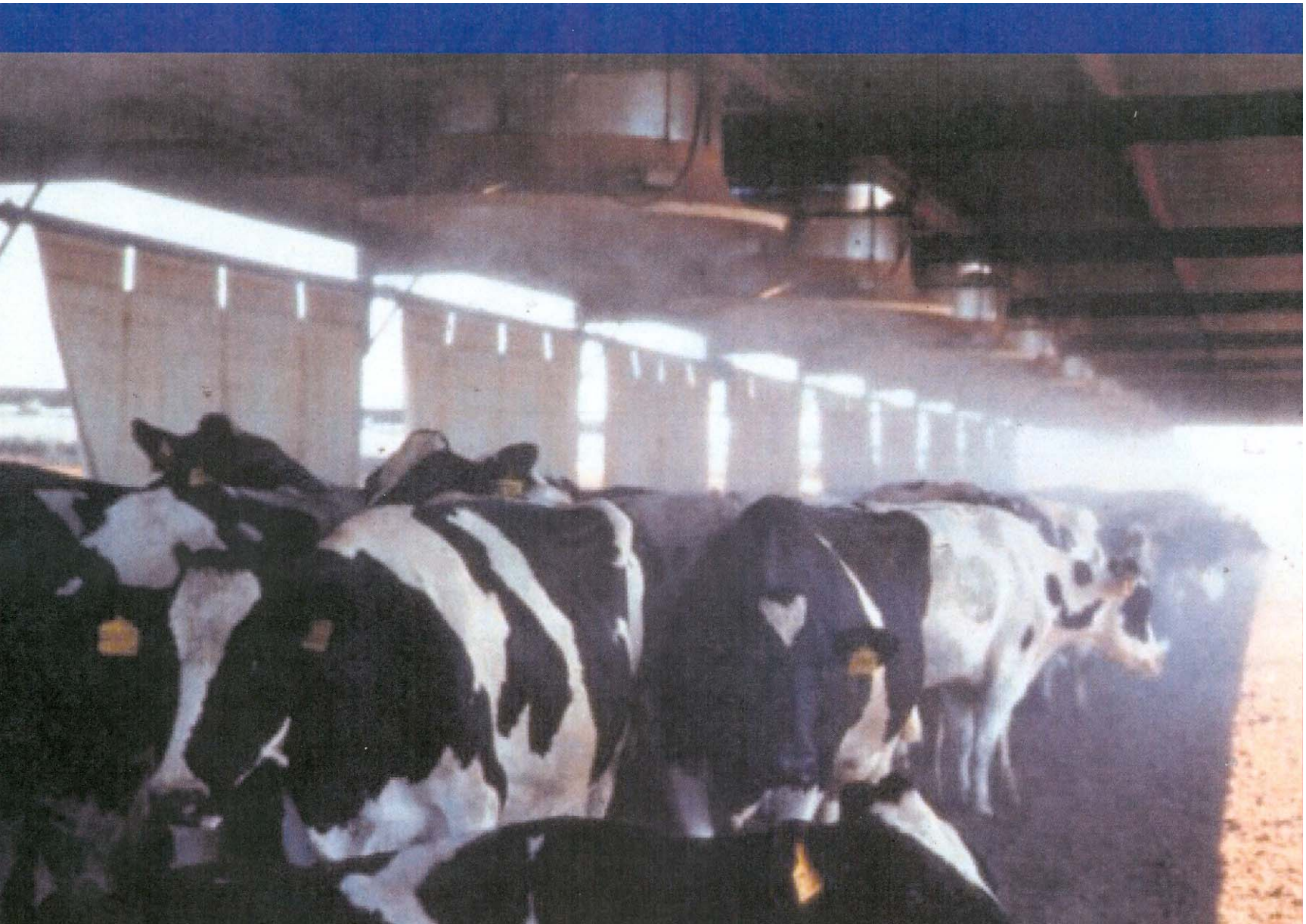
Desert Dairy Industry (Saudi Arabia)

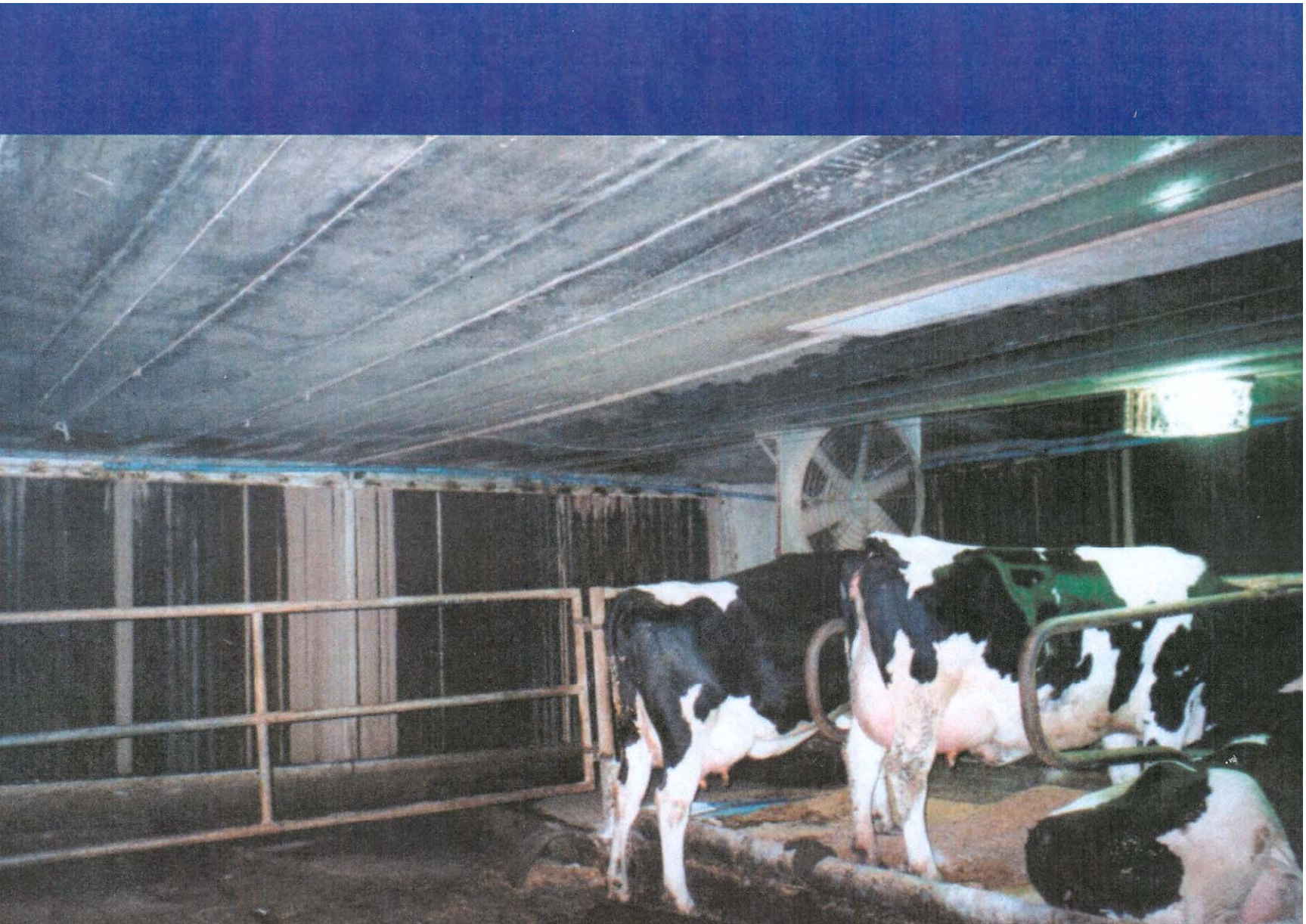
- Herd size – 40,000+
- – Milk sold per cow per year
  - 1998 – 22,000
  - 2005 – 29,000



Tropical Dairy Industry (Thailand)

Peak milk yields over 100 lb per day

Calving interval of 13.8 months



2005 University of Arizona/ Kansas State University/ Monsanto Trial

40 Dairy Farms in 24 States

Looked at cooling methods and thermal
heat stress on dry and lactating cows

2005 University of Arizona/ Kansas State University/ Monsanto Trial

Results:

- Shaded cows produced more milk and remained cooler than non-shaded cows.

2005 University of Arizona/ Kansas State University/ Monsanto Trial

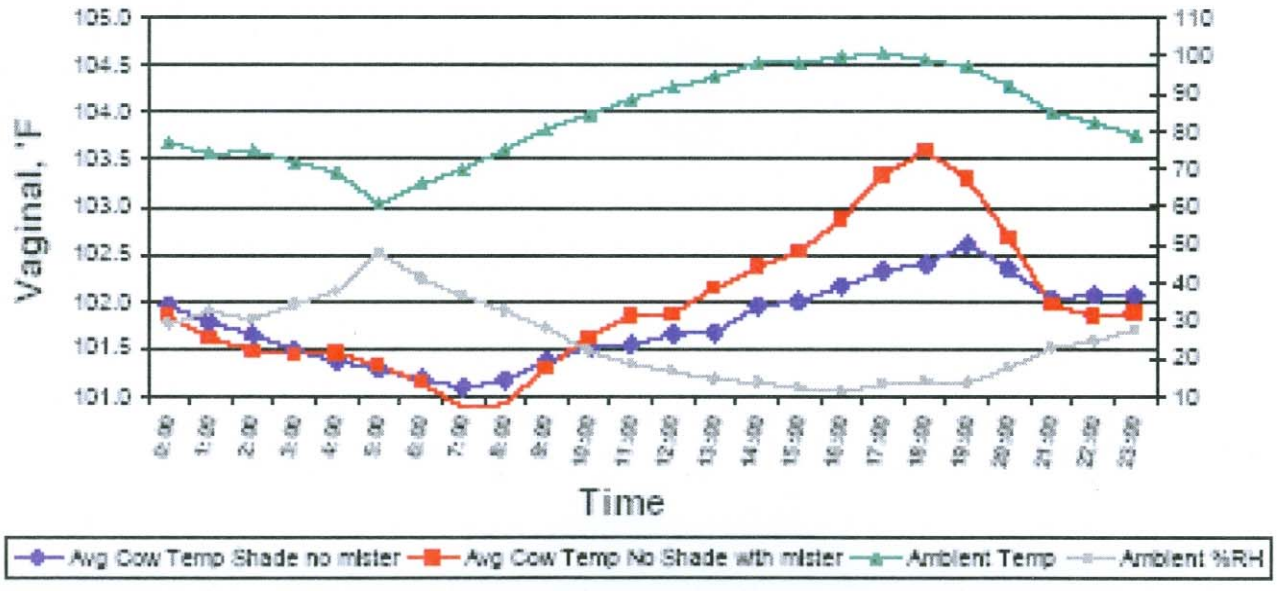
Results:

- Shade alone maintained lower body temperatures than misters alone.

05 University of Arizona/ Kansas State University/ Monsanto Trial

Washington

Compare Dry Cow Open Lot
8/4/05-8/7/05
No Misters with Shades
With Misters, No Shades



2005 University of Arizona/ Kansas State University/ Monsanto Trial

Results:

- Soakers on the exit lane from the parlor extends cooling benefit of parlor cooling.

2005 University of Arizona/ Kansas State University/ Monsanto Trial

Results:

- There is a benefit of holding pen cooling if the system is properly installed, maintained and operated

Nutritional Management of Heat Stress

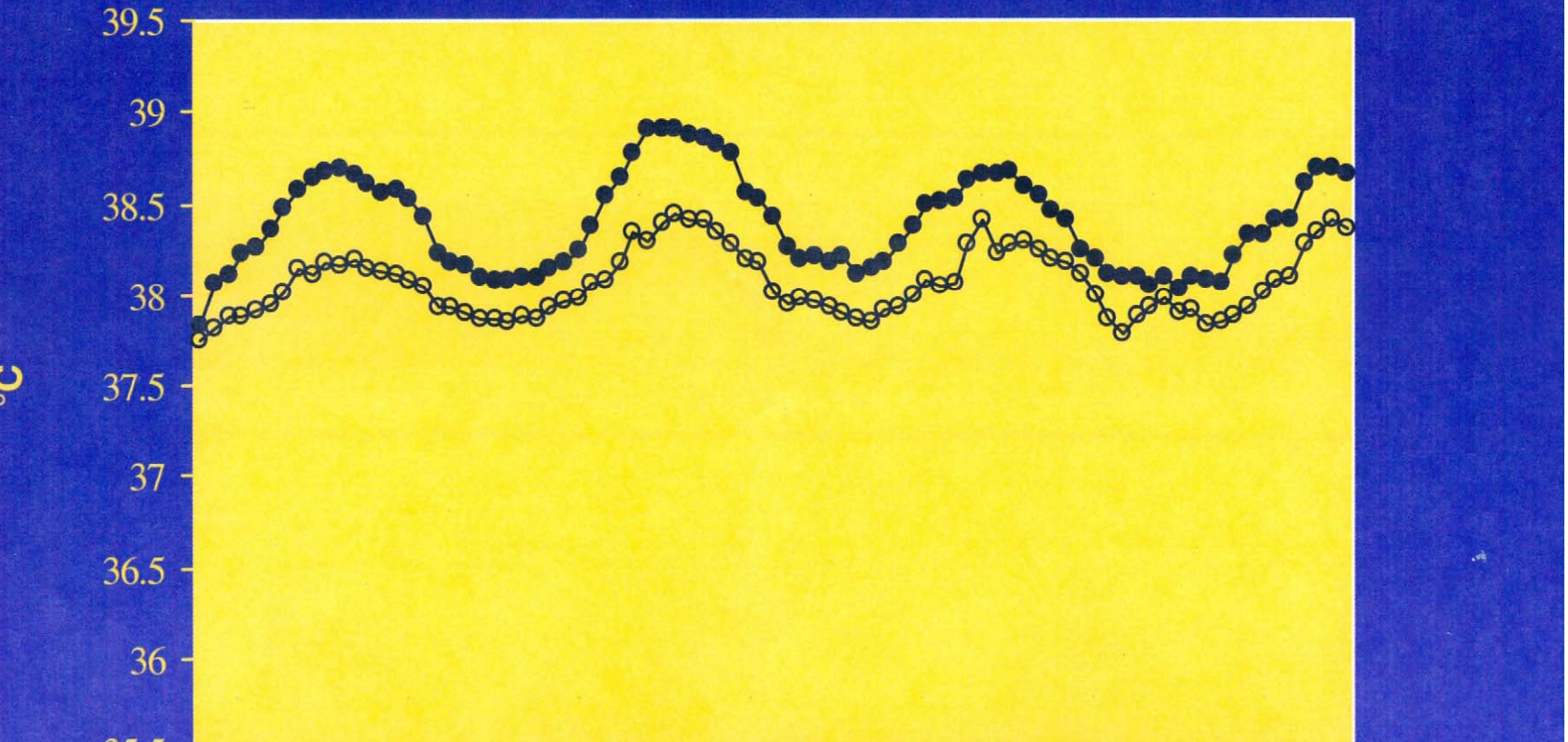
- ncrease slightly NDF & ADF to minimize risk of ruminal acidosis
- Addition of fat in high fiber diets
- Clean water below 85°F
- Feed in the early morning or late evening hours because peak heat production in cows occurs 3-4 hours

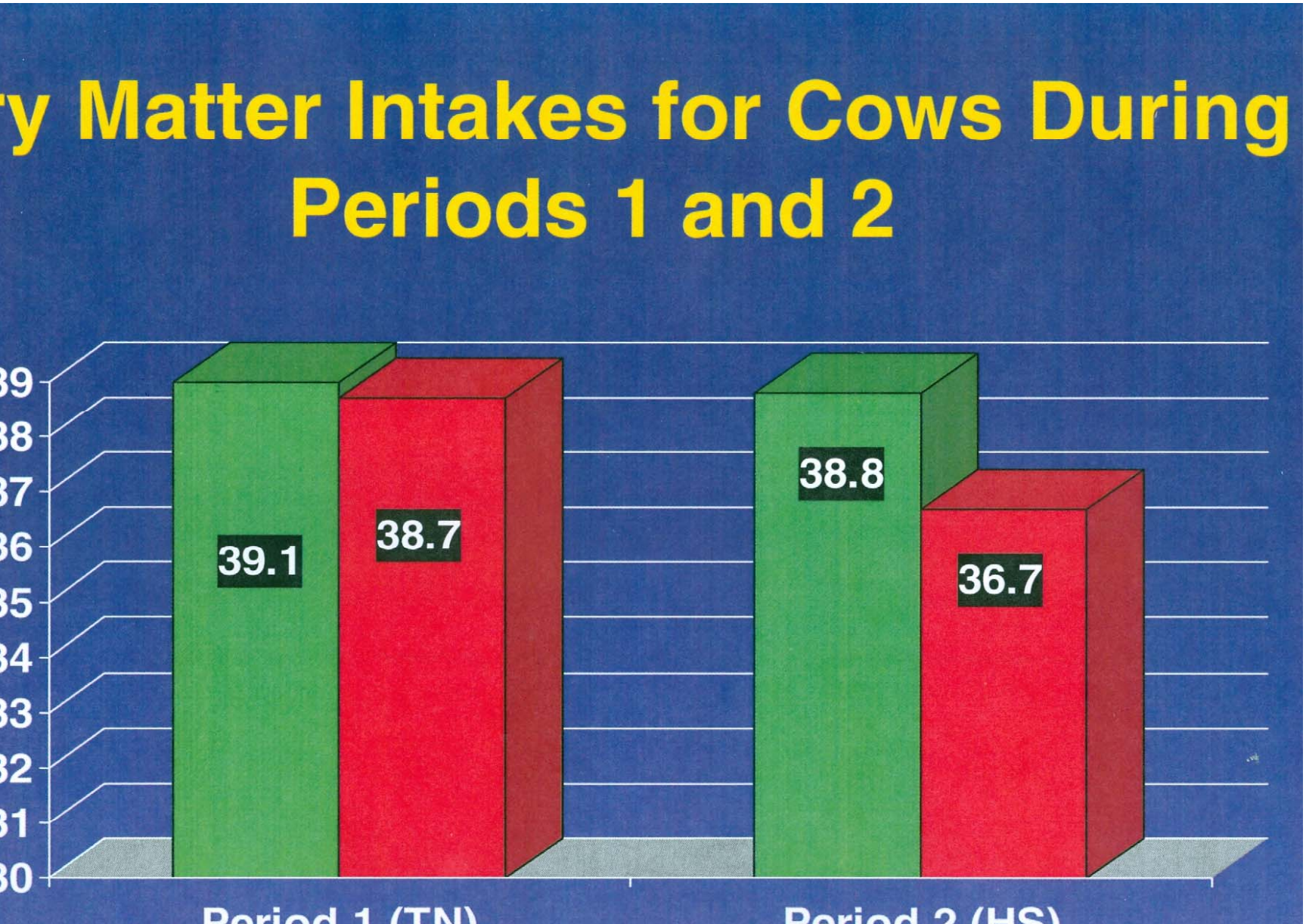
Treatments

velve multiparous Holstein cows
oducing an average of 31 kg/d and
lanced for parity and stage of lactation
ere randomly assigned to either 0 g
capsulated niacin/d (C) or 12 g niacin/d
IASHURE™®) (Trt) and were exposed to
o environmental temperature patterns.

Trt 1-THI never exceeded 72

ect of Niacin (NIASHURE) on Vaginal mperature in Lactating Dairy Cattle Subjected to Acute Heat Stress




y Matter Intakes for Cows During
Periods 1 and 2
39
38
37
36
35
34
33
32
31
30
39.1
38.7
38.8
36.7

Average Daily Milk Yield for Cows During Period 1 and 2