

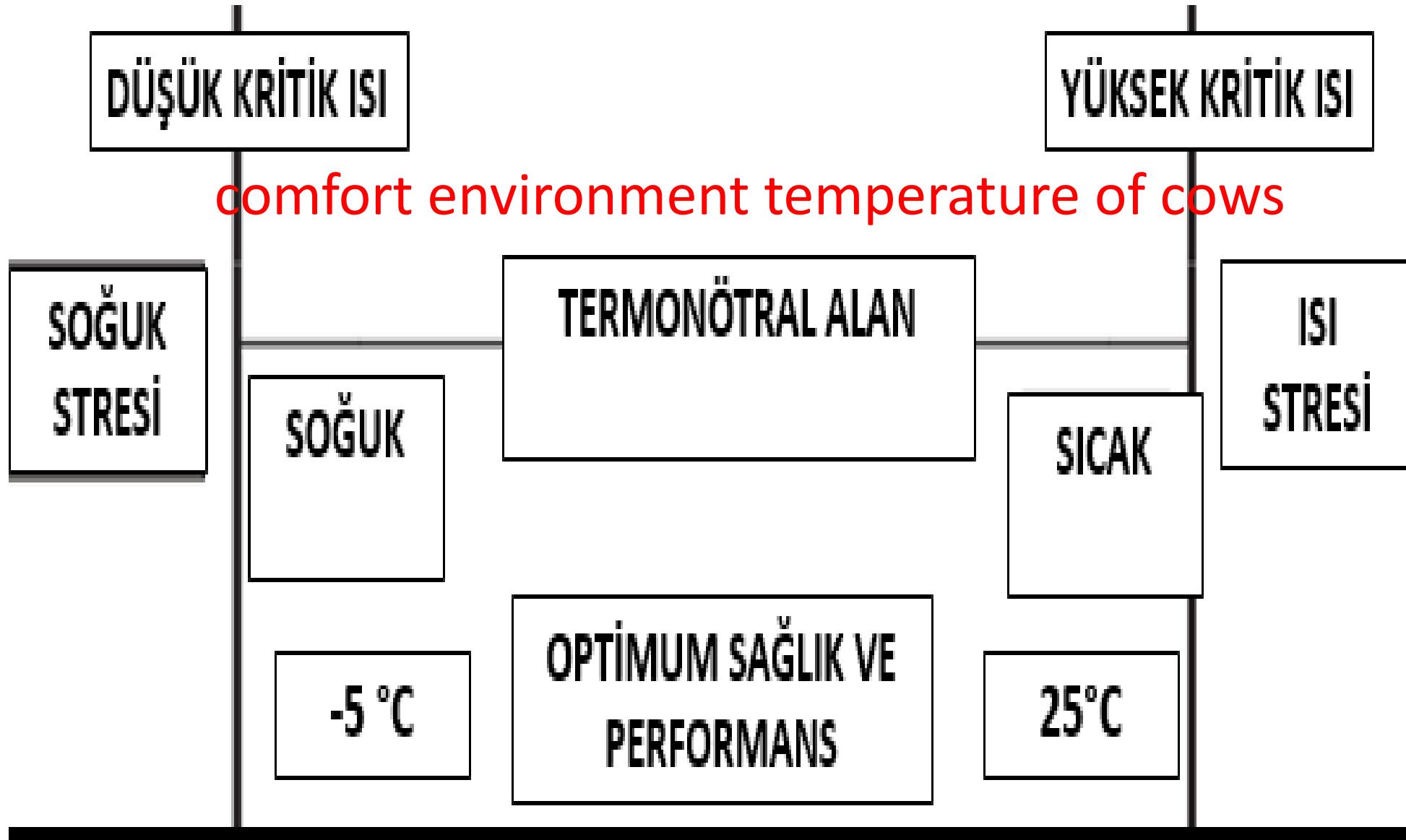


# REPRODUCTIVE HERD HEALTH

Doç. Dr. Halit Kanca

# **TEMPERATURE STRESS AND ITS EFFECTS IN MILK COWS**

# Temperature Stress



(Avendano-Reyes, 2012)

# Temperature Stress

cows are cold  
more durable

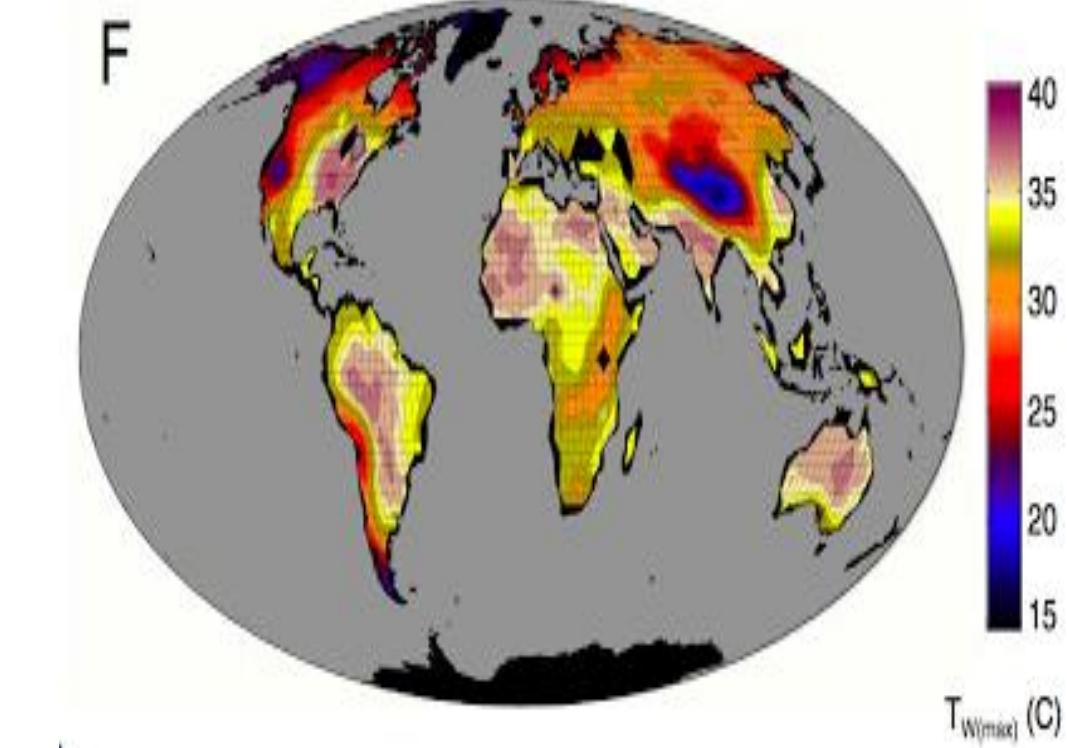


# Temperature Stress

SNI > 64



Metabolic transactions + environment



Respiratory  
Body surface      Israel  
SNI: 80 ?

(Rick, 2010; Avendano-Reyes, 2012)

# Temperature Stress

| Isı °C | % Bağıl Nem |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |    |
|--------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|----|
|        | 0           | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75  | 80  | 85  | 90 |
| 22.0   | 64          | 65 | 65 | 66 | 66 | 67 | 67 | 67 | 68 | 68 | 69 | 69 | 69 | 69 | 70 | 70  | 70  | 71  | 71 |
| 23.0   | 65          | 65 | 66 | 67 | 67 | 67 | 68 | 68 | 68 | 69 | 69 | 69 | 70 | 70 | 71 | 71  | 72  | 72  |    |
| 23.5   | 65          | 66 | 67 | 67 | 67 | 68 | 68 | 69 | 69 | 69 | 70 | 70 | 70 | 71 | 71 | 72  | 72  | 73  |    |
| 24.0   | 66          | 66 | 67 | 67 | 68 | 68 | 69 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73  | 73  | 74  |    |
| 24.5   | 66          | 66 | 67 | 68 | 68 | 68 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74  | 74  | 75  |    |
| 25.0   | 67          | 67 | 68 | 68 | 69 | 69 | 70 | 71 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74  | 75  | 75  |    |
| 25.5   | 67          | 68 | 68 | 69 | 69 | 69 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 74 | 75 | 75  | 76  | 76  |    |
| 26.0   | 67          | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 74 | 75 | 76 | 76  | 77  | 78  |    |
| 26.5   | 68          | 69 | 69 | 70 | 70 | 70 | 71 | 72 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 78  | 78  | 79  |    |
| 27.0   | 68          | 69 | 70 | 70 | 71 | 72 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 77 | 78  | 78  | 80  |    |
| 28.0   | 69          | 69 | 70 | 71 | 71 | 72 | 72 | 73 | 74 | 75 | 75 | 76 | 77 | 77 | 78 | 79  | 79  | 81  |    |
| 28.5   | 69          | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80  | 80  | 82  |    |
| 29.0   | 70          | 70 | 71 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 80  | 81  | 83  |    |
| 29.5   | 70          | 71 | 72 | 72 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 81 | 81  | 82  | 84  |    |
| 30.0   | 71          | 71 | 72 | 73 | 74 | 74 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 81 | 81 | 82  | 83  | 84  |    |
| 30.5   | 71          | 72 | 73 | 73 | 74 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 81 | 81 | 82 | 83  | 84  | 85  |    |
| 31.0   | 72          | 72 | 73 | 74 | 75 | 76 | 76 | 77 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84  | 85  | 86  |    |
| 31.5   | 72          | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 79 | 80 | 80 | 81 | 82 | 83 | 84 | 85  | 86  | 87  |    |
| 32.0   | 72          | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86  | 86  | 88  |    |
| 33.0   | 73          | 74 | 75 | 76 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 86  | 87  | 89  |    |
| 33.5   | 73          | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 85 | 86 | 87  | 88  | 89  |    |
| 34.0   | 74          | 75 | 76 | 77 | 78 | 79 | 80 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88  | 89  | 91  |    |
| 34.5   | 74          | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89  | 90  | 92  |    |
| 35.0   | 75          | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90  | 91  | 93  |    |
| 35.5   | 75          | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 85 | 86 | 87 | 88 | 89 | 90 | 91  | 93  | 94  |    |
| 36.0   | 76          | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 91 | 92  | 94  | 95  |    |
| 36.5   | 76          | 77 | 78 | 80 | 80 | 82 | 83 | 83 | 85 | 86 | 87 | 88 | 89 | 91 | 92 | 93  | 94  | 95  |    |
| 37.0   | 76          | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 87 | 88 | 89 | 90 | 91 | 92 | 93  | 94  | 96  |    |
| 38.0   | 77          | 78 | 79 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 90 | 91 | 92 | 93 | 94  | 95  | 98  |    |
| 38.5   | 77          | 79 | 80 | 81 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 90 | 92 | 93 | 94 | 95  | 96  | 99  |    |
| 39.0   | 78          | 79 | 80 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 94 | 95 | 96  | 97  | 100 |    |
| 39.5   | 78          | 79 | 81 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 94 | 96 | 97  | 98  | 101 |    |
| 40.0   | 79          | 80 | 81 | 83 | 84 | 85 | 86 | 88 | 89 | 90 | 91 | 93 | 94 | 95 | 96 | 96  | 99  | 100 |    |
| 40.5   | 80          | 80 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 95 | 96 | 97 | 99  | 102 | 103 |    |
| 41.0   | 80          | 81 | 82 | 84 | 85 | 87 | 88 | 89 | 90 | 91 | 93 | 94 | 95 | 97 | 98 | 99  | 100 | 103 |    |
| 41.5   | 80          | 81 | 83 | 84 | 85 | 87 | 88 | 89 | 91 | 92 | 94 | 95 | 96 | 98 | 99 | 100 | 102 | 103 |    |

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# Heat Stress

- Effect of heat stress

- Reproduction
- Immune system
- Metabolism
- Milk production

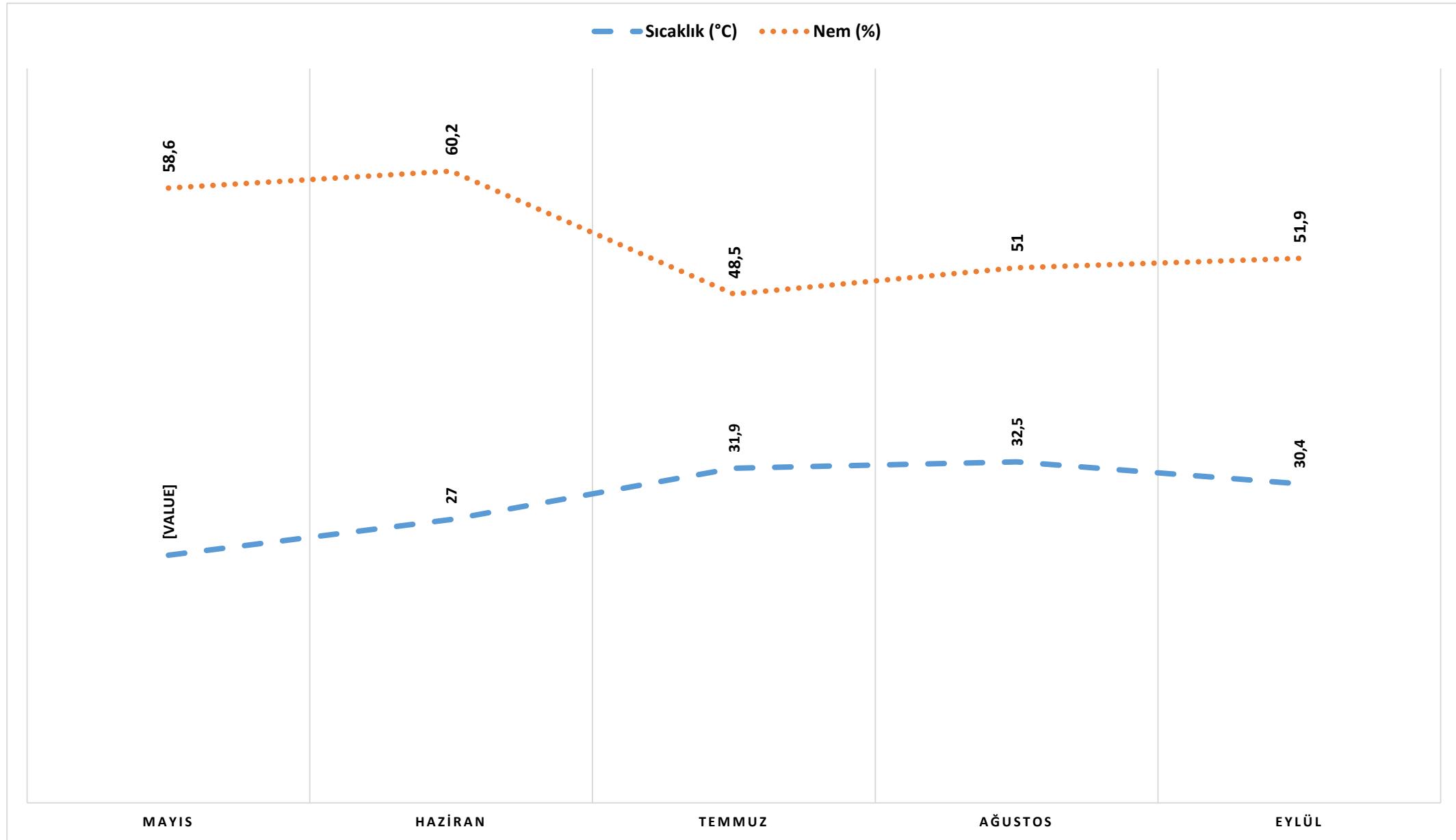


USA

\$ 1.5 billion annual loss

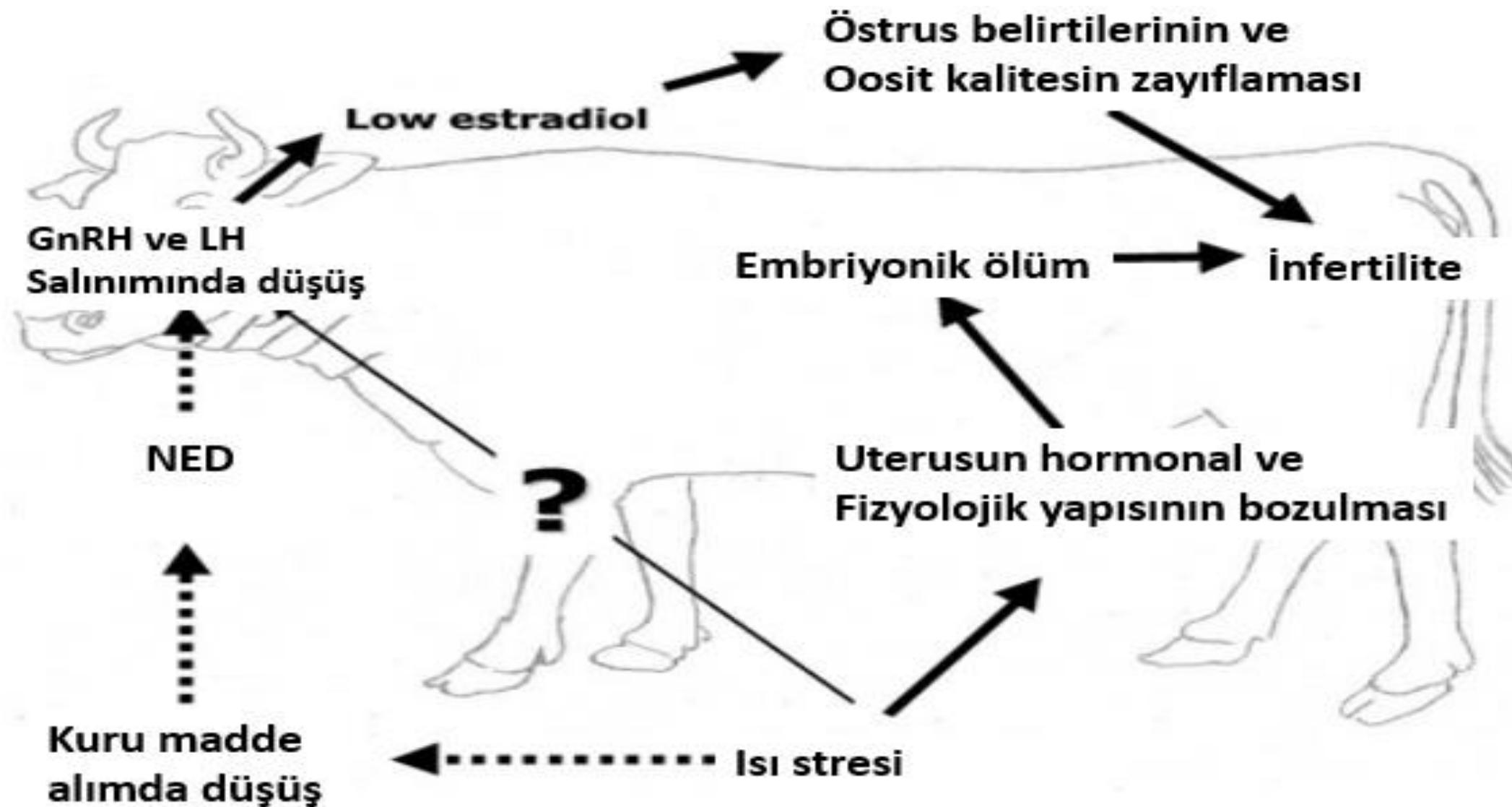
(Avendano-Reyes, 2012; Azizi, 2015)

# Heat Stress



(Anonim, 2017)

# Heat Stress



(De Rensis ve Scaramuzzi, 2003)

# Effect of heat stress on fertility

1- 1,5 °C ↑

Deterioration of membrane lipid composition of oocyte

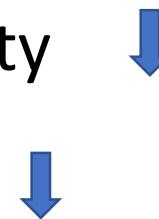
Cell apoptosis and oocyte development disorder

Early embryonic death (3 - 7 days)

Interferon tau

Effect on release of PGF2α

CL continuity



Heat Stress



GH and NEFA↑



Insulin, IGF-1↓



GnRH, Estradiol, LH↓



Conception rate



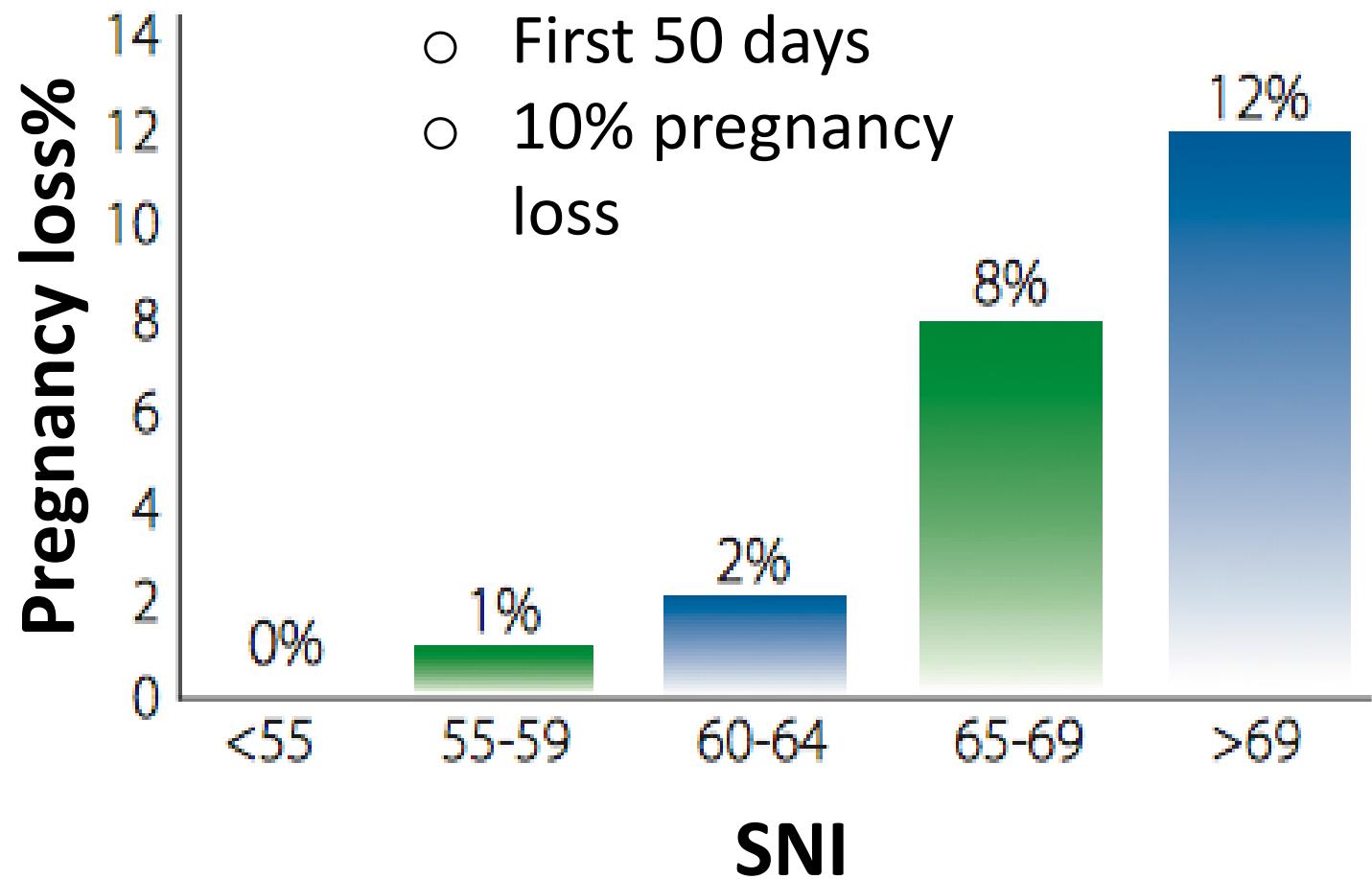
Embryonic Death↑

(De Rensis ve Scaramuzzi, 2003; Arav ve Zvi, 2008 )

# Effect of heat stress on fertility

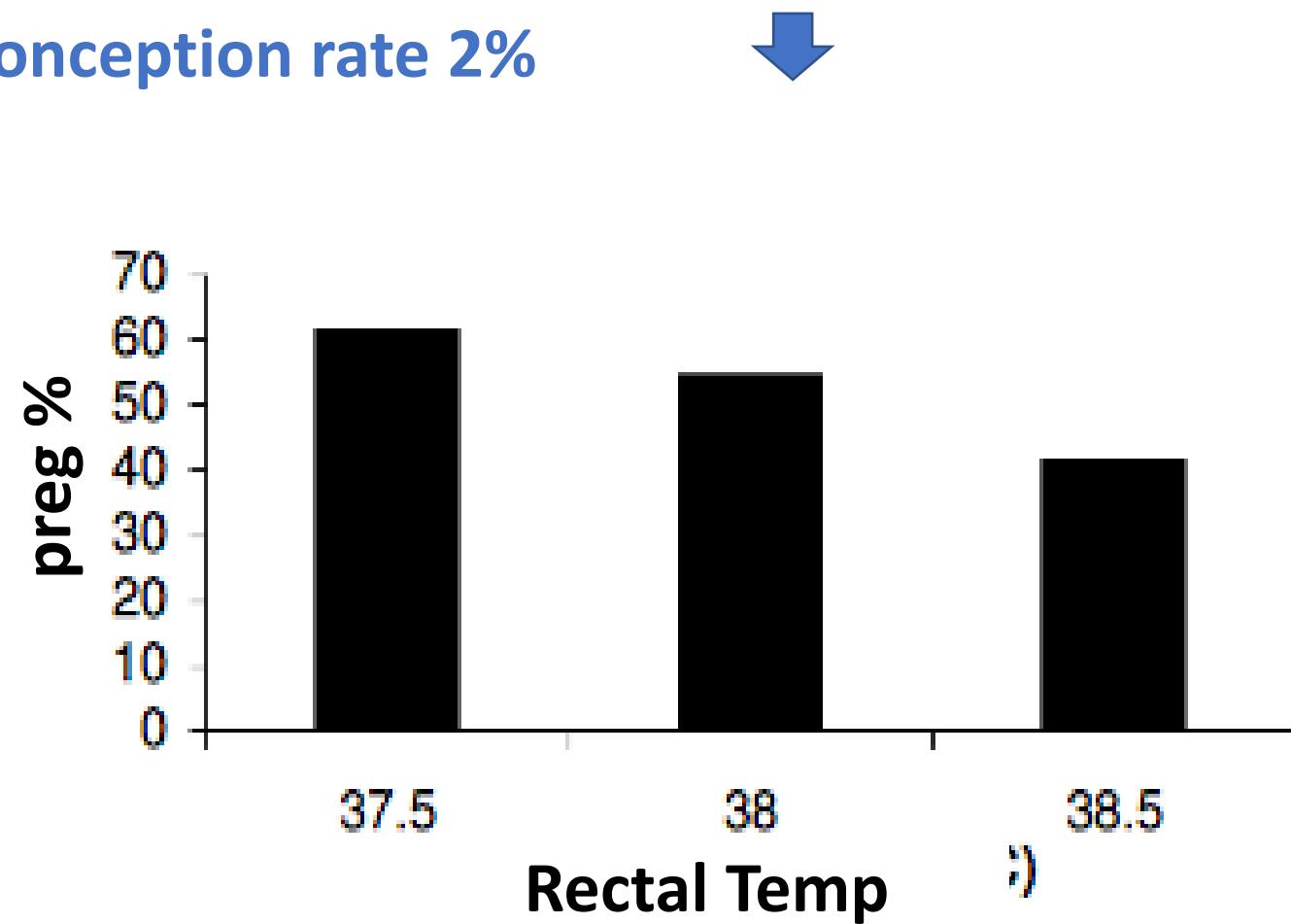
## Pre-estrous (10 days) heat stress

- Ovulation and Oocyte
- delay in maturation
- D.F development problem
- Reduction in blastocyte development ability after fertilization
- Implantation problem



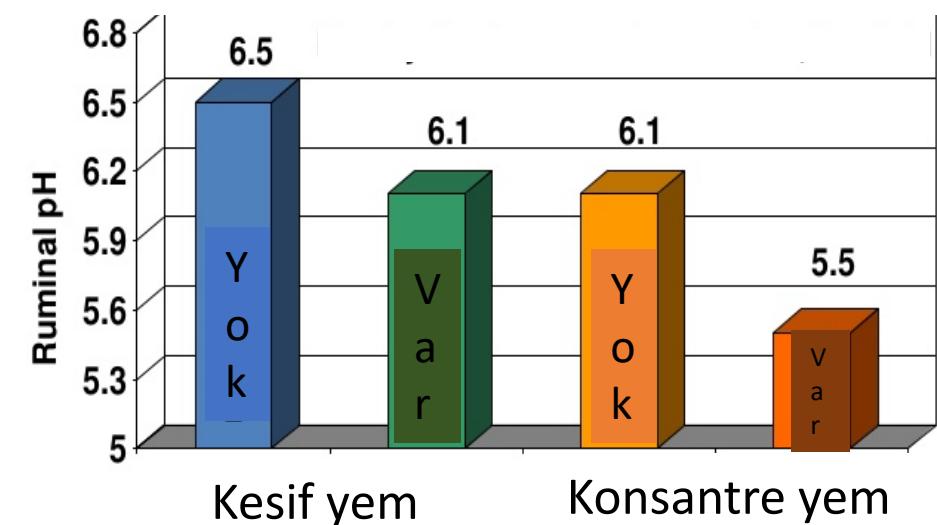
# Effect of temperature stress on fertility

THI 1 unit increase,  
conception rate 2%



Rumen pH 5,5 ↓

Effect of heat stress on rumen  
pH



(Lucy, 2003; Santos 2012)