# Technical Update – Heat Stress

*Information correct as at 09.00am 18.05.20*

> - Be ready for heat stress as we approach the summer months
> - Take actions to improve air flow using natural and forced ventilation as required
> - Changes to diet can reduce the impact of heat stress

Temperatures are forecast to rise over the next few days and by mid-week we could see the highest levels of the year so far. Cows have a thermal neutral zone between 5 and 20 degrees Celsius and can rapidly start to suffer from heat stress if some preventative methods are not put in place. Heat stress induces behavioural and metabolic changes in cattle that are intended to maintain body temperature and we usually see a decrease in productivity. Historically it was thought that this drop in milk was solely due to a low DMI, however, we now know that DMI is only part of the story and that heat stress actually influences protein synthesis and amino acids in the blood.

## Mild Signs of Heat Stress

- Reduction in milk yields of 1-2%
- Grouping in the shed or field
- Cows standing in cubicles more than usual
- Increase in water intakes
- Loose faeces, usually with undigested feedstuffs

## Moderate Signs of Heat Stress

- Reduction in milk yield and milk proteins of between 2-10%
- Reduced dry matter intakes (by 10% or more)
- Panting and gasping
- In the short-term an increase in RFM and metritis will be seen and longer-term it is common to see an increase lameness over the following 3 months.

## The Real Impact of Heat Stress

1. Milk yield and milk protein will reduce by between 0 - 17% and 0 -4% respectively.  Milk lactose and milk fat will unlikely be affected in % terms, but will show lower total yields as milk yield is reduced.
2. Heat stress can limit the conception rates for animals cycling 10 days after high temperatures have been recorded.
3. Data indicates that high-yielding dairy cows start to reduce milk yields at Temperature humidity index (THI) of 68.
4. Dry cows are also very susceptible to heat stress and research has shown that calves born to dams under stress do not perform as well as those not affected.

## "Prevention is better than cure"

1. Make the most of natural ventilation where possible. Measure air movement and identify ways to improve the air flow.  Opening roof ridges and removing alternate Yorkshire boarding is cheap and simple. Installing fans or ventilation tubes for youngstock is the next step
2. On new buildings target a steeper roof pitch (22 degrees) to aid the chimney effect and avoid roof lights on South facing sides.
3. Wider barns will be more difficult to regulate air flow. 3-row+ barns will often require fans to be installed as natural air flow will be harder to achieve.
4. Cows are most likely to benefit from sprinkler systems in the collecting yard (as this is a high-risk area with cows congregating) and over the feed fence. Sprinkler systems do not lower

the temperature in the housing but assist the cows to increase heat loss through cooling the skin by water evaporation. The systems need to provide large droplets of water and sufficiently soak the cows otherwise they can increase the humidity and make the problem worse.

5. Fan need to be installed at regular intervals to increase air speed at cow level. They are best installed above collecting yards, cubicles and in parlours.
6. Diet alterations to consider: Always ensure good supplies of fresh water .Use dietary fats to increase energy density of rations and offset lower DMIs. Use Actisaf yeast and Acid Buf to help rumen stability. If rations are heating add a preservative and mycotoxin binders will also help if you are concerned about yeasts and mould developing.

| Themperature | | % Relative Humidity | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| °F | °C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
| 72 | 22.0 | 64 | 65 | 65 | 65 | 66 | 66 | 67 | 67 | 67 | 68 | 68 | 69 | 69 | 69 | 70 | 70 | 70 | 71 | 71 | 72 | 72 |
| 73 | 23.0 | 65 | 65 | 66 | 66 | 66 | 67 | 67 | 68 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 71 | 72 | 72 | 73 | 73 |
| 74 | 23.5 | 65 | 66 | 66 | 67 | 67 | 67 | 68 | 68 | 69 | 69 | 70 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74 |
| 75 | 24.0 | 66 | 66 | 67 | 67 | 68 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74 | 75 | 75 |
| 76 | 24.5 | 66 | 67 | 67 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74 | 75 | 75 | 76 | 76 |
| 77 | 25.0 | 67 | 67 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74 | 75 | 75 | 76 | 76 | 77 |
| 78 | 25.5 | 67 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 74 | 75 | 75 | 76 | 76 | 77 | 77 | 78 |
| 79 | 26.0 | 67 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 74 | 75 | 76 | 76 | 77 | 77 | 78 | 78 | 79 |
| 80 | 26.5 | 68 | 69 | 69 | 70 | 70 | 71 | 72 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 76 | 77 | 78 | 78 | 79 | 79 | 80 |
| 81 | 27.0 | 68 | 69 | 70 | 70 | 71 | 72 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 77 | 78 | 78 | 79 | 80 | 80 | 81 |
| 82 | 28.0 | 69 | 69 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 77 | 78 | 79 | 79 | 80 | 81 | 81 | 82 |
| 83 | 28.5 | 69 | 70 | 71 | 71 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 80 | 81 | 82 | 82 | 83 |
| 84 | 29.0 | 70 | 70 | 71 | 72 | 73 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 80 | 81 | 82 | 83 | 83 | 84 |
| 85 | 29.5 | 70 | 71 | 72 | 72 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84 | 84 | 85 |
| 86 | 30.0 | 71 | 71 | 72 | 73 | 74 | 74 | 75 | 76 | 76 | 77 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84 | 84 | 85 | 86 |
| 87 | 30.5 | 71 | 72 | 73 | 73 | 74 | 75 | 76 | 77 | 77 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84 | 85 | 85 | 86 | 87 |
| 88 | 31.0 | 72 | 72 | 73 | 74 | 75 | 76 | 76 | 77 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84 | 85 | 8 | 86 | 87 | 88 |
| 89 | 31.5 | 72 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 79 | 80 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 86 | 87 | 88 | 89 |
| 90 | 32.0 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 86 | 87 | 88 | 89 | 90 |
| 91 | 33.0 | 73 | 74 | 75 | 76 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 86 | 87 | 88 | 89 | 90 | 91 |
| 92 | 33.5 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 |
| 93 | 34.0 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 80 | 81 | 82 | 83 | 85 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 |
| 94 | 34.5 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 86 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 |
| 95 | 35.0 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 |
| 96 | 35.5 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 |
| 97 | 36.0 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
| 98 | 36.5 | 76 | 77 | 78 | 80 | 80 | 82 | 83 | 83 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 98 |
| 99 | 37.0 | 76 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 98 | 99 |
| 100 | 38.0 | 77 | 78 | 79 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 98 | 99 | 100 |
| 101 | 38.5 | 77 | 79 | 80 | 81 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 90 | 92 | 93 | 94 | 95 | 96 | 98 | 99 | 100 | 101 |
| 102 | 39.0 | 78 | 79 | 80 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 94 | 95 | 96 | 97 | 98 | 100 | 101 | 102 |
| 103 | 39.5 | 78 | 79 | 81 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 94 | 96 | 97 | 98 | 99 | 101 | 102 | 103 |
| 104 | 40.0 | 79 | 80 | 81 | 83 | 84 | 85 | 86 | 88 | 89 | 90 | 91 | 93 | 94 | 95 | 96 | 98 | 99 | 100 | 101 | 103 | 104 |
| 105 | 40.5 | 79 | 80 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 95 | 96 | 97 | 99 | 100 | 101 | 102 | 103 | 105 |
| 106 | 41.0 | 80 | 81 | 82 | 84 | 85 | 87 | 88 | 89 | 90 | 91 | 93 | 94 | 95 | 97 | 98 | 99 | 101 | 102 | 103 | 104 | 106 |
| 107 | 41.5 | 80 | 81 | 83 | 84 | 85 | 87 | 88 | 89 | 91 | 92 | 94 | 95 | 96 | 98 | 99 | 100 | 102 | 103 | 104 | 106 | 107 |
| 108 | 42.0 | 81 | 82 | 83 | 85 | 86 | 88 | 89 | 90 | 92 | 93 | 94 | 96 | 97 | 98 | 100 | 101 | 103 | 104 | 105 | 107 | 108 |
| 109 | 43.0 | 81 | 82 | 84 | 85 | 87 | 89 | 89 | 91 | 92 | 94 | 95 | 96 | 98 | 99 | 101 | 102 | 103 | 105 | 106 | 108 | 109 |
| 110 | 43.5 | 81 | 83 | 84 | 86 | 87 | 89 | 90 | 91 | 93 | 94 | 96 | 97 | 99 | 100 | 101 | 103 | 104 | 106 | 107 | 109 | 110 |
| 111 | 44.0 | 82 | 83 | 85 | 86 | 88 | 90 | 91 | 92 | 94 | 95 | 96 | 98 | 99 | 101 | 102 | 104 | 105 | 107 | 108 | 110 | 111 |
| 112 | 44.5 | 82 | 84 | 85 | 87 | 88 | 90 | 91 | 93 | 94 | 96 | 97 | 99 | 100 | 102 | 103 | 105 | 106 | 108 | 109 | 111 | 112 |
| 113 | 45.0 | 83 | 84 | 86 | 87 | 89 | 91 | 92 | 93 | 95 | 96 | 98 | 99 | 101 | 102 | 104 | 105 | 107 | 108 | 110 | 111 | 113 |
| 114 | 45.5 | 83 | 85 | 86 | 88 | 89 | 92 | 92 | 94 | 96 | 97 | 99 | 100 | 102 | 103 | 105 | 106 | 108 | 109 | 111 | 112 | 114 |
| 115 | 46.0 | 84 | 85 | 87 | 88 | 90 | 92 | 93 | 95 | 96 | 98 | 99 | 101 | 102 | 104 | 106 | 107 | 109 | 110 | 112 | 113 | 115 |
| 116 | 46.5 | 84 | 86 | 87 | 89 | 90 | 93 | 94 | 95 | 97 | 98 | 100 | 102 | 103 | 105 | 106 | 108 | 110 | 111 | 113 | 114 | 116 |
| 117 | 47.0 | 85 | 86 | 88 | 89 | 91 | 93 | 94 | 96 | 98 | 99 | 101 | 102 | 104 | 106 | 107 | 109 | 111 | 112 | 114 | 115 | 117 |
| 118 | 48.0 | 85 | 87 | 88 | 90 | 92 | 94 | 95 | 97 | 98 | 100 | 102 | 103 | 105 | 106 | 108 | 110 | 111 | 113 | 115 | 116 | 118 |
| 119 | 48.5 | 85 | 87 | 89 | 90 | 92 | 94 | 96 | 87 | 99 | 101 | 102 | 104 | 106 | 107 | 109 | 111 | 112 | 114 | 116 | 117 | 119 |
| 120 | 49.0 | 86 | 88 | 89 | 91 | 93 | 95 | 96 | 98 | 100 | 101 | 103 | 105 | 106 | 108 | 110 | 111 | 113 | 115 | 117 | 118 | 120 |

■ Stress Threshold
Respiration rate exceeds 60 BPM
Milk yield losses begin
Reproductive losses detectable
Rectal temperature exceeds 38.5°C (101.3°F)

■ Moderate-Severe Stress
Respiration rate exceeds 85 BPM
Rectal temperature exceeds 40°C (104°F)

■ Mild-Moderate Stress
Respiration rate exceeds 75 BPM
Rectal temperature exceeds 39°C (102.2°F)

■ Severe Stress
Respiration rate 120-140 BPM
Rectal temperature exceeds 41°C (106°F)

Source: Collier et al, 2012, Arkansas University