Managing heat stress in transition cows and calves


*Department of Animal and Dairy Science, University of Georgia; †Department of Animal Sciences, University of Florida

Heat stress reduces milk production

Heat-stressed lactating cows have blunted adipose tissue mobilization and increased whole body glucose utilization

Cooling during the ENTIRE dry on DMI
Heat stress doesn’t affect fat mobilization of dry cows

- Lamp et al., 2015

Heat stress doesn’t affect glucose tolerance of dry cows

-14 d relative to calving

Heat stress doesn’t affect blood metabolites and insulin of dry cows

Heat stress increases protein mobilization of dry cows

Adapted from Lamp et al., 2015
Cooling during the ENTIRE dry on milk yield (Multiparous cows)

- Wolfenson et al., 1988
- Avendaño-Reyes et al., 2006
- Adin et al., 2009
- do Amaral et al., 2009
- do Amaral et al., 2011
- Tao et al., 2011
- Thompson et al., 2012
- Tao et al., 2012b
- Thompson et al., 2014

Average Milk Production, kg/d
Diff: 4 kg/d (12.2%)

Cooling during the Close-up on milk yield (Multiparous cows)

- Urdaz et al., 2006
- Adapted from Wang et al., 2010
- Adapted from Gomes et al., 2014
- Karimi et al., 2015
- Average

Average Milk Production, kg/d
Diff: 2.2 kg/d (5.8%)

Cooling during the late gestation on milk yield (~ 1month, Heifers)

- Adapted from Wang et al., 2010
- Adapted from Gomes et al., 2014

Average Milk Production, kg/d
Diff: 2.4 kg/d (6.2%)

Cooling dry cows increases MY

- Tao et al., 2011

Weeks in milk
Tao et al., 2011
Cooling improves mammary growth in the late dry period

Heat stress decreases estrone sulfate

Heat stress may alter mammary involution in early dry period

Collier, et al., 1982; 2008; Tao et al., 2011; 2013
Hypothesis: Heat Stress Impairs Mammary InvoluHon

Heat stress blunts mammary autophagy during the early dry period

Heat stress impairs lymphocyte proliferation

Heat stress impairs IgG responses against ovalbumin challenge

do Amaral et al., 2011

Gomes et al., 2014

Wohlgemuth et al., 2015
Heat stress impairs neutrophil function

Prepartum cooling increases metritis

Prepartum cooling is the key
- Most effective approach
- Slight reduction in body temperature can have strong impact on subsequent lactation
Prepartum cooling slightly reduces cow body temperature

Reduction in body temperature when dry improves subsequent milk yield

Summary – Heat stress during the dry period on cow

- Impairs mammary growth during the dry period
- Decreases milk production in the next lactation
- Alters metabolic responses during transition
- Compromises immune function during transition
- Cooling dry cow is the key

Maternal heat stress on calf
Late gestation heat stress decreases birth weight

Adapted from Tao and Dahl, 2013

Late gestation heat stress affects calf body weight

Monteiro et al., 2013

Glucose clearance to glucose infusion

In utero heat-stressed calf had higher ability to absorb glucose

Monteiro et al., 2015

Insulin clearance to insulin infusion

In utero heat-stressed calf had insulin resistance – less insulin mediated glucose entry to tissue

Monteiro et al., 2015, JAM
Maternal heat stress decreases serum total IgG of calves

Maternal heat stress affects lymphocyte function of calves

Summary – Heat stress during the dry period on calf

- Impairs fetal growth and lowers birth weight
- Compromises immune function before weaning
- Decreases milk production in the first lactation