Adapting Chicken Production to Climate Change Through Breeding

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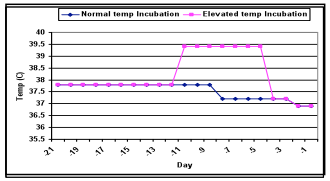
Experimental design

Day -21 — Embryonic thermal conditioning



0 — Hatch: about 2,000 in 2 generations

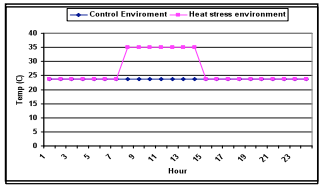
Raised in conventional floor pens

17 — Transfer to environmental chambers

20 — Body temp; iSTAT CG8+ blood parameters:
BE, Glu, HB, HCO3, Hct, iCa, K, Na, PCO2, pH, PO2, sO2, TCO2

21 — Body weight, body temp; iSTAT CG8+

Chick Daily Heat Cycles



22 — Tissue harvest
Collect iSTAT CG8+ data

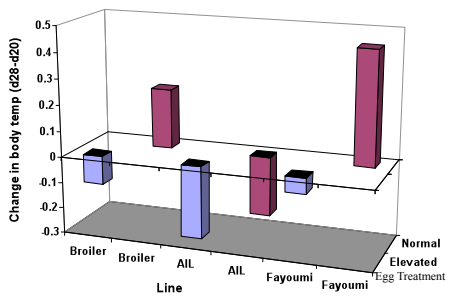
28 — Body weight, body temp
Harvest ileal content
iSTAT CG8+ data
Tissue weights/measurement, post-harvest
pectoral muscle, abdominal fat, shank length

42 — Tissue harvest

pectoralis	heart	duodenum
spleen	liver	ileum
brain	abdominal fat	jejunum

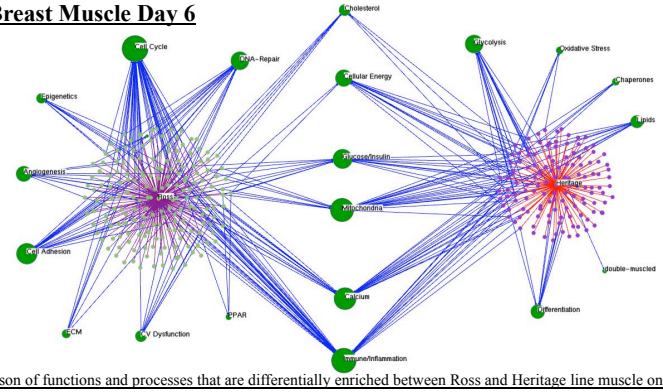
Ongoing &Future Work

- **Genomics** — QTL mapping in F18 AIL (EN, CH)
- **Epigenetics** — methylation
- **Transcriptomics** — RNAseq



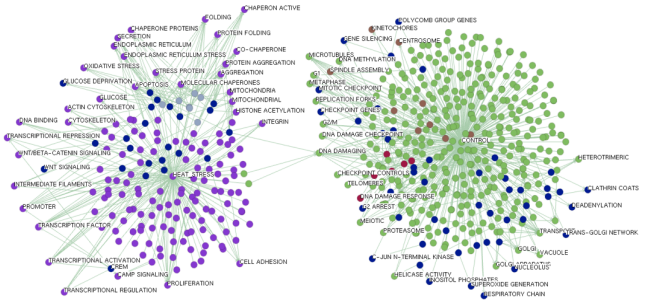
Interaction of egg treatment X line on change in body temperature (d28-d20). There is a significant interaction of genetic line with egg (embryo) thermal conditioning treatment on the differential in body temperature of birds before heat stress (day 20) and after chronic heat stress (day 28). Elevated temperature of egg incubation (blue bars) of both broilers and Fayoumis results in **significantly decreased body temperatures after thermal stress, compared to chicks hatched from eggs that were incubated at normal temperature** (purple bars), which show increases in chick body temperature after heat-stress. For the Advanced Intercross Line (AIL), chicks hatched from normal and thermally conditioned eggs show a decrease in body temperature from day 20 to day 28, regardless of whether they were subjected to chronic heat stress as chicks.

Breast Muscle Day 6



Comparison of functions and processes that are differentially enriched between Ross and Heritage line muscle on day 6 post-hatch. The genes are displayed as unlabelled nodes. Note enrichment for processes involved in cell division in the Ross line versus differentiation and basic metabolism functions in the Heritage line.

White Leghorn Liver Hepatocellular (LMH) Cells: Heat Stress



LMH response to heat stress. LMH cells were either heat stressed at 42ºC for 2.5 hours or maintained at 37ºC. Genes are displayed as unlabelled nodes. Genes that were differentially enriched were grouped by eGIFT into processes and functions and the displayed using BioLayout.