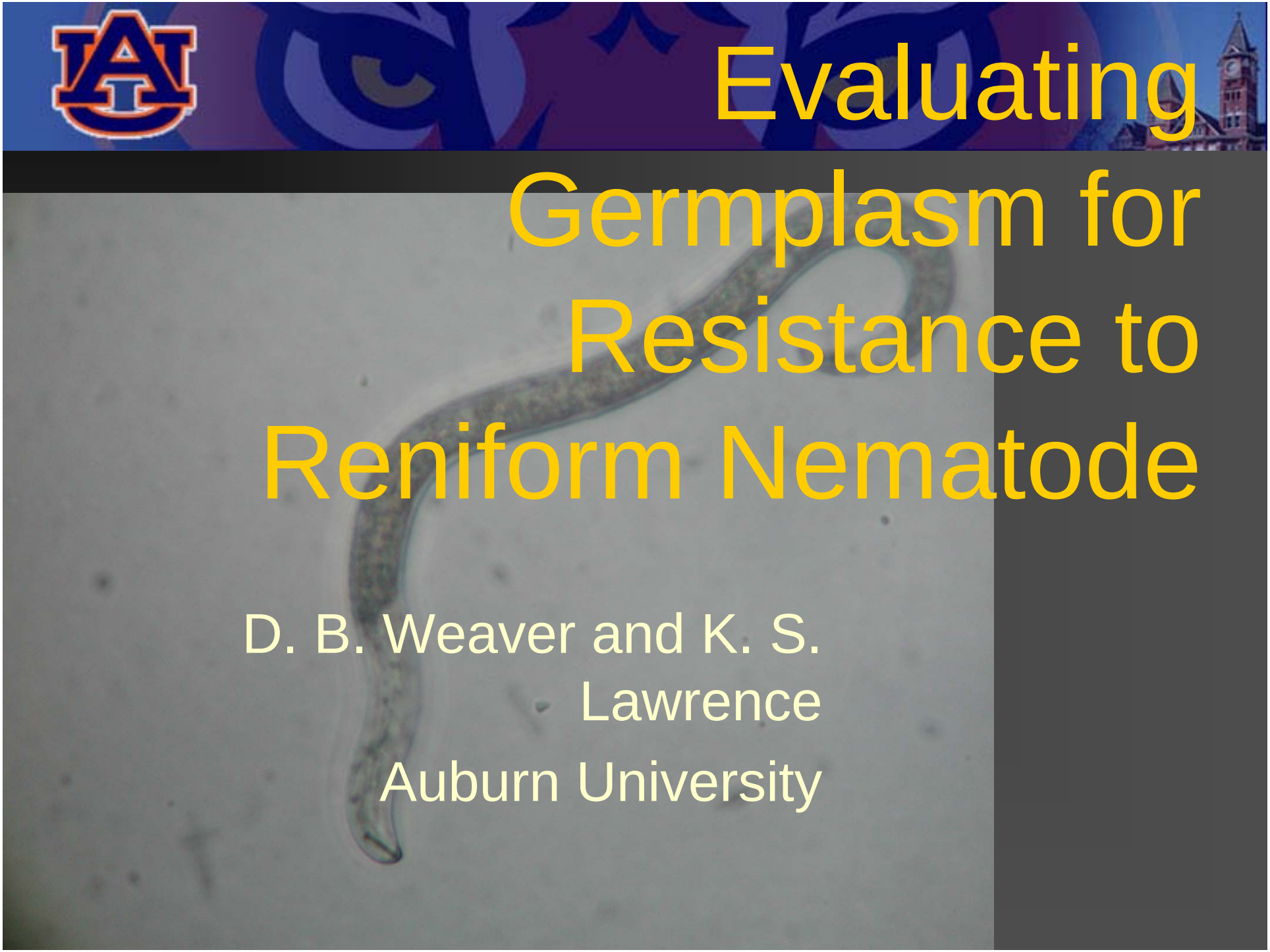

Evaluating Germplasm for Resistance to Reniform Nematode

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Major objectives

- Evaluate all available accessions of *G. hirsutum* (TX list) for reaction to reniform nematode.
- Determine heritability of resistance.
- Incorporate resistance into adapted germplasm.

Evaluation process

- Accessions are evaluated in the greenhouse in the initial stage.

Reniform resistance evaluation

- 4 reps (single plants) are evaluated per accession, inoculated with a “mix” of reniform populations.
- 50 accessions per screening.

Reniform resistance evaluation

- After 60 days, nematode populations are determined and a reproductive factor calculated.
- Multilevel approach is used.

Reniform evaluation

- Two factors related to resistance are initially examined:
- Vermiform numbers, a measure of the ability of the nematodes to survive, and
- Eggs, which measure reproduction.

Reniform evaluation

- Accessions in the lowest 10 percentile for each parameter will be advanced to the next level of evaluation.
- Final evaluation will take place in the field to confirm any greenhouse resistance.

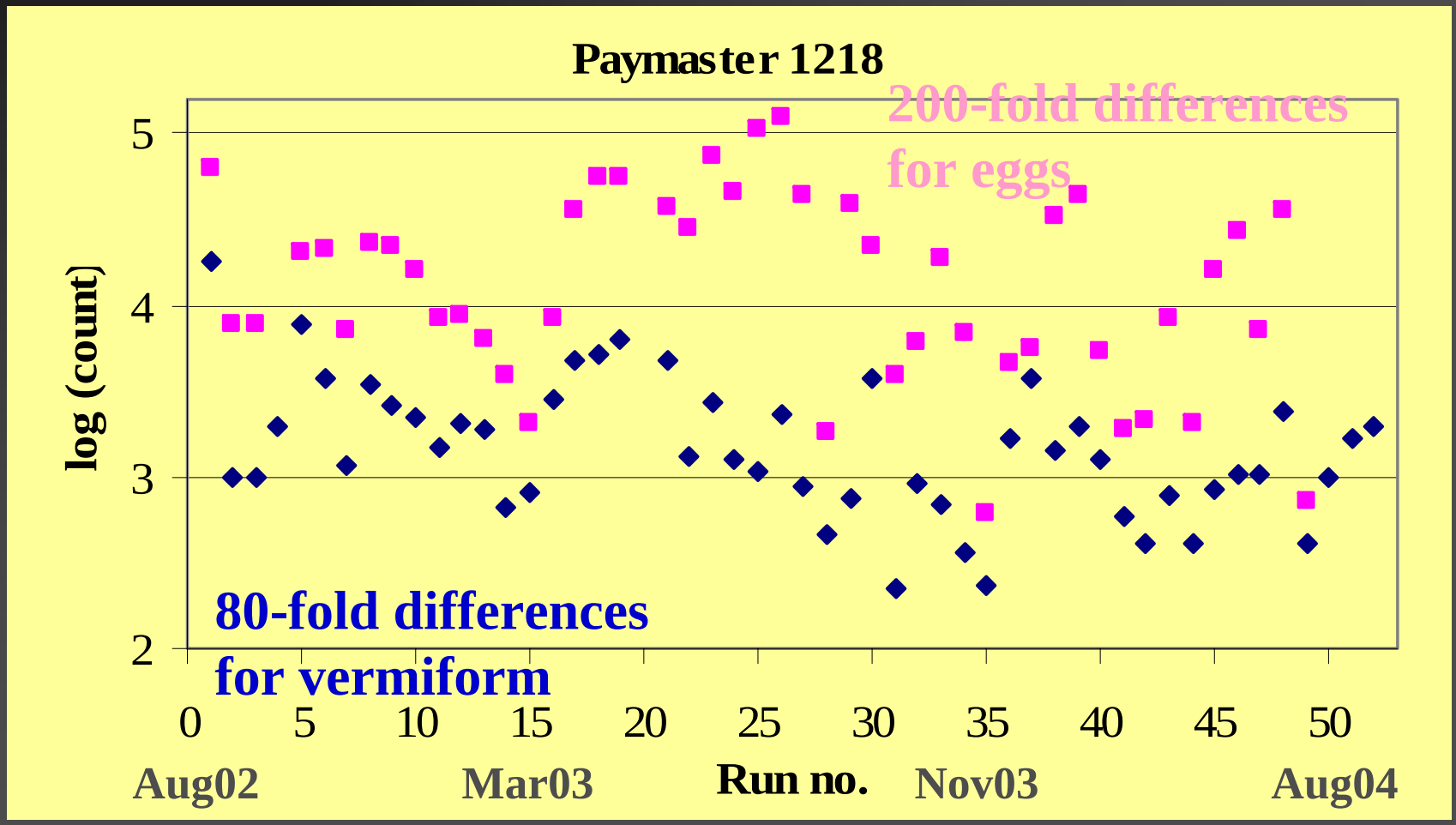
Progress so far (2003 meeting):

- Approx. 1000 accessions evaluated (about 25% of total collection)
- 865 accessions had complete data
- Problems with germination
- Paymaster 1218 in every set

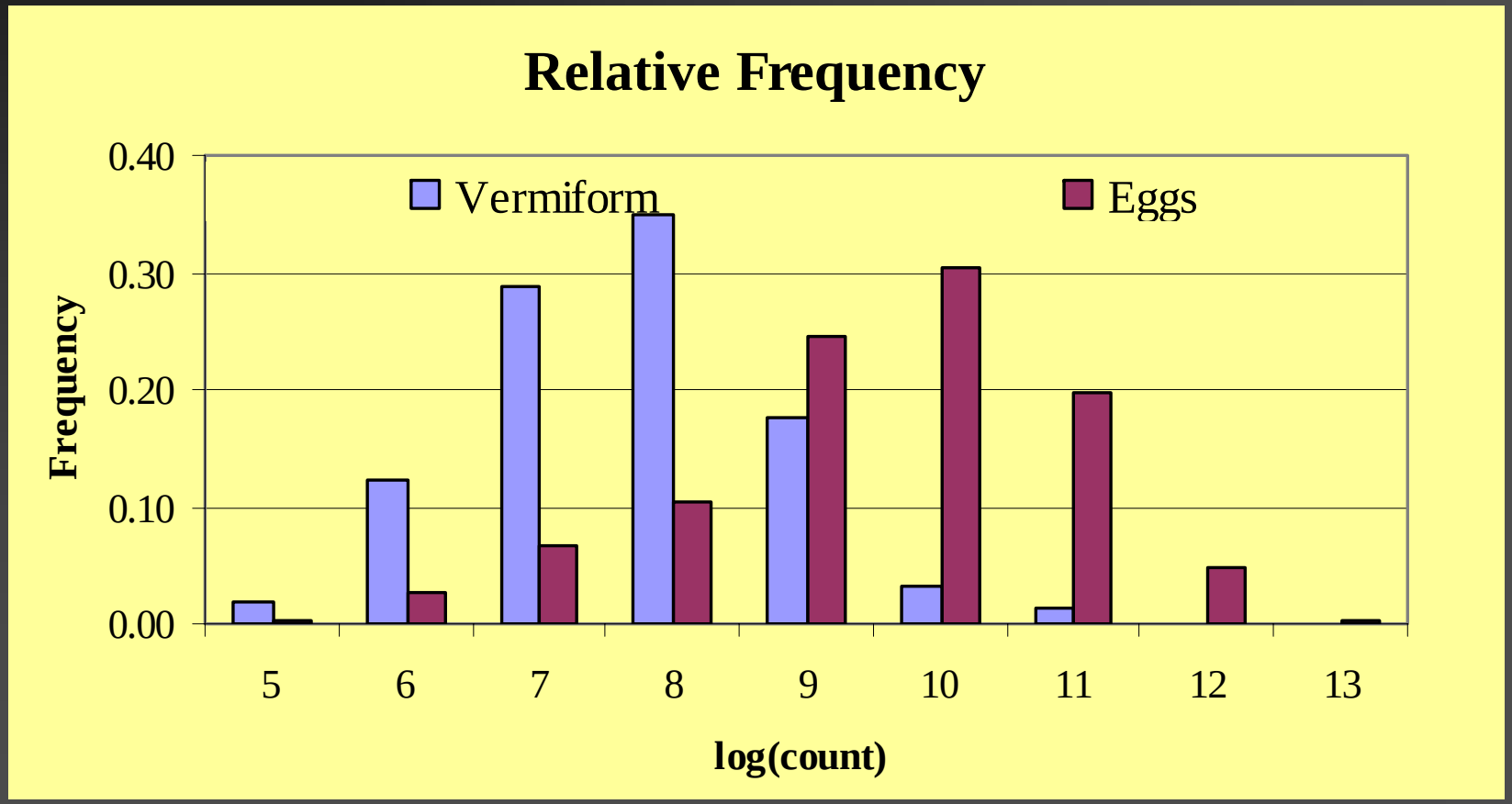
Progress so far (present):

- Complete data for 1603 accessions
  - Paymaster 1218 in every set
- Preliminary analysis
  - Data normalized through log transformation
  - Vermiform vs. eggs
    - **Paymaster 1218**
    - **Accessions**
    - **Accessions standardized based on PM 1218**

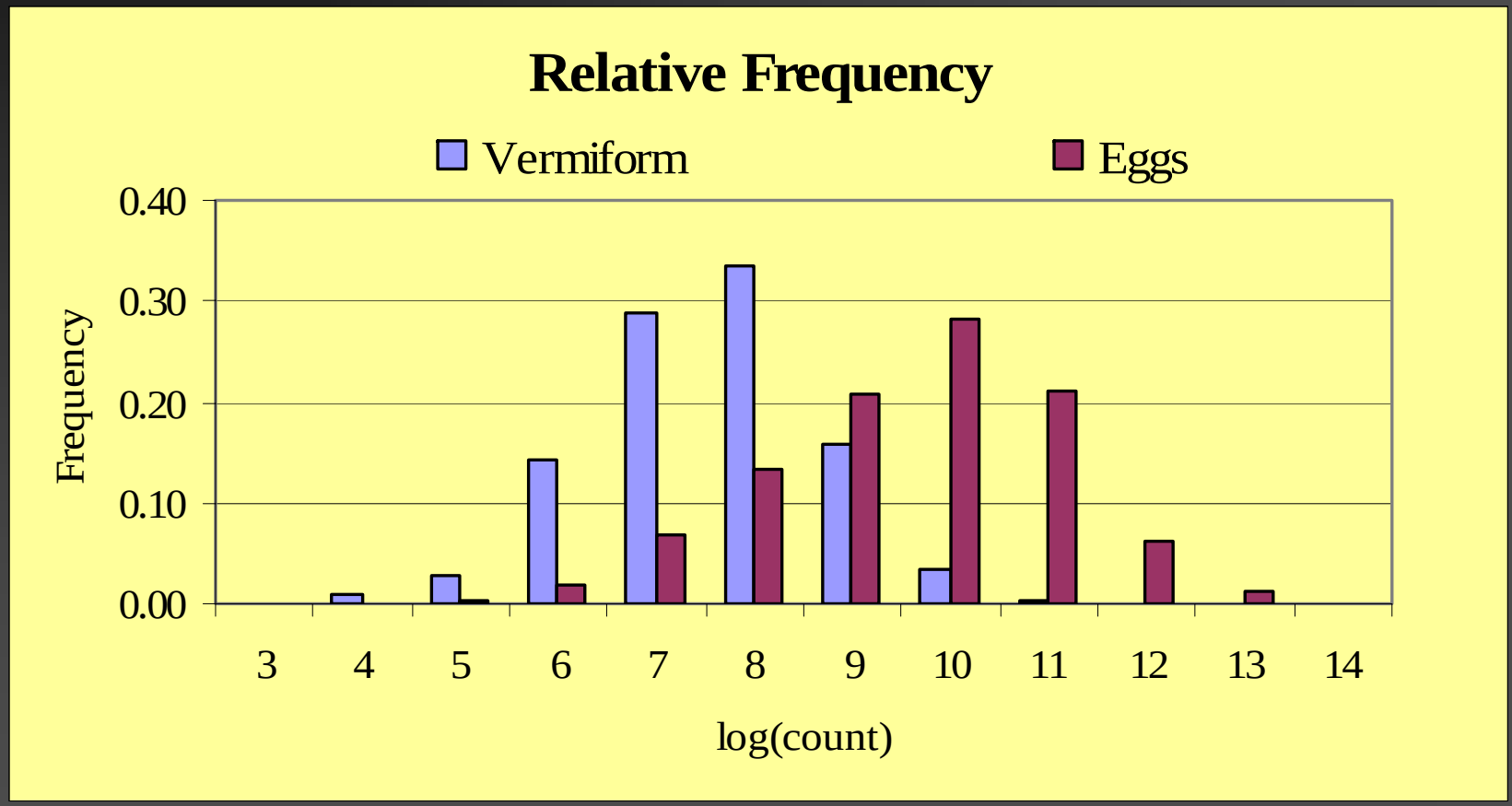
Vermiform or eggs?



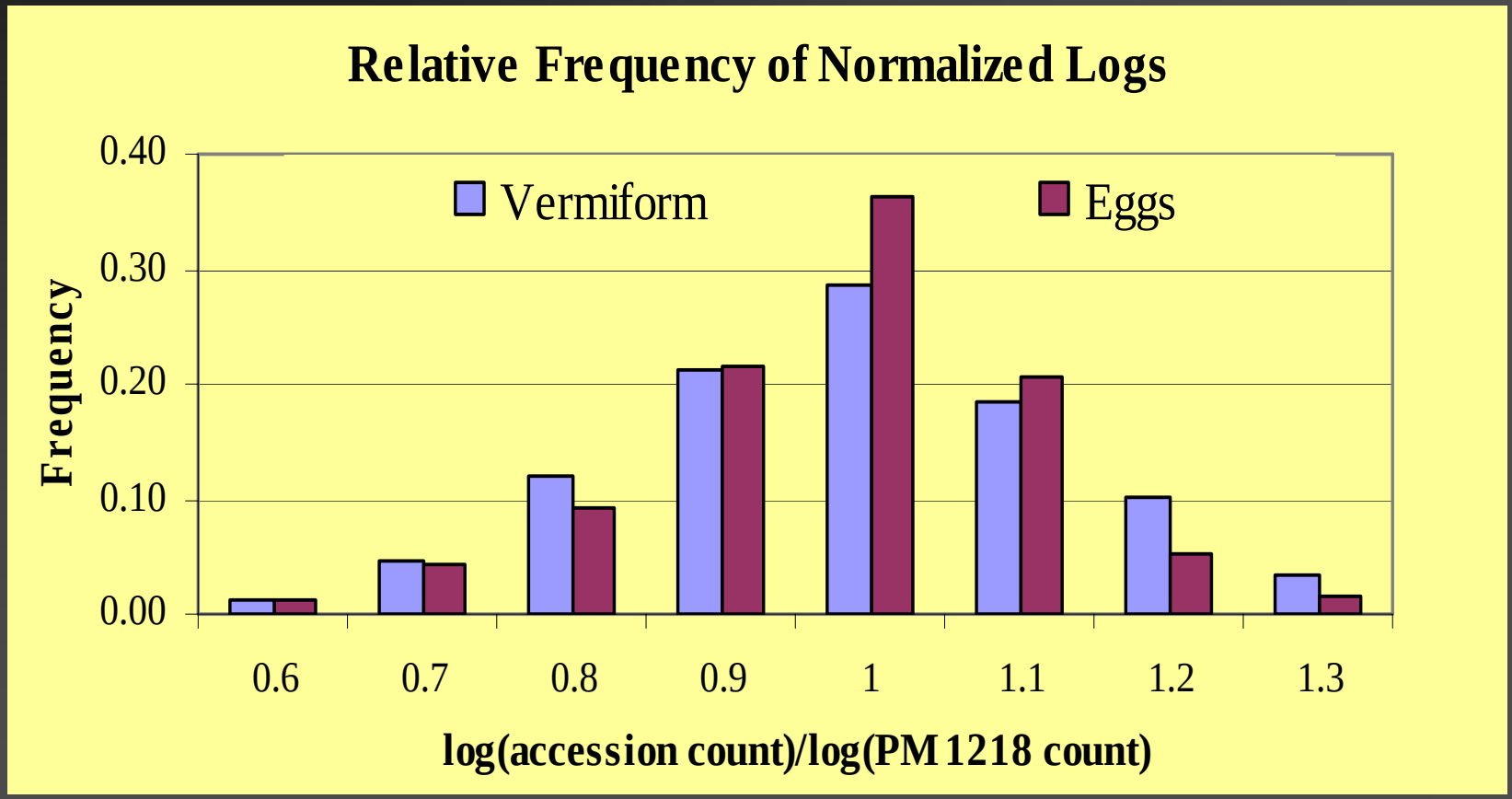
Log(counts) – 865 accessions



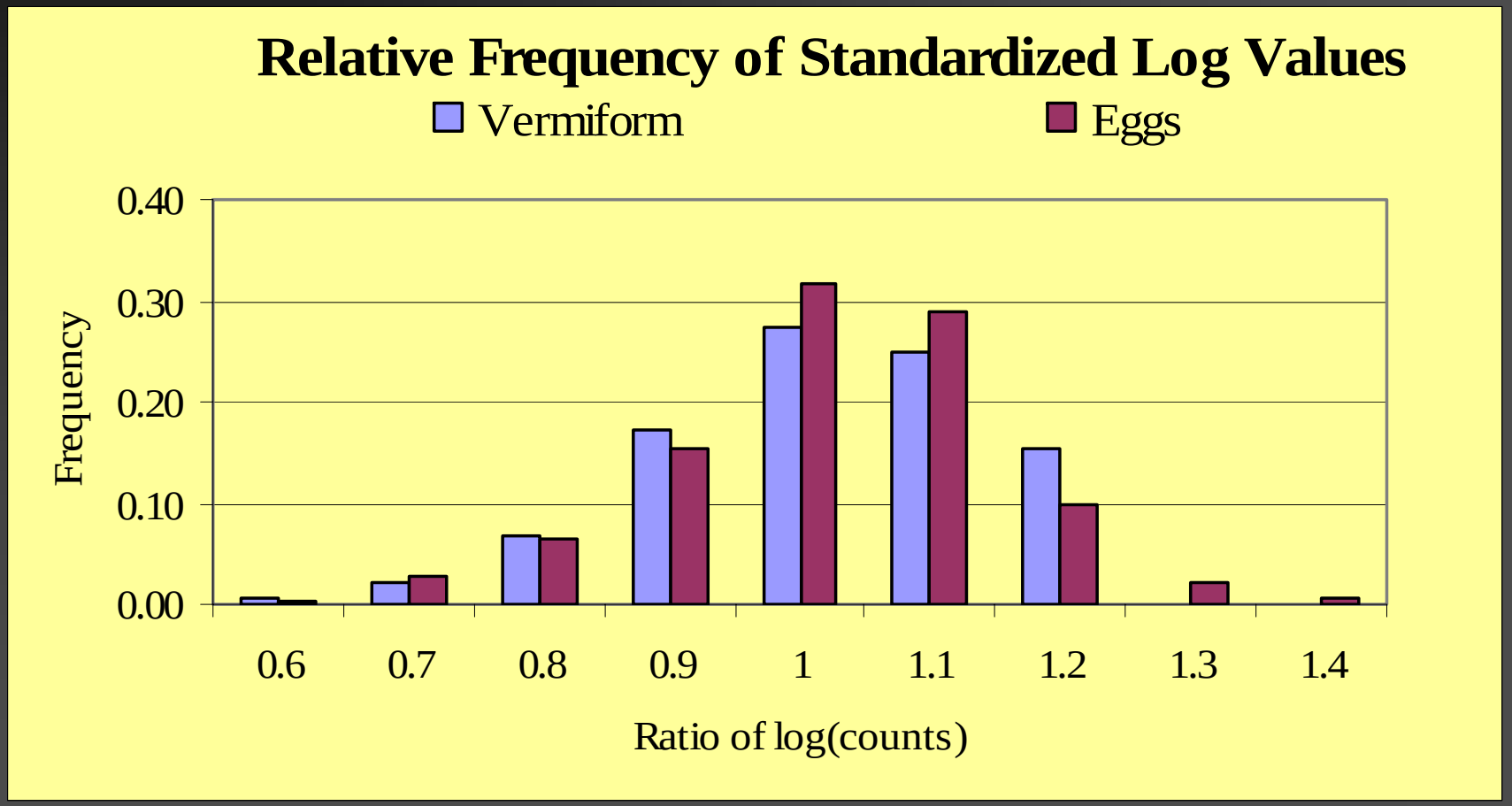
Log(counts) – 1603 accessions



Counts relative to PM 1218 (2003)



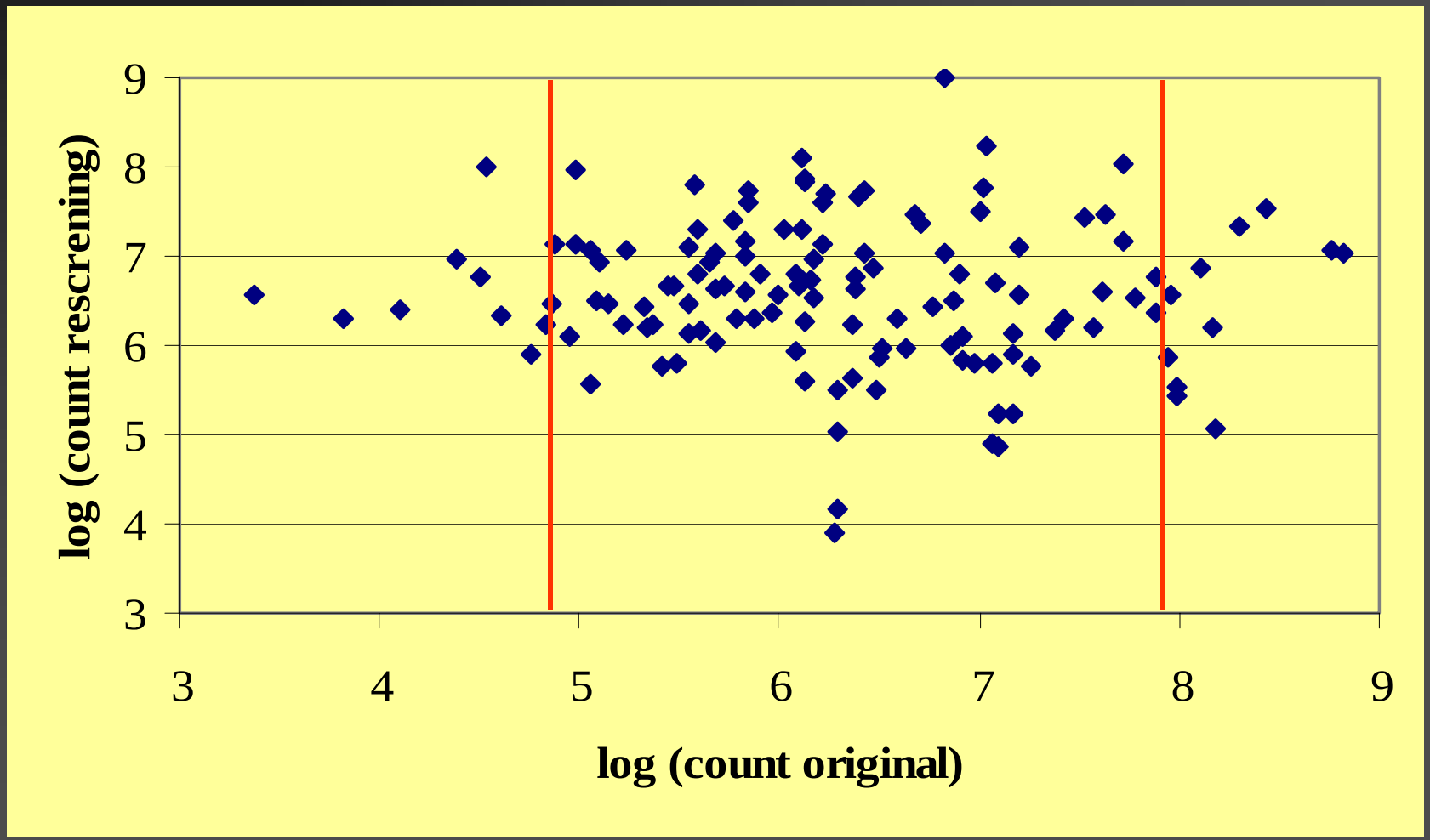
Counts relative to PM 1218



Criteria for 2nd round testing

- Lowest 2 entries in each run for
  - Vermiform counts
  - Egg counts
  - Sum = **175** entries
- Actually tested – **134** entries
  - No seed available: **21** entries
  - At least one of the lowest 2 identical for vermiform and eggs: **20** entries

Original vs. Second round - Vermiform



Criteria for 3rd round evaluation

- Create groups based on following criteria
  - Candidates with lowest counts in 1st and 2nd rounds: **10** entries
    - **2 entries best in both rounds – RESISTANCE?**
  - Candidates with low counts in 1st round but intermediate in 2nd round: **10** entries
  - Candidates with low counts in 1st round but highest in 2nd round: **12** entries

Procedures for 3rd round

- Rescreening in the greenhouse
  - **Increased reps**
  - **Other check cultivars besides PM 1218**
- Field studies
  - **Raise entries in the GH and transplant into reniform infested field**
    - **Avoids confounding with emergence problems**
  - **“Control” spatial variation**
    - **Check plots and/or augmented designs**
    - **Nearest neighbor analysis**

Further avenues

- “Purity” of entries
  - **Based on pollen color, entry 1419 looks like a mixture of *hirsutum* and *barbadense***
- Choice of check cultivars in evaluation
  - **Vermiform survival vs. reproduction**
  - **Evaluate common cultivars**
  - **PM 1218 now well characterized**
- Hybridize “resistant” entries with best agronomic types