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Use of Process Mapping in Poultry Slaughter Systems To Benchmark Microbiological Control

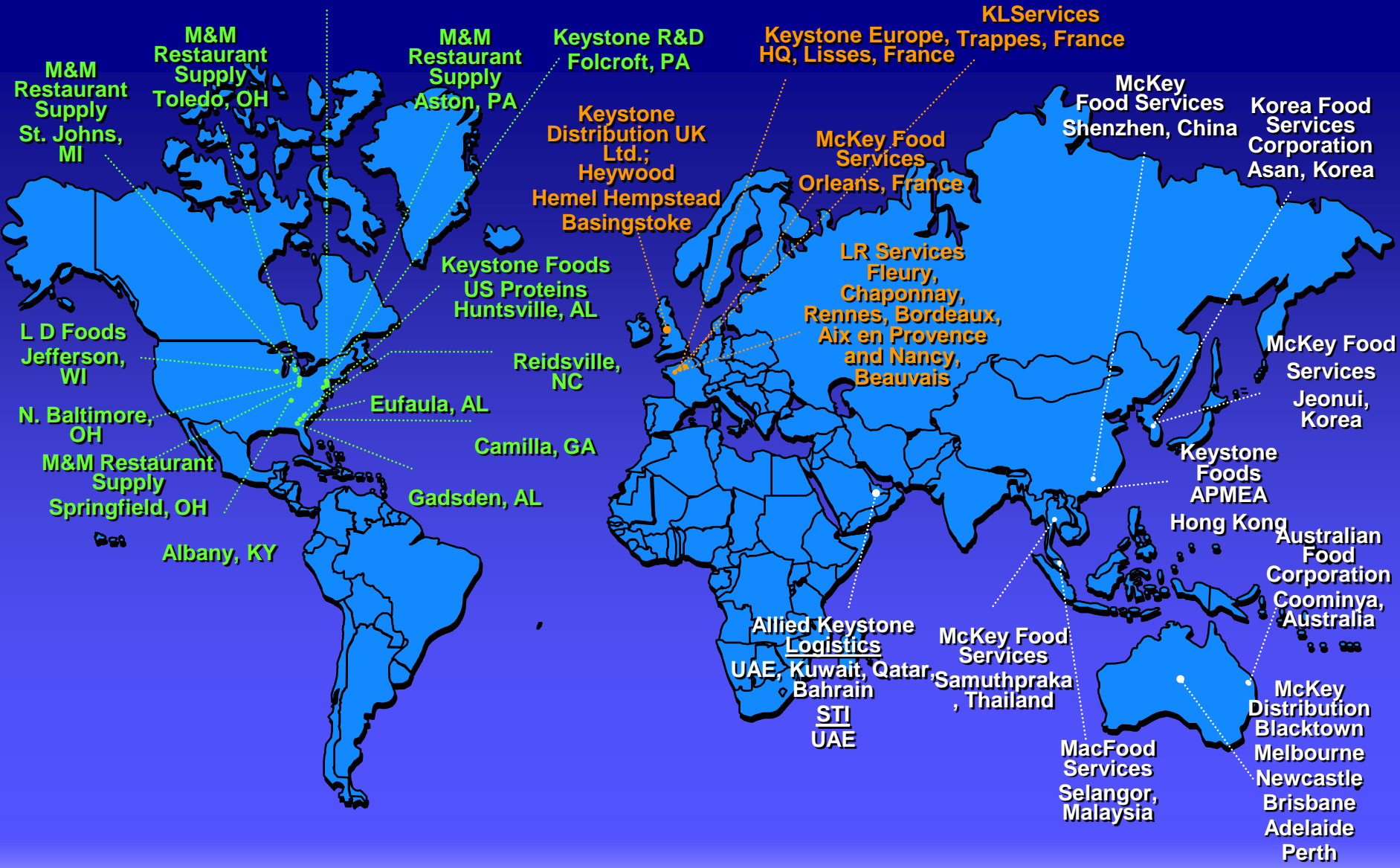
Dane Bernard

MIKE PETERS / Dayton (Ohio) Daily News



2006

**KEYSTONE FOODS
WORLDWIDE HEADQUARTERS**
West Conshohocken, PA



Use of Process Mapping in Poultry Slaughter Systems to Benchmark Microbiological Control



**Dane Bernard
Keystone Foods**



Where are we today?

- **Frequency of finding *Salmonella* in whole bird rinses has been reduced**
- **Industry is aware of the need for even more progress and this will happen**
- **Economically challenging environment for beef and poultry**
- **Bonus information; Free Range, Organic and Air Chill do not assure *Salmonella* free.**

What is a Hurdle?

Microbiologically, a hurdle is a barrier to microbial growth or, in this case, a way of removing or killing microorganisms



Multiple hurdles is what you do when a single intervention or hurdle doesn't get you where you need to go!

(Lone Ranger is the only one with Silver Bullets and he doesn't work in the chicken industry!)



Process Mapping, or Line Profiling:

Sampling at selected points in the process where contamination levels can be assessed for the purpose of measuring microbiological status of birds against a specific target organism or class of organisms.

So why go to all this trouble?

- **Process Mapping provides the baseline for assessing microbiological impact of anticipated changes**
- **Will show areas where immediate improvements can be made**
- **Will provide basis for judging the effect of individual process adjustments.**

Process mapping is one approach to identify best opportunities to reduce microbial pathogens during the slaughter process

Biomapping at Poultry Processing Facilities

- Organisms tested for:
 - *Salmonella* (presence/absence)
 - *E.coli**
 - Total Coliforms*
 - Aerobic Plate Count*

*Enumerative

Routes of *Salmonella* contamination

?

Many Many

Sampling points

- **Pre Scalding (feathers on WBR)**
- **Post Scalding**
- **Post Pickers**
- **Post Auto rehang**
- **Post Venter**
- **Post Opener**
- **Post Mystro**
- **Chlorinated rinse cabinet**
- **Pre cropper/post inspection**
- **Post cropper**
- **Post neck breaker (remove necks)**
- **Post neck skinner**
- **Post LoVac**
- **Post Brush**
- **Post IOBW**
- **Post Sanova spray (OLR)**
- **Post Chill**
- **Post Sanova dip (not at all locations)**

Sampling plan

- **Samples taken over a 3 day period from both first and second shift**
- **Five sampling periods each day**
- **Farm of Origin recorded**
- **Sampling begins with feathers on and proceeds through line with same flock.**

Some specifics

- **A typical vertically integrated operation**
 - **Breeders (contract growers)**
 - **Hatcheries**
 - **Feed Mills**
 - **Broilers (contract growers)**

Some specifics (Keystone)

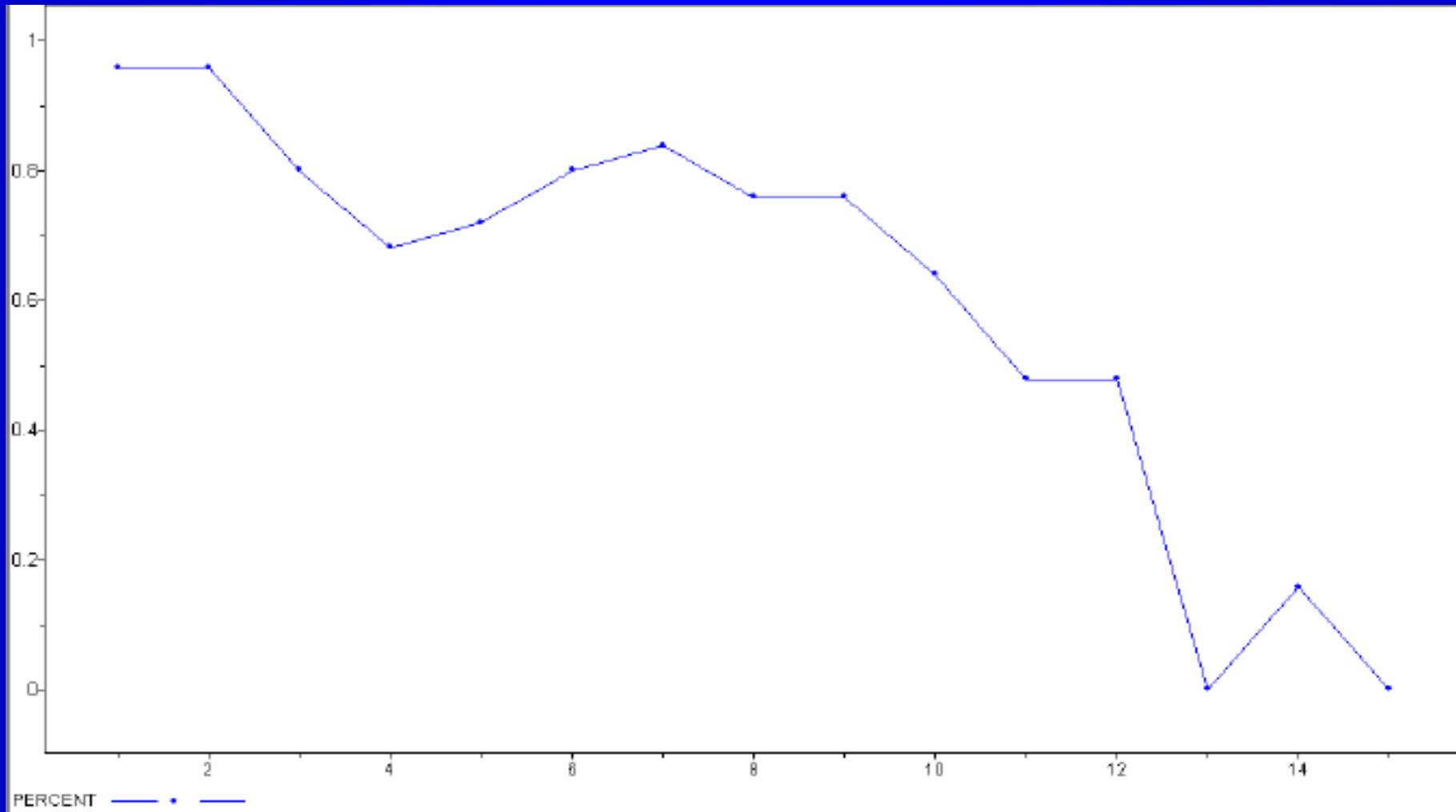
- All feed for breeders and broilers is heated to ~ 82 – 88 C.
- All breeder flocks are vaccinated for *Salmonella*:
 - Commercially available Live vaccine via water or spray at day one, two weeks and five weeks. A killed vaccine is administered via injection at 12 and 18 weeks. The vaccine contains the following strains:
 - *S. enteritidis*
 - *S. heidelberg*
 - *S. typhimurium*
 - *S. kentucky*

Some specifics (typical operation)

- Eggs are transported in dedicated vehicles to hatchery under strict temperature control
- Hatcheries are fumigated with Quaternary ammonium sanitizer
- Eggs vaccinated for Marek's
- Chicks are vaccinated (aerosol) for ND and Bronchitis
- Broilers are not vaccinated against *Salmonella* (not effective)

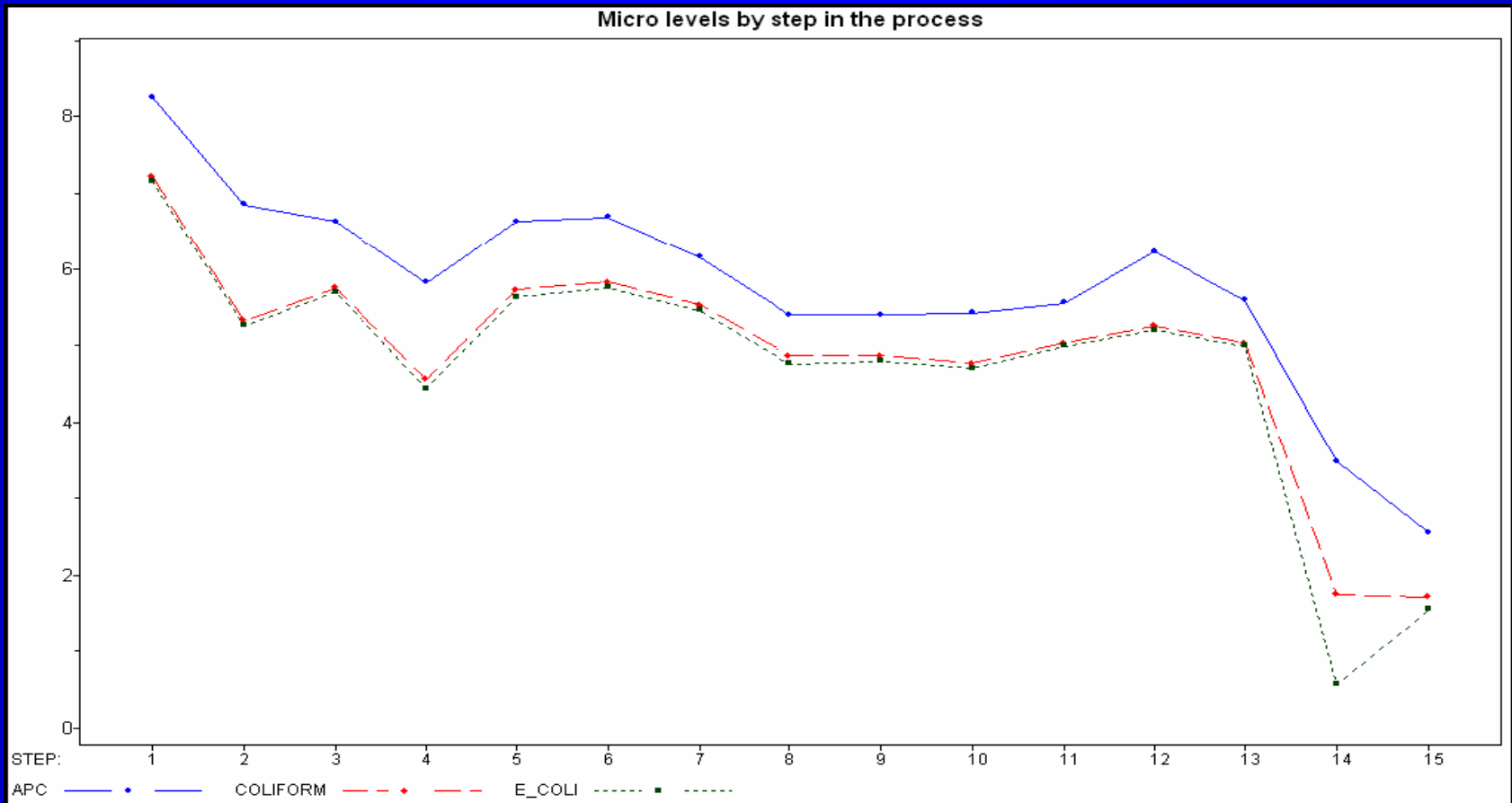
Biomapping

Salmonella % at various points along the line.



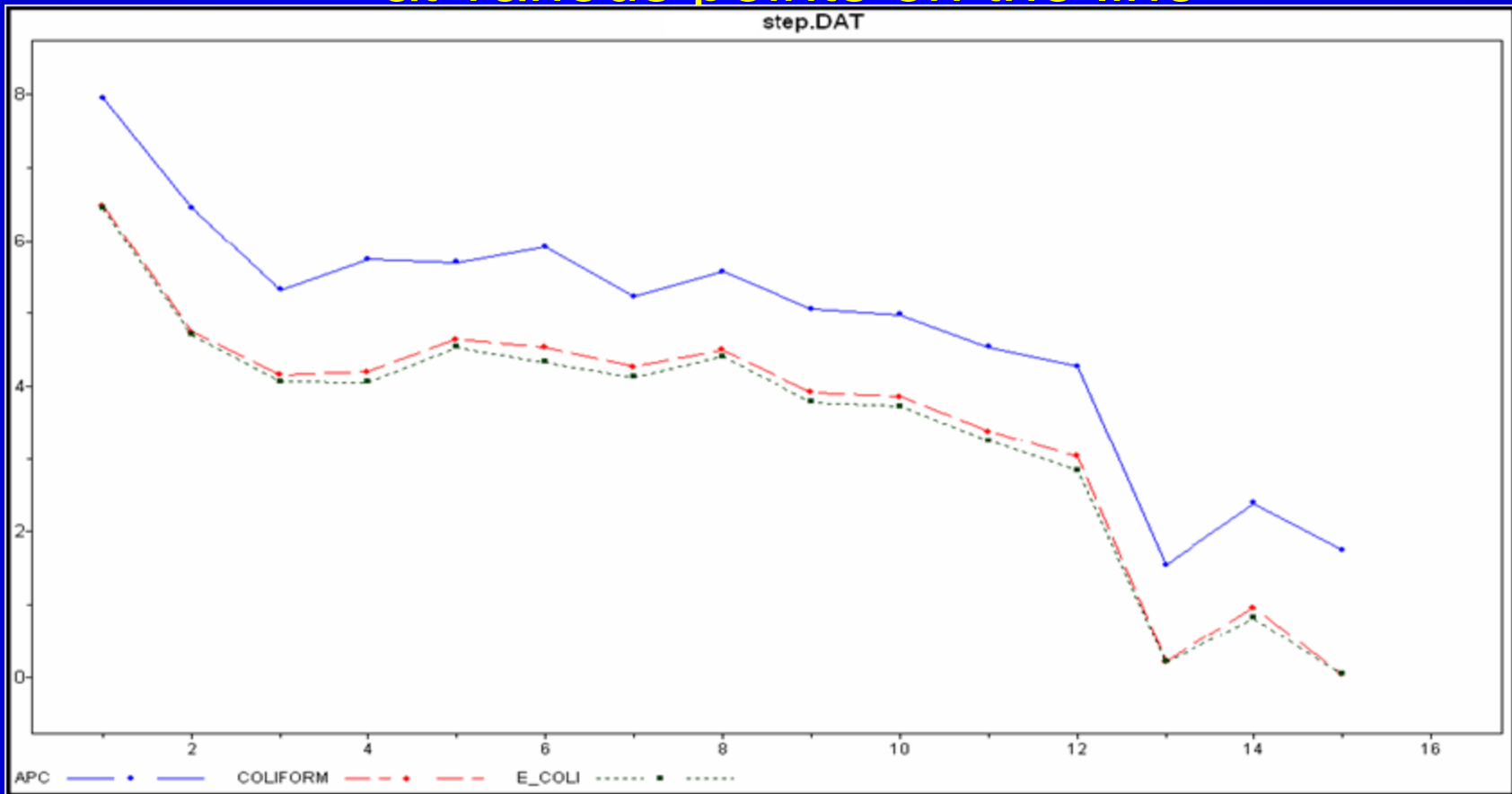
Biomapping

Average log counts of *E.coli*, Coliform and APC at various points on the line



Biomapping

Average log counts of *E.coli*, Coliform and APC at various points on the line



Statistical analysis

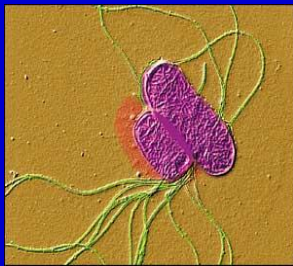
- **Statistically significant difference in APC between farms and between complexes**
- **Statistically significant reduction in APC, *E. coli* and Coliforms through the process (~5 logs)**
- **Statistically significant reduction in *Salmonella* prevalence**

Summary

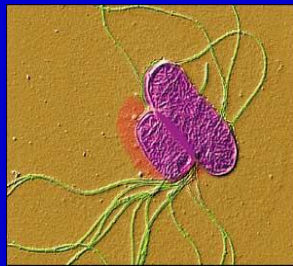
- **Some preliminary observations**
 - **No one intervention is universally effective**
 - **Still have a good deal of unexplained (unexplainable??) variation in processed birds**
 - **Is this due to the birds?**
 - **Process variables not yet defined?**

Summary

- Things we have tried:
 - Water treatments
 - Phage
 - Various vaccine combinations
 - Competitive exclusion
- WE NEED AN INEXPENSIVE WAY TO ENUMERATE *SALMONELLA* !



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