Production Efficiency-General comments

- All comes back to quality!
- Many of these topics are inter-related and are difficult to separate (i.e. design and trellis systems, canopy management, crop estimation and crop load management)- systems approach is unavoidable
- The solutions to many problems are regionally specific and often best handled by private industry
- Reasonable length projects for ARS: Publish or perish? Consistent funding?
- Mechanization mentioned from the DC meeting (March 2006) with the robotic systems may eventually require reworking of the trellis system, vineyard design, etc.
- Assumed that ARS impact can be increased by being more efficient with existing resources
- Outreach plan and tech transfer can be accomplished by usual methods: trade journals, extension, growing meetings etc. Encourage ARS to reward scientists for this outreach!

Vineyard design- defined as row orientation, irrigation layout, soil type, grape product type, slope, etc.

ARS Accomplishments: none identified, however, M. Keller (WSU) working on vine spacing in 2 current research projects- one funded by USDA

Gaps: -vine density/spacing over long term (10 to 15 years)

-maybe best done by the ARS (instead of university)

-canopy management ID'd as gaping hole

-minimize labor inputs-see mechanization

-remote sensing to evaluate land for pre-planting

-**Future work and Suggested Researchers:** potential collaboration between Keller and Tarara; remote sensing Lee Johnson

New Training/Trellis systems- has every imaginable trellis system been tried?
Raisin & juice ideal= max yield, high quality and ease of mechanization

ARS Accomplishments: none identified; most done by industry

Gaps: -little to do in terms of the trellis system itself

- Raisins: a trellis that facilitates cane cutting at harvest (quality)- too applied for ARS?

Canopy Management Systems

ARS Accomplishments: -“Squid” project- Tarara’s work combines trellis design and canopy management; measuring the effect of diff environmental factors on canopy management

Gaps: -reduction of labor

-employ mechanization to improve efficiency of shoot thinning; should ARS be working on mechanization?

-Table grapes need (size and color) to be included for this work?

Yield Estimation

ARS Accomplishments: -Tarara load cell project; Eileen Perry (WSU)-image sensing (side scan system)

Gaps: -apply load cell work in multi-wire systems and the hort requirements for management

-develop the coefficients for load cells in different systems-combine with physiological markers

-crop estimation is problematic

-estimating crop potential with alternative to bud dissection (e.g. dye or infra-red)

-need for basic research on physiology of fruitfulness as it enhances production efficiency

Future work: -apply load cell technology to other grape crop systems

Suggested Researchers: Industry collaborators

Crop Load Management-important and varies for raisin, table, wine and juice grapes

ARS Accomplishments: none identified

Gaps: -mechanization and/or robotics for crop thinning possible with the help of engineers and private industry (e.g Vision Robotics)

-Load cell work needs application fine tuning

-chemical thinning (e.g. methyl jasmonates-Fidelibus)

Irrigation and Fertilization Requirement-

ARS Accomplishments: Irrigation-Shellie, Schreiner, McElrone, Tarara, Williams (UCD), Steenwerth, Baumgartner-various aspects of water use, irrigation efficiency, cover crop competition

Nutrients- Schreiner (both soil and foliar applications), Joan Davenport (WSU), Mycorrhizal work (Schreiner and Baumgartner)

Gaps:

-Sap flow sensors to better understand grape water demand

-Cover crop interactions/competition experiments- long term

-Salinity problems with drip irrigation in low rainfall areas

-Timing of the sampling needs work based on dated studies that may not be helpful for making changes within a given season

-Research regarding foliar applied nutrients and timing of applications

-Irrigation management research (e.g. sap flow, dendrometer, pressure bomb, soil moisture, lysimeter)

-Develop nutrient standards correlated with irrigation management (e.g. deficit irrigation)

Mechanization and Automation Technologies

ARS Accomplishments: None identified for 3 decades

Gaps: -better mechanization of everything from pruning to harvest

-need engineers

-“MARS Rover” or “Roomba” for vineyards… can we automate it?