

Forage-Animal Production Research Unit (FAPRU): establishment of a new USDA-ARS research location

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Introduction Forages are vital to the success of grazing livestock production systems. Forages provide a low cost source of nutrients for animal production (Barnes & Nelson 2003; Ball *et al.*, 1996). Limited fundamental (i.e., genomic, proteomic, metabolomic) research on the effects of environment and management on plant quality and production and the effects of plant metabolites (i.e., nutrients, anti-quality factors, nutraceuticals) on animal performance has hindered our ability to improve the productivity of forage-based enterprises. There is insufficient information for reliable prediction of animal performance in response to plant metabolites. To address these issues, USDA-ARS established **FAPRU** (Forage-Animal Production Research Unit) in 2003 at U Kentucky, Lexington. Its mission is to improve the productivity, profitability, competitiveness and sustainability of forage-based enterprises through improved understanding of the fundamental biological processes that occur at the animal-plant interface.

Materials and methods To accomplish the FAPRU mission, multidisciplinary teams work to identify, evaluate, and manipulate genetic and physiological factors to enhance animal performance and forage plant quality and production. Transfer of technologies and management systems to forage-based enterprises ultimately realises the FAPRU mission. To aid the success of the mission, FAPRU has recruited scientists with expertise in genomics, metabolomics, and grazing systems. Expertise in other areas, such as proteomics, plant breeding, pasture ecology, and nutrient intake and metabolism are being recruited or tapped through FAPRU's partnership with U Kentucky and other research locations. Also, FAPRU has funded development of laboratory competency in genomics, proteomics, metabolomics and real-time ultrasonic imaging. To validate its mission, focus its research on producer concerns and identify research priorities, FAPRU held a Focus Group Meeting with stakeholders (August 19-20, 2004). Stakeholders were selected from the transition zone of the Eastern and Midwestern States. This transition zone is characterised by a transition from warm-season forages in the south to cool-season forages in the north.

Results Drs. James Strickland (Research Leader) and Glen Aiken (Research Animal Scientist) were hired in 2003. Drs. Isabelle Kagan (Research Plant Physiologist) and Randy Dinkins (Plant Molecular Geneticist) were hired in 2004. This staffing provided FAPRU with expertise in the areas of genomics, metabolomics, and grazing systems. One scientist position still remains to be filled with expertise in rumen ecology. Large laboratory equipment purchases by FAPRU include a genetic sequencer, a RT-PCR, a LC/MS/MS, 2 GC/MS systems (ion traps; one with pyrolysis), an accelerated solvent extractor, an ultrasound with vascular and 3D tissue imaging capabilities, and a spot cutter and picker for 2D gels as well as an automated station for MALDI plate preparation (in partnership with U Kentucky). The Focus Group Meeting identified 4 research priorities: (a) tall fescue toxicosis and best management practices, (b) forage utilisation, (c) expert systems, and (d) environment-plant-animal interactions. These research priorities are currently being formulated into the FAPRU 5 year research plan.

Conclusions The complexity of the biological processes and interactions associated with the animal-plant interface and sustainability of forage-based enterprises necessitates the use of multidisciplinary interinstitutional research teams to address adequately the issues facing forage-based enterprises in the 21st century. FAPRU is excited about potential collaborations and current and future opportunities to improve the sustainability of forage-animal production systems world-wide.

References

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