

Genomic Selection and Herd Management Tools to Improve Feed Efficiency of the Dairy Industry

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MANAGEMENT PLAN

Table WP1: Project organization - Investigator Roles and Timeline for Aims (year 1 to 5 and impacts beyond)

Aims with names of lead investigator and initials of co-investigators ¹	Year 1	Year 2	Year 3	Year 4	Year 5
AIM 1: Feed efficiency database (VandeHaar) Aim 1a. Armentano, MVH, KW, DS, RV, RT, MH, CS, JD Aim 1b. VandeHaar, Tempelman, KW, DS, RV	Accurately phenotype and genotype 5260 new cows to create feed efficiency database over 5 years → Ensure completeness of feed and cow information → Define structure of database → Ensure long-term public access to database →				
AIM 2: Genetic architecture (Weigel) Aim 2a. Weigel, RV, RT, DS, LA, MVH Aim 2b. Weigel, RV, DS, RT Aim 2c. Spurlock, Worku, RT Aim 2d. Tempelman, RV, MVH, LA, KW, DS	Plan methods → Determine heritability and genetic relationships for feed efficiency → Examine alternative traits that impact feed efficiency → Characterize inheritance at the genomic level → Localize QTL and identify candidate genes for efficiency or related traits with undergraduate students → Refine parameters → Estimate GxE interactions →				
AIM 3: Genomic selection programs (Weigel) Aim 3a. Tempelman, KW, RV, DS Aim 3b. Weigel, DS, RV, RT Aim 3c. Veerkamp, KW, DS, VC, LA, MVH, RT Stakeholder input	Evaluate accuracy of genomic predictions. → Compute genomic PTA → Develop new selection indices → Input from USDA AIPL and AI companies →				
AIM 4: Decision support tools (Cabrera) Aim 4a. Hanigan, VandeHaar, LA, CS, RD, JD Aim 4b. Cabrera, DB, RS, LA, MVH Aim 4c. Cabrera, RP, DS Aim 4d. Cabrera, MVH, DB, RS Stakeholder input	Survey about grouping → Develop tools for reproduction and culling → Develop whole farm evaluation tool → Evaluate current nutrition models → Deploy them → Deploy → Deploy → Demonstrate them → Demonstrate → Deploy → Evaluate impact → Evaluate impact → Evaluate impact → Input from farmers, extension agents, consultants, nutritionists, and veterinarians →				
AIM 5: Educate (Wattiaux) Aim 5a. Wattiaux, MWN, MWu, MVH Aim 5b. Weber Nielsen, MWu, MWx, DB, MVH Aim 5c. Worku, Spurlock, all others Stakeholder input	Develop and implement K-12 programs with assistance from undergraduate students → Develop and implement undergraduate pedagogy with assistance from undergraduate students → Teaching workshops held annually in conjunction with annual meeting → Mentor students in research (cow studies and genome data mining), extension and teaching → Input from university faculty, K-12 leaders, 4-H leaders, K-12 students, undergraduate students, and consultants → Input from teachers and students with Ag and nonAg backgrounds →				
Coordination and communication. VandeHaar, LA, KW, RV, DS, VC, all others	Project meetings held annually, site visits by PD for cooperating herds, quarterly meetings at MSU and UW → Conference calls, networking, and quarterly email briefings →				
Dissemination. VandeHaar, KW, VC, all others	Articles in Mich Dairy Review, popular press, Extension notes and websites → Discover conference → ADSA symposium →				

¹ LA=Lou Armentano, DB=Dave Beede, VC=Victor Cabrera, JD=Jan Dijkstra, MH=Mark Hanigan, RP=Richard Pursley, RD=Randy Shaver, DS=Diane Spurlock, CS=Charlie Staples, RT=Rob Tempelman, MVH=Mike VandeHaar, RV=Roel Veerkamp, MWx=Michel Wattiaux, MWN=Miriam Weber Nielsen, KW=Kent Weigel, MWu=Millie Worku