**Anticipated publications related to the Twin Birch Farm (Objective 2)**

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| **Title** | **Authors** | **Objective** | **Journal** | **Anticipated Date** |
| *Comparison of process-based models to quantify nutrient flows and greenhouse gas emissions of milk production* | Karin Veltman1, Curtis Jones2, Richard Gaillard3, Prathamesh Avadhut Bandekar4, Sebastian Cela5, Larry Chase6, Benjamin Duval3, Cesar Izaurralde2, Quirine M. Ketterings5, Changsheng Li7,8, Marty Matlock4, Al Rotz9, William Salas8, Peter Vadas3, Olivier Jolliet1 | Process model comparison and identification of key needs | Agriculture ecosystem and environment | Submit (July 2015)  NOT COMPLETED |
| *Evaluating strategies for greenhouse gas mitigation and adaptation to climate change for the Twin birch farm*  *Need to coordinate with Al Rotz publication indicated below* | Karin Veltman1, Curtis Jones2, Richard Gaillard3, Prathamesh Avadhut Bandekar4, Larry Chase6, Cesar Izaurralde2, Changsheng Li7,8, Marty Matlock4, Al Rotz9, William Salas8, Peter Vadas3, Forest, Nicholas  Olivier Jolliet1 | Sensitivity study evaluating a series of alternative mitigation scenarios based on the analysis of the present carbon, nitrogen and phosphorus cycle of the NY pilot farm, inclusion of the Climate change scenarios and based on proposed BMPs (Matt Ruark) | **International Dairy Journal?** | 28-Jul-15 |
| *Evaluating strategies for greenhouse gas mitigation an adaptation to climate change for a New York dairy farm* | C. Alan Rotz, R. Howard Skinner, Anne M.K. Stoner, and Katharine Hayhoe (USDA NAA-PWSM) | To demonstrate the use of whole farm and global climate models as useful tools for evaluating greenhouse gas mitigation strategies and strategies for adapting to projected future climate | Proceedings of the Dairy Environmental Systems and Climate Adaptation Conference | 28-Jul-15  COMPLETED |
| *Farm Simulation Can Help Dairy Production Systems Adapt to Climate Change* | C. Alan Rotz, R. Howard Skinner, Anne M.K. Stoner, and Katharine Hayhoe (USDA NAA-PWSM) | To demonstrate the use of whole farm and global climate models as useful tools for evaluating strategies to adapt dairy farms to projected future climate. | Book Chapter | Unknown |
| *Critical evaluation of process differences and similarities between DAYCENT, APEX, IFSM, DNDC, and CSCPS ( in some combination)* | Jones (Maryland) Gaillard/Rotz (/USDA – DFRC and NAA-PSWM) (Others ??) | Why the models are different | **?** | (Aug/Sept.2015)  WAITING FOR RESULTS FROM VELTMAN *et al.* |

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| *Model comparison at a regional level: evaluation of emissions and impacts of milk produce in the State of Wisconsin.* | *Karin Veltman1, Curtis Jones2, Richard Gaillard3, Prathamesh Avadhut Bandekar4, Larry Chase6, Cesar Izaurralde2, Changsheng Li7,8, Marty Matlock4, Al Rotz9, William Salas8, Peter Vadas3, Forest, Nicholas*  *Olivier Jolliet1* | *Each of the modeling team members will develop an approach to apply their model at a regional level for Wisconsin milk production. GHG and N- and P-related emissions per kilogram of milk produced in Wisconsin will be compared between models.* | *?* | NOT BEGUN YET |
| *Evaluation of mitigation and adaptation scenarios at regional level for milk production in Wisconsin.* | *Karin Veltman1, Curtis Jones2, Richard Gaillard3, Prathamesh Avadhut Bandekar4, Larry Chase6, Cesar Izaurralde2, Changsheng Li7,8, Marty Matlock4, Al Rotz9, William Salas8, Peter Vadas3, Forest, Nicholas*  *Olivier Jolliet1* | *Sensitivity study on BMPs (based on Matt's list) and climate change scenarios, based on objective 2. Scenario analysis on how to reach US objective of 25% reduction based on potential BMPs adoption scenarios.* | **International Dairy Journal?** | NOT BEGUN YET |
| 2 papers on CNCPS | Larry Chase | the biology of CNCPS | Journal of Dairy Science | Accepted |
| *Climate Change Impacts on the Dairy Industry*  *Herd Management Strategies to Reduce Methane Emissions in Dairy Herds* | Larry Chase | 1) The CNCPS model is used to show changes in nutritional strategies to predict the potential changes in GHG emissions compared to the baseline levels.  2) The CNCPS model will be to predict GHG emissions from dairy rations currently being fed in commercial dairy herds. | Proc. Dairy Environmental Systems and Climate Adaptation Conf., Ithaca, NY. | July 29-31, 2015  COMPLETED |
| *Biogeochemical modeling with APEX* | RC Izaurralde, CD Jones, JR Williams, WB McGill | Process model comparison and identification of key needs | Proceedings of 2015 SWAT conference | End of October 2015 |
| *Simulating microbial denitrification with EPIC: model description and initial testing* | RC Izaurralde, WB McGIll, JR Williams, CD Jones, RP Link, DH Manowitz, DE Schwab, X Zhang | Process model comparison and identification of key needs | Environmental Science and Technology | End of October 2015 |
| *Impacts of climate change on nutrient loads from a dairy farm: SWAT model* | Bandekar, P. A., M. Matlock |  | Unknown | Unknown |
| *Various* | Members of the measurement team | Provide the model results to the field scientist to include in their papers because field researchers should be the lead authors on all papers using their field data. | ?? | ?? |

**Phase 2 of Objective 2a is using field measurements for model validation and calibration**

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| **Title** | **Authors** | **Objective** | **Journal** | **Anticipated Date** |
| *Quantitative comparison of model performance across several measurement sites within the Dairy CAP research group* | Jones (Maryland) Gaillard (USDA--DFRC) take the lead with contribution of the other modellers + objective leaders | APEX, DAYCENT ( and DNDC?) calibrate models for each field site using data provided by the Measurement Team through the Data Repository | ? | Approximately 2-4 weeks for each calibration  **Publication by Jan/Feb 2016 (?)** |
| *Qualitative assessment of model performance and recommendations/implications for future model selection* | Jones/Gaillard (?)take the lead with contribution of the other modellers + objective leaders |  | ? | concurrent with/subsequent to quantitative comparison **Feb/Mar 2016 (?)** |

**Objective 2b**: Identify climate change scenarios and impacts

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| **Title** | **Authors** | **Objective** | **Journal** | **Anticipated Date** |
| *Evaluation of system performance under various climate scenarios: implications for future management and mitigation* | Nicholas and Forest | Simulate systems from validated field studies using future climate scenarios   * Yield v. GHG * When/how/why/do systems fail |  |  |
| *Performance of adaptive scenarios under future climate change scenarios* | Forest and Nicholas | Develop mitigation/ adaptation scenarios using evaluation from above (via Forest) and stakeholder input |  | Year 4 |
| Stakeholder participation in developing adaptive dairy management for climate change scenarios | Gaillard; others | Input to 2nd Wisconsin paper |  |  |

**Objective 2c**: Integration with LCA - (2c) re-parameterized models according to LCA needs

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| **Title** | **Authors** | **Objective** | **Journal** | **Anticipated Date** |
| Process-based Life Cycle Analysis of the dairy Twin Birch farm | in collaboration with the LCA team | Generating input data from the process model comparison, taking IFSM as a baseline and other model to determine ranges in GHG and nutrient related emissions  Short term 🡪 provide Twin Birch input and output data to LCA team (Karin Veltman + Olivier Jolliet)  End 2015 🡪 also provide the variations in emissions associated with BMPs | Int J. of LCA? | 12/2015 |
| Process-based Life Cycle Analysis of milk production in Wisconsin | in collaboration with the LCA team | Take output of the Wisconsin model comparison at regional level to determine ranges in GHG and nutrient related emissions at state level |  |  |
| Evaluate and improve regional benchmarks integrated into LCA impact assessment |  | LCA evaluation based on the mitigation and adaptation scenario analysis for Wisconsin |  |  |