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Session 1A

Feedstock Supply, Logistics, Processing, and Composition

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A cost effective and sustainable supply of biomass feedstocks is a critical component of a viable biorefinery industry that is capable of making a credible impact on petroleum displacement. Feedstock costs can amount to a very significant fraction of the cost of the final biorefinery product. Thus, the reduction of the costs of feedstock production, harvest, collection, transportation, storage, and preprocessing can have a direct and positive effect on the overall viability of a given biorefinery. In addition, the feedstock and technology choices that are made for maintaining a sustainable biomass supply will have important implications not only for the biorefinery industry, but also for society as a whole. This session focused on feedstock supply, logistics, processing and composition, all of which are important elements of the feedstock supply chain.

Ken Vogel of USDA-ARS began the program with a discussion of two major potential biomass energy crops, alfalfa and switchgrass. He highlighted the environmental benefits of including these crops in the agricultural landscape, as well as the unique agronomic traits that make these species attractive for biomass production. Because the chemical composition of biomass is critical in determining its potential for conversion to ethanol, the next presentation by Bonnie Hames of NREL on this topic was fitting. She described the new and modified set of analytical procedures developed by NREL to more accurately and completely account for the many chemical components of herbaceous biomass. The biomechanical properties of straw and corn stover were described by Christopher Wright of INL. Designers of processing facilities for handling biomass should take note of the significantly different compression modulus which were found within and among straws from wheat and barley varieties. Michael Montross of the University of Kentucky reported on the results of making adjustments to a conventional grain combine for use in one-pass corn grain and stover harvest. These results offered the possibility of one-pass harvesting, partial fractionation of the stover, without expensive equipment

redesign. Ensiling wheat straw was investigated by Joni Barnes of INL as an alternative method for storage and preservation of biomass. She reported that silage inoculant, moisture, and free sugar additions were necessary to stabilize polysaccharide composition in wheat straw during storage via ensiling. This effect was primarily due to the requirement for rapid and maintained reduction of pH. Use of slurries to transport and partially saccharify corn stover was evaluated through mathematical models presented by Amit Kumar of the University of Alberta. The session concluded with a cautionary presentation by Wallace Wilhelm of USDA-ARS that warned against the loss of soil organic matter from too much residue removal when harvesting biomass crops. Prolonged residue removal was reported to reduce soil organic matter and subsequent yields of crops. Papers presented as part of the poster session contributed additional insights on biomass production, compositional analysis, and biomechanical properties.