ADSA-ASAS Northeast Section Symposium: Optimal Land Use for Northeast Farms—Growing Crops and Feeding Animals

610 Whole-farm assessment of alternative cropping and feeding strategies. C. A. Rotz*, *USDA/ARS, University Park, PA.*

A change in cropping and feeding practices can affect the performance, economics and environmental impacts of a dairy farm. A whole farm assessment of all major effects can only be done through process level simulation of the production system. The Integrated Farm System Model provides a research and educational tool for this type of evaluation. A farm production system can be simulated through many years of weather to quantify the performance, economics and environmental effects under the assumed management. Then various changes in cropping and feeding practices can be simulated to determine their effects. Performance measures include crop yield and nutritive value, animal intake and production, machinery use and timeliness of operations, and the use of resources such as fertilizer, fuel, and labor. Production costs, income and net return are then calculated from the simulated performance. Predicted environmental impacts include emissions of ammonia, hydrogen sulfide and greenhouse gases, edge of farm losses of sediment and phosphorus, and leaching of nitrogen and phosphorus to groundwater. From the predicted performance and losses, carbon, energy, water and reactive nitrogen footprints are determined for each production practice. A life cycle assessment is used to determine these footprints, which includes both direct farm sources as well as those occurring in the production of resources used on the farm. This Windows-based software tool is available for research and educational use at https://www.ars.usda.gov/Main/docs.htm?docid = 8519. Information obtained through the simulation of various management practices will lead to the selection of more sustainable production systems for dairy production in the Northeast in response to changing climate and economic conditions.

Key Words: farm model, production economics, environmental footprint

611 The expanding role of alternative forages for dairy farms in the Northeast. G. W. Roth*, *Penn State University, University Park.*

There has been a dramatic increase in the interest in use of alternative crops for feed in the dairy industry in the Northeast. This has been driven by several factors: (1) the high cost of off farm purchased feed and forages, (2) periodic droughts which have affected corn production on some soils and (3) the high cost of corn production with high N and seed costs. Overall this has resulted in an intensification of crop production with some farms harvesting up to 3 crops in a year where only one may have been harvested in the past. This intensive cropping has been facilitated by the availability of good no-till equipment and custom planting and harvesting operators that can rapidly harvest and plant quickly to optimize potential yields. Fall oats, winter triticale, rye, wheat, and barley, ryegrass, sorghum-sudan, and forage sorghums are some of the most popular alternatives. Each crop has a unique fit in different soils and climates and role in dairy rations. When managed well, these crops can play an important role in the lactating cow rations. If management or weather conditions cause issues with the forage quality then they can often be utilized in rations for replacement animals, and often this is the key objective of alternative crop production. Two key management challenges are proper N fertilization and harvesting at the correct maturity. Under fertilizing with N can result in lower yields and low protein forages, while harvesting too late can result in high fiber and low energy forages. The fall and winter small grains have the potential to use the growing season between corn harvest and planting and in some regions and this can add an additional 3–4 tons/acre of dry matter to the forage production potential. Sorghum and sorghum sudan crops are more drought resistant than corn and have a special niche on droughty soils that result in poor corn yields or wet soils that are difficult to plant corn in on a timely basis. These systems are providing ways to manage crop production risks, protect soils from erosion, reduce runoff and leaching and improve the nutrient balance of dairy farms while increasing the forage production on the farm.

Key Words: forage, small grain, sorghum

612 Integrating land use and dairy cattle rations: Challenges and opportunities. L. E. Chase*, *Cornell University, Ithaca, NY.*

Dairy producers face formidable challenges integrating crop acres, cropping programs, animal feed requirements, rations, environmental considerations and economics. A case study approach was used on a New York dairy farm over a 5-year period to examine these interactions. At the intiation of the study, this farm had 435 tillable hectares that were divided into 43% as corn silage and 57% as alfalfa and grass mixed forages. The farm was milking 408 cows with an average mlk production of 30.9 kg/cow/day. Forty-three percent of the total ration consumed was home grown feeds. The land base was a mix of well-drained valley and moderate to poorly drained sloping soils. A whole farm planning process was implemented that encompassed changes in the cropping program, forage harvest procedures, forage storage, ration management and ration formulation. The key changes were increasing the hectares of grass forages grown on the hillside lands, improved bunker silo management, utilizing an electronic feed management system and adjusting rations using the CNCPS (Cornell Net Carbohydrate and Protein System) model. At the end of the study, there were 460 tillable hectares consisting of 38% in corn silage and 31% each in alfalfa and grass forages. Herd size had increased to 544 milking cows producing 33.6 kg/cow/day. The increase in herd size was mainly due to lower culling rates and some purchased animals. The rations fed contained 59% home grown feed. During this study, total milk sold per day incresased by 45% as a result of the changes in milk produced per cow and cow numbers. Daily purchased feed cost decreased by 24% while the feed cost/kg of milk produced was 52% lower. Imported nitrogen and phosphorus decreased by 37 and 40% due to utilizing more home produced feeds in the ration. Total herd nitrogen excretion was 17% lower at the end of the study while phosphorus excretion decreased by 28%. This project provides an example of the types of changes that can result from using a whole farm planning and implementation process on a commercial dairy farm.

Key Words: nutrient management, CNCPS, whole-farm planning