

Farmer-driven research for developing models of successful low input dairy farms of small to medium size in the American midwest

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Introduction The dairy industry in the upper Midwest continues to evolve with a drastic reduction in the number of dairy farms with less than 100 cows that utilise tie-stall housing. Many of the farms that do remain are at a critical point where facilities require renovation or replacement that is not economic. Rural communities have fewer residents engaged in agriculture to participate in the local economy and the rural landscape includes many farm sites that are abandoned. Low input dairies are an alternative system developed by farmers as a grass-roots movement. Low input farms may include grazing, outdoor housing throughout the year, crossbreeding, group housing of calves, etc. Barns formerly used to stable cows may be renovated to provide a milking centre. Low input dairy farmers are eager to participate in on-farm research when they determine the direction of research. We will describe one trial designed to answer questions determined by farmers and outline our research approach to designing effective reduced input dairy farms. The objective is to identify the essential components of management and organisation for low input dairy farms in the American Midwest.

Methods Sets of 6-8 low input dairy farmers in southern and central Minnesota were convened and asked to identify researchable issues on their farms for which they would invest time and effort to conduct research in accordance with a structured protocol. Three questions emerged: 1. Can grazed heifers achieve a growth rate of 0.9 kg/day? 2. Does grazing cost less than confinement housing? 3. Will grazing generate as much profit as field crop production? One farmer agreed to provide two replicates of 30 Holstein heifers (300kg) for grazing and feedlot comparisons for three consecutive years. A research protocol was negotiated with the farmer. A fifth year stand of lucerne was fenced for pasture and heifers were rotated twice weekly.

Results There was no significant difference in the growth rate which achieved the target of 0.9 kg/day. Grazing was a lower cost method of growing heifers than a feedlot each year. The average daily cost over three years was \$1.29 in the feedlot and \$0.94 on pasture. Returns from pasture were contrasted with maize grain, soybeans and lucerne grown for hay. Returns per hectare were maize grain, -\$36.53; soybeans, \$74.45; lucerne hay, \$225.19; and grazing, \$328.51. The farmer participated in the analysis and has presented the results at several public gatherings, including the annual meeting of the American Forage and Grassland Council.

Further steps There is a need for an evaluation of the components of successful low input dairy production systems. Traditional research utilises a series of comparative trials in a controlled setting. Our approach obtains dairy systems information for a diverse set of reduced input, moderate size dairy farms and a more intensively managed prototype farm. This is a system for analysing production and management information, consolidating the results and testing the results by modelling. The method provides results that have authenticity prized by farmers and a methodology that is accepted by scientists.

- Data collection from 10 low input farms
 - Pasture, feed purchase, milk sales, other inputs
 - Document range of performance in the field
- Intensive data from the prototype
 - Create a base herd to initiate the model
 - Include results from discipline studies
- Simulation with Simherd (DK) and other models
 - Identify characteristics of successful systems
 - Create a map for further research

Summary Participatory research yields authentic information which is very credible with farmers. When farmers have a strong voice in identifying researchable methods they take ownership of the process and provide high quality data. There is a relatively narrow window of time to solve complex systems relationships. On-farm survey data for modelling systems can be obtained in greater abundance and at lower cost than exclusive reliance on research stations.