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Factors associated with the financial performance of spring-calving, pasture-based dairy farms

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ABSTRACT

As land becomes a limiting resource for pasture-based dairy farming, the inclusion of purchased supplementary feeds to increase milk production per cow (through greater dry matter intake) and per hectare (through increased stocking rate) is often proposed as a strategy to increase profitability. Although a plausible proposition, virtually no analysis has been done on the effect of such intensification on the profitability of commercial pasture-based dairy farm businesses. The objective of this study was to characterize the average physical and financial performance of dairy systems differing in the proportion of the cow's diet coming from grazed pasture versus purchased supplementary feeds over 4 yr, while accounting for any interaction with geographic region. Physical, genetic, and financial performance data from 1,561 seasonal-calving, pasture-based dairy farms in Ireland were available between the years 2008 and 2011; data from some herds were available for more than 1 yr of the 4-yr study period, providing data from 2,759 dairy farm-years. The data set was divided into geographic regions, based on latitude, rainfall, and soil characteristics that relate to drainage; these factors influence the length of the pasture growth season and the timing of turnout to pasture in spring and rehousing in autumn. Farms were also categorized by the quantity of feed purchased; farms in which cows received <10, 11–20, 21–30, or >30% of their annual feed requirements from purchased feed were considered to be categories representative of increasing levels of system intensification. Geographic region was associated with differences in grazing days, pasture harvested per hectare, milk production per cow and per hectare, and farm profitability. Farms in regions with longer grazing seasons harvested a greater amount of pasture [an additional 19 kg of dry matter (DM)/ha per grazing day per hectare], and greater pasture harvested was associated with increased milk component yield per hectare (58.4 kg of fat and 51.4 kg of protein more per tonne of DM pasture harvested/ha) and net profit per hectare (€268/ha more per tonne of DM harvested). Milk yield and yield of milk components per cow and per hectare increased linearly with increased use of purchased feed (additional 30.6 kg of milk fat and 26.7 kg of milk protein per tonne of DM purchased feed per hectare), but, on average, pasture harvested/hectare and net profit/hectare declined (−0.60 t of DM/ha and −€78.2/ha, respectively) with every tonne of DM supplementary feed purchased per hectare. The results indicate an effect of purchased feeds not usually accounted for in marginal economic analyses (e.g., milk to feed price ratio): the decline in pasture harvested/hectare, with the costs of producing the unutilized pasture in addition to the cost of feed resulting in a lower profit. In conclusion, greater milk component yields per cow were associated with increased profit per hectare, and a greater use of purchased feeds was associated with an increase in the yield of milk components. However, on average, increasing yield of milk components through the supply of purchased feeds to pasture-based cows was associated with a decline in pasture harvested per hectare and profitability. The decline in pasture harvested per hectare with increased use of purchased supplements per cow is probably the primary reason for the low milk production response and the failure to capitalize on the potential benefits of purchased supplements, with the associated costs of growing the unutilized pasture, in conjunction with increased nonfeed variable and fixed costs outweighing the increased milk production and revenue from supplementation. Farmers considering intensification through use of purchased supplements to increase the stock-carrying capacity of the farm (i.e., stocking rate) must ensure that they focus on management of pasture and total cost control to capture the potential benefits of supplementary feed use.

Key words: dairy, grassland, farm systems, milk production, economics

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INTRODUCTION

There has been renewed interest in grazing production systems internationally because of milk price volatility and perceived animal welfare advantages (Dillon et al., 2005; Macdonald et al., 2008). Efficient grazing dairy systems are designed to optimize the use of grazed grass while maximizing lactation length and individual cow DMI. In the context of predominantly pasture-based milk production, the farming system most suited to this pasture growth pattern involves a compact calving period in spring, just before the flush of pasture growth, attempting, as much as possible, to match the seasonal supply of pasture and the herd intake demand (Dillon et al., 1995; Macdonald et al., 2008).

Because of the low cow DMI under grazing compared with cows consuming TMR (Kolver and Muller, 1998), grazing dairy cows tend to have low milk production/cow compared with housed cows; however, they also tend to have relatively low production costs per kilogram of milk and per kilogram of milk fat and protein (Dillon et al. 1995; Macdonald et al., 2011). Furthermore, although milk production/cow is low, milk production/hectare can be high (Macdonald et al., 2008; McCarthy et al., 2011). Nonetheless, the low milk production per cow is often seen as a limitation that can be improved upon through improved genetics (Ramsbottom et al., 2012), reduced stocking rate (Macdonald et al., 2008; McCarthy et al., 2011), or the provision of additional feed as a supplement to pasture (Kennedy et al., 2002; Horan et al., 2004; Roche et al., 2006). There are well-defined response curves to these management changes and, in theory, it is possible to increase milk production/cow through changes in these variables and improve productivity and profitability. For the most part, however, these response curves have been derived from data collated in controlled research environments, and very few studies have been conducted on commercial farms that describe the change in productivity and profitability that result from changes to these management variables.

The objective of this study was to utilize a database of farm physical and financial measurements to identify the main factors associated with farm profitability in commercial dairy herds and to determine the expected change in profitability with changes in these management variables.

MATERIALS AND METHODS

The Seasonal-Calving Grazing System

The optimum management protocol for seasonal-calving grazing systems was described in detail by Macdonald and Penno (1998) and Macdonald et al. (2008). Briefly, management protocols aim to have the cow harvest as much pasture as possible (Dillon et al., 1995). Mechanical harvesting of silage is practiced when pasture growth exceeds herd demand, and cows are supplemented with concentrate feeds and conserved forages when pasture growth is less than cow requirements. In the Irish dairy system, average pasture consumed/hectare is estimated to be 7.3 t of DM/ha annually, with cows also receiving 875 kg of concentrates/cow (Teagasc, 2012)

In temperate pasture systems, minimal pasture growth occurs during winter and early spring, and the peak of pasture growth occurs in mid-spring (Roche et al., 2009). As a result, cows are managed to minimize the requirements for fresh pasture during winter, through the provision of conserved forages, with or without housing, during the winter months, or are moved to an alternative property for feeding before calving, before being “turned out” to graze fresh pasture between early spring and early winter. Compact seasonal calving and breeding protocols ensure that the maximum numbers of cows are in peak lactation to coincide with peak pasture growth; the current median calving date in Ireland is March 14 (Teagasc, 2012). Producers apply “maintenance” dressings of phosphorus and potassium fertilizers and nitrogen at approximately 150 kg of N/ha throughout the season to stimulate greater pasture growth for grazing and silage (Teagasc, 2012).

Farm Physical Data

Data used in the analysis were obtained from the Irish national dairy farm database (Profit Monitor, Teagasc, Ireland); the database contains farm physical and financial data for approximately 3,000 individual dairy farmer users. In the present study, farm physical and financial performance data were extracted for 1,561 spring-calving dairy farms (representing 2,759 farm-years) with >20 cows for the years 2008 to 2011, inclusive. All herds had information on physical and financial performance.

Monthly numbers of cows, replacement heifers, and nondairy stock were averaged across each calendar year to determine average livestock units for each of the 3 respective stock categories. One livestock unit (**LU**) is a bovine of over 2 yr of age: a 1- to 2-yr-old and a 0- to 1-yr-old bovine are the equivalent of 0.7 and 0.3 LU, respectively. Farm stocking rate was calculated by dividing the hectares of forage area (pasture and forage crop area combined) utilized by the total LU on the farm.

Total milk sold by volume was divided by average dairy cow LU present on the farm to calculate aver-