Measuring labor input on pasture-based dairy farms using a smartphone

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ABSTRACT

With the cessation of milk quotas in the European Union, dairy herd sizes increased in some countries, including Ireland, with an associated increase in labor requirement. Second to feed costs, labor has been identified as one of the highest costs on pasture-based dairy farms. Compared with other European Union countries, Ireland has historically had low milk production per labor unit; thus, optimization of labor efficiency on farm should be addressed before or concurrently with herd expansion. The objective of this study was to quantify current levels of labor input and labor efficiency on commercial pasture-based dairy farms and to identify the facilities and management practices associated with increased labor efficiency. Thirty-eight dairy farms of varying herd sizes, previously identified as labor-efficient farms, were enrolled on the study and data were collected over 3 consecutive days each month over a 12-mo period, starting in May 2015 and finishing in August of 2016. This was achieved through the use of a smartphone application. For analysis purposes, farms were categorized into 1 of 3 herd size categories (HSC): farms with <150 cows (HSC 1), 150–249 cows (HSC 2), or ≥250 cows (HSC 3). Overall farm labor input increased with HSC with 3,015, 4,499, and 6,023 h worked on HSC 1, 2, and 3, respectively. A higher proportion of work was carried out by hired staff as herd size increased. Labor efficiency was measured as total hours input to the dairy enterprise divided by herd size. Labor efficiency improved as herd size increased above 250 cows with 17.3 h/cow per yr observed for HSC 3; labor efficiency was similar for HSC 1 and 2, at 23.8 and 23.3 h/cow per yr, respectively. A large range of efficiency was observed within HSC. The labor requirements had a distinct seasonal pattern across the 3 HSC with the highest input observed in springtime (February to April) primarily due to calving and calf-care duties, milking, and winter feeding. The lowest input was observed in wintertime (November to January) when cows were dry. Particular facilities and management practices were associated with efficiency within certain tasks, the most notable in regard to milking and winter feeding practices. Additionally, the most efficient farms used contractors to perform a higher proportion of machinery work on farm than the least efficient farms.

Key words: dairy farm labor, labor efficiency, hours per year, pasture-based

INTRODUCTION

Unique within the predominantly indoor systems of the European dairy industry, the Irish dairy sector is characterized by a seasonal pasture-based system with enterprises that rely heavily on family labor (Boyle, 2002). Optimizing the utilization of pasture is one of the key aspects to increased overall farm profitability in pasture-based dairy systems such as those found in Ireland, Australia, and New Zealand. However, labor is now seen as an increasing cost in these systems. As herd size increases, associated increases occur in the number of both part-time and full-time staff (Gleeson et al., 2007; O'Donovan et al., 2008). Reports from the Farm Accountancy Data Network (FADN, 2016) indicated that in 2013, 88% of labor on Irish dairy farms consisted of family labor. However, dairy herd size has increased following the abolition of the quota system in the European Union, and the number of Irish dairy farms with herds greater than 100 cows has increased from 4.5% of all Irish dairy farms in 2005 to 23% in 2016 (Teagasc, 2017).

While the average herd size in Ireland was 76 cows in 2016, it was relatively small compared with an average herd size of 419 cows in 2015/2016 in the New Zealand pasture-based system and an average herd size of 262 cows in Australia in 2016/2017 (DairyNZ and LIC, 2016; Dairy Australia, 2017; Teagasc, 2017). However, the Irish pasture-based dairy industry is undergoing a transformation similar to the change witnessed on farms in those countries since the 1990s. From 1990,

a dramatic shift has occurred in the number of dairy farms with a decrease of 18 and 60% in Australia and New Zealand, respectively, with herd size increasing by 160% (Dairy Australia, 2015; DairyNZ and LIC, 2015).

The Central Statistics Office of Ireland (**CSO**; Ireland's national statistical office whose purpose is to impartially collect, analyze, and make available statistics about Ireland's people, society, and economy) defines an annual working unit (**AWU**) or full-time staff as someone working 1,800 h/yr. Of the different sectors of agricultural work in Ireland (dairy, beef, arable, sheep, or mixed enterprises), specialist dairying is the most labor-intensive farm type with 84% of farm owners working at least 1.0 full AWU in 2013, and 94.9% working at least 0.75 AWU. In contrast, just 12.7% of farm owners in other farm sectors worked 0.75 AWU or more (CSO, 2013). The seasonality of farm labor requirements within spring-calving pasture-based systems is central to the understanding of labor demands in these systems. The tasks of calving and calf rearing require significant labor resources in the spring time (February–April in the Northern Hemisphere), making this the busiest time of year (Gleeson et al., 2007; O'Donovan, 2008). It is well-documented that the milking task accounts for the majority of labor required on pasture-based dairy farms with reports of it accounting for 40 to 50% of total farm labor in Australia and 34% in Ireland (Mein and Smolenaars, 2001; O'Donovan et al., 2008). Thus, optimizing labor-efficient practices and facilities for these tasks is of key importance when considering an increase in herd size and the associated labor increases.

According to the 2015 Irish National Farm Survey, 34% of dairy farms (319 sampled) were managing at least 74 cows per AWU (NFS, 2016). The last labor study undertaken in Ireland related to dairying revealed an estimated labor requirement of 41.3 h/cow per yr for an average herd size of 77.4 cows (O'Donovan et al., 2008). This was an improvement from the 53.8 h/cow per yr found in an earlier labor study of Irish dairy farms with a similar average herd size (O'Shea et al., 1988). However, upon comparison with the pasture-based system in New Zealand, the Irish 41.3 h/cow per yr was at a lower labor efficiency level than the 20 h/cow per yr for a much larger herd of 229 cows in New Zealand herds (IFCN, 2002). New Zealand has increasingly turned to technology as a means of circumnavigating the labor issue to improve labor productivity with a particular focus on the milking tasks, which has shown an improvement in labor efficiency and profitability (Jago et al., 2010; Edwards et al., 2013a, 2015; Eastwood and Yule, 2015). Therefore, the Irish system has opportunities to identify and implement more ef-

ficient practices to reduce the amount of labor inputted per cow.

A strong link is present between increased scale of enterprise and increased labor efficiency (O'Donovan, 2008; Deming et al., 2015). As dairy herd size increases, the farm business operation increases in similarity to other business models (e.g., requirement for semi-skilled, skilled, and managerial personnel). With the addition of more staff on farm, farmers will need to adopt new skills such as human resource management.

In conjunction with improving labor productivity and efficiency is the need to improve the image of dairy farming as an occupation. Historically, labor shortages and the difficulty of finding qualified personnel have been a struggle for dairy farmers (Winsten et al., 2010). Similar to the challenges with hired staff in Ireland, New Zealand farmers reported recruitment and retention of skilled employees as a challenge to their businesses with 40% of farmers reporting difficulty in recruitment at all skill levels (Eastwood et al., 2015). Myles (2000) previously reported the difficulty in retaining good farm staff in a sector where young farm workers described poor working conditions, labor management issues, and the absence of career progression. Other aspects of the industry that have resulted in a negative image are the long days, unusual working hours, and repetitious work associated with the milking task, which frames the working day with early morning starts and late finish times to accommodate a balanced milking interval (Porter, 1993). Farm owners and workers are putting a greater emphasis on work/life balance, which can be managed through improved labor efficiency, the addition of help on farm, or both (Macken-Walsh and Byrne, 2015).

Thus, it is crucially important to first generate factual data on the overall labor supply and demand issue on farms, and second, once the scale of the problem is observed, potential solutions can be put forward. It may be possible to reduce labor demand on farms through improving operational strategies, facilities, introduction of technology, or improved management of people and tasks on the farm. But the central point is that the labor must first be measured.

To address the issue of increased herd size and need for increased efficiency and productivity, current labor demand and efficiency must be quantified. Knowing the time required for different tasks, identification of opportunities for improvement through technology and the orientation of research and development to automating and streamlining tasks is of considerable importance. Thus, the objective of this study was to quantify levels of labor input and labor efficiency on commercial labor-efficient dairy farms and to identify