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A Review of Health and Safety Leadership and Managerial Practices on Modern Dairy Farms

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ABSTRACT. As modern dairy operations around the world expand, farmers are increasingly reliant on greater automation and larger numbers of hired labor to milk cows and perform other essential farm tasks. Dairy farming is among the most dangerous occupations, with high rates of injury, illness, and employee turnover. Lower education levels, illiteracy, and limited language proficiency increase the possibility of injury or death associated with higher risk occupations such as dairy. Sustaining a healthy, productive workforce is a critical component of risk management; however, many owners and managers have not received formal training in employee management or occupational health and safety. Optimal dairy farming management should address milk production that is sustainable and responsible from the animal welfare, social, economic, and environmental perspectives. Each of these aspects is interdependent with each other and with a sustainable, healthy, productive workforce. Very few studies address the effectiveness of risk management in the dairy industry. Studies suggest that labor management practices are a potential competitive advantage for dairy farms, but the connection with efficiency, productivity, and profitability has not been clearly demonstrated. Transformational leadership has been associated with improved safety climate and reduced incidence of injury, whereas passive leadership styles have opposite effects. There is a need to develop and evaluate the effectiveness of safety-specific transformational leadership among dairy owners and managers. A systematic approach to risk management should address worker health and safety as an integral component of production, food safety, and animal welfare. A successful program must address the cultural and linguistic barriers associated with immigrant workers.

KEYWORDS. Dairy, injury, leadership, management, safety

INTRODUCTION

As dairy farms expand capacities and increase production, operations rely on greater automation and larger numbers of hired labor. Globally,

these workers are primarily immigrants who often have little dairy experience. Dairy farming is among the most dangerous occupations, with high rates of injury, illness, and employee turnover. Sustaining a healthy, productive

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workforce is an important component of risk management. A recent study by Leigh¹ estimated that work-related injuries and illnesses in the United States cost \$250 billion in 1 year (2007)—yet there are very few studies addressing the effectiveness or return on investment of risk management strategies in any industrial sector. Many dairy owners and managers have not had formal training in employee management or occupational health and safety. Effective human resource management becomes increasingly important as dairies employ more advanced technological tools to become more efficient and productive. This paper provides an overview of current management practices as they relate to worker health and safety on modern dairies.

CURRENT PRACTICES ON DAIRIES

Farm Sustainability

Modern large-scale dairy operations are characterized as capital intensive with multiple inter-related systems and processes.² As a property of agricultural production, farm sustainability may be interpreted as either the ability to satisfy a diverse set of goals or an ability to continue through time.³ Schematically, farm sustainability consists of three interrelated components: economic, social, and ecological.³⁻⁶ Economic sustainability relates to the profit dimension, which includes production levels and their associated costs. Social sustainability relates to the people dimension including farm workers as well as the local community. Ecological sustainability relates to the environmental dimension. According to the *Guide to Good Dairy Farming Practice*, a joint publication of the International Dairy Federation and the Food and Agriculture Organization, good dairy farming practice ensures that milk is produced by healthy animals in a manner that is sustainable and responsible from the animal welfare, social, economic, and environmental perspectives.⁷ Implementing good dairy farming practice is good risk management for the short- and long-term future of the dairy farming enterprise. This *Guide* encourages dairy farmers to adopt proactive preventative practices rather

than waiting for problems to occur.⁷ Research suggests dairies implement practices aimed at ensuring animal welfare⁸; but despite being a component of farm sustainability, issues related to the physical health and well-being of owners, managers, or hired labor are not often proactively addressed on modern dairy farms.⁴

MANAGEMENT PRACTICES AND FARM EFFICIENCY

Dairy production has seen phenomenal growth worldwide in terms of milk productivity during the last 50 years. For example, US milk productivity has quadrupled since 1944. Fifty-nine percent more milk has been produced with 64% fewer cows, thereby reducing the carbon footprint (per pound of milk) by two thirds by utilizing less feed, water, and land, as well as resulting in less manure and CO₂ emissions.⁹ These improvements are due to several technological improvements in areas such as genetics, nutrition, animal welfare, and housing. Superimposed on technological improvements is the degree of managerial effectiveness when these improvements are implemented by owners, managers, and employees.

Prior studies have addressed herd management practices and their influence on various performance measures related to herd health. The influence of management practice on bulk tank somatic cell count (BTSCC) has been evaluated in several studies.¹⁰⁻²⁰ Bulk tank SCC is a function of the prevalence of intramammary infection (IMI) within a dairy herd and is an important indicator of milk quality.¹⁹ Wenz et al.¹⁹ evaluated associations between BTSCC and herd management practices such as rolling herd average, herd size, cattle importation practices, animal housing, milking and cow management, and waste management.

From an economic perspective, technical efficiency (TE) is the effectiveness with which a given set of inputs is used to produce an output. A firm is said to be technically efficient if a firm is producing the maximum output from the minimum quantity of inputs, such as labor, capital, and technology. In a technically efficient operation, resources are not wasted in

the production process. Many studies have estimated the degree of TE among dairy farms in different regions and countries using an array of statistical approaches.²¹ These studies examine the effects of management practices and level of intensification (i.e., increase in number of cows per quantity of land; or stocking rate) in an effort to explain the relative importance of inputs in dairy performance. Cabrera et al.²¹ investigated parameters that had the greatest impact on dairy farm performance and found that productivity resulted from an increase in technology and efficiency, not farm size. Cabrera et al. also reported an association between farm intensification and increased efficiencies (less feed purchases per cow), which was also reported in other studies involving farms in Spain²² and Australia.²³ The use of a total mixed ration (TMR) was found to be positively associated with higher levels of TE, likely because cows have less opportunity to sort feed and are forced to consume a more consistent balance of nutrients. As these findings relate to worker performance, the mixing of a proper TMR is totally dependent on correct mixing and feeding of the ration by the feed mixer and feed truck operator. Chidmi et al.²⁴ determined that TMR does not significantly affect TE of the most efficient farms, but only the less efficient farms. Cabrera et al.²¹ reported an increase of TE with a higher proportion of family labor versus total labor, indicating that the return on family labor is higher than that of hired labor. Additionally, milking frequency improved technical efficiency, but parlor design did not influence efficiency. Chidmi et al.²⁴ investigated other variables and their relationships to technical efficiency. Nonfarm activities or activities other than dairy (i.e., non-value-added activities) showed a negative effect on TE, indicating the importance of focusing on one enterprise (milking cows) or having additional people attempt the diversification (farming, calf program, etc.). Singh and Sharma²⁵ conducted a TE analysis on the dairy industry in India and reported that TE was negatively influenced by producer age, whereas producer innovativeness, education level, and economic status had positive impacts on technical efficiency.

The global industry trend is one of increasing farm sizes, with larger numbers of cows

due to associated economies of scale. Due to farm intensification and increased production, owners are faced with new challenges related to increased numbers of workers and ensuring safe working environments. Historically, dairy farms have been and continue to be family-owned operations. On smaller farms, most management and labor activities were performed by just a few people or by one individual. With farm expansion, management responsibilities are performed by one or a few managers and additional people are hired to perform the majority of daily production tasks such as milking, feeding, cow health, and calf care.²⁶ As more employees are hired to perform different tasks on expanding farms, managers must find more effective mechanisms to ensure that employees are performing high-quality work.²⁷ The measurement of TE is a viable approach to gauge dairy farm performance. However, our literature review did not find any studies that investigated human resource management (HRM) practices and their potential influence on farm technical efficiency.

Human Resource Management

Human resource management is the set of practices that managers use to ensure quality employee performance. This includes recruitment, selection, training, communication, evaluation, and termination.²⁸ With an increasing reliance on immigrant labor, the availability of employees is a common challenge confronted by owners.²⁹ Additional human resource challenges include employee performance evaluation, achievement of employee performance goals, worker training, and recruitment and identifying qualified employees.²⁹ As herds grow in size, owners spend less time on farm work and more time managing employees, which they perceive as a key challenge.³⁰ Prior research suggests that managers on expanding dairy farms struggle with the transition to human resource management. Bewley et al.³⁰ suggested that Wisconsin dairy producers who expanded their farm operations experienced more difficulty and less satisfaction with HRM than with other aspects of farm management. The researchers attributed these findings to the farm

managers' lack of training in human resource management.

Prior to 1990, labor management research in the agriculture sector was limited.³¹ Since this time, empirical research has concentrated on human resource functions such as recruitment and selection,³² compensation,^{33–37} and employee retention.^{37,38} There is limited research on the integration or interaction of human resource practices and farm performance.²⁹ Mugeru and Bitsch²⁹ described labor management practices of dairy farmers, and determined how these practices contributed to farm competitiveness. Their findings suggest that human resources and the emanating human resource system are potentially the source of sustained competitive advantage for dairy farms. Stup et al.²⁷ sought to identify relationships between HRM practices used on dairy farm operations and the productivity and profitability of the dairies. A significant positive relationship was found between return on equity and the use of continued training, and a significant negative relationship was found between the use of standard operating procedures (SOPs) for feeding and somatic cell count. Profitability and productivity did not appear to be major factors in producers' decision to use or not use HRM practices. Stup et al.²⁷ concluded that technical HRM practices do not significantly affect dairy farm productivity or profitability, and further research was needed to determine the effects of strategic HRM practices.

Research addressing HRM practices as they relate to worker safety behavior and performance specifically on dairy farms is scarce. Mugeru and Bitsch reported human resource practices on six case dairy farms in Michigan. Only one of these farms had Occupational Safety and Health Administration (OSHA) regulatory compliance as a HRM goal.²⁹ Lower et al.³⁹ determined the proportion of Australian farming enterprises with systems and processes that met industry and regulatory standards for health and safety. Among 100 Australian dairy operations, only 39% had written farm health and safety plans. Newly hired workers received safety training on 43% of sampled dairy farms, and workers received specific safety briefing before starting a high-risk job on 47% of farms.

Ninety-eight percent of sampled dairy farms had regular hazard inspections. Safety was discussed in meetings with farm workers on 44% of farms.³⁹

MANAGEMENT AND LEADERSHIP STYLES

Barkema et al.²⁰ investigated management style and its association with BTSCC and the incidence rate of IMI in Dutch dairy herds. Results suggested that herds managed by farmers who worked precisely, paid more attention to individual cows, and implemented measures to prevent mastitis more often had lower BTSCC. Young and Walters⁴⁰ investigated the relationship between dairy farmer personality types and farm production measures in the US state of Utah. Using the Myers-Briggs Type Indicator (MBTI) to classify personalities, Young and Walters reported limited associations between farmer personality classifications and herd production values. The authors suggested that future studies should address relationships between personality traits and labor and business management practices on dairy farms.⁴⁰

Prior research demonstrates that organizational leaders play a central role in influencing safety-related attitudes and actions in the workplace.⁴¹ Hofmann and Morgeson reported that high-quality leader-member exchange contributed to improved safety communication and safety commitment, which in turn contributed to reduced injuries.⁴² Barling et al.⁴³ demonstrated that perceptions of supervisor safety-specific transformational leadership were related to safety consciousness, perceptions of safety climate, safety events, and injuries. Accumulated data suggest that when leaders promote safety, organizations experience improved safety records and positive safety outcomes.⁴¹

A successful leader is an individual who is effective and has a positive effect on his/her environment.⁴⁴ Poor leadership can be characterized in two ways: abusive or passive. Abusive leaders are overly punitive or aggressive, and they may violate commonly accepted codes of conduct.⁴⁵ Passive or ineffective leaders lack

positive leadership skills and do not achieve desired outcomes.^{44,45} Active leadership can be characterized in terms of the transformational leadership model.^{46,47} Transformational leadership style enhances employee motivation, morale, and performance through several mechanisms. These mechanisms include connecting the follower's sense of identity and self to the collective identity of the organization; being a role model for followers that inspires them and makes them interested; challenging followers to take greater ownership for their work; and understanding the strengths and weaknesses of followers so the leader can align employees with tasks that enhance their performance. Transformational leaders thus exhibit four characteristics: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration.⁴⁸ With these characteristics, transformational leaders positively affect organizational and individual outcomes, including organizational commitment, business unit performance, employee satisfaction with leadership, and employee performance.⁴¹ Transformational leaders are considered to be highly effective agents in the workplace who are concerned about the well-being of their employees.

Limited research has examined the impact of both passive (ineffective) and active (transformational) leadership on safety-related outcomes in the workplace. Zohar⁴⁹ found that transformational leadership style was associated with improved safety climate and reduced incidence of injury. Kelloway et al.⁴¹ simultaneously examined leadership characteristics in the prediction of safety-related outcomes. The authors demonstrated that transformational and passive leadership styles have opposite effects on safety climate and safety consciousness. Safety-specific passive leadership was associated with an increase in the number of safety-related events and ultimately the incidence of injury. Safety-specific transformational leadership style was associated with a reduction in safety-related events and injuries. Kapp⁵⁰ investigated the influence of leadership practices on the safety compliance and safety participation of employees. Results indicated that greater levels of transformational

leadership are associated with greater levels of safety compliance and behavior; however, safety climate moderates the leadership–safety compliance relationship. Under a positive safety climate, employee safety behavior improved as supervisor leadership practices increased. No improvement in safety behavior was observed in nonpositive safety climates. These findings provide support to the value of strong safety climates for improving safety behavior among employees, as well as the value in improving the leadership practices of managers and supervisors.⁵⁰ No studies have specifically addressed safety-specific transformational leadership among dairy owners or managers, and future studies should address this research need.

CULTURAL, LANGUAGE, AND LITERACY BARRIERS AMONG FOREIGN DAIRY WORKERS

As modern dairy operations around the world expand, farmers have become increasingly reliant on immigrant workers to milk cows and perform other essential farm tasks. Hispanic laborers from Mexico, Central, and South America are increasingly being utilized on larger US dairies.^{51–53} Filipino workers are staffing large dairies in New Zealand,^{54,55} and Western European dairies are employing workers from Eastern European countries.⁵⁶

The US dairy industry is increasingly dependent on Hispanic immigrant labor. The US National Milk Producers Federation (NMPF)⁵³ reported an average of 3.2 workers per US farm were of domestic origin, and 2.0 workers were of foreign origin. Fifty percent of surveyed farms ($N = 1344$) from 47 states reported employing immigrant labor, which represented 62% of the US milk supply.⁵³ Researchers have reported percentages of Hispanic labor on US dairies to be 50% in New York,⁵⁷ 85–89% in Colorado,^{51,58} 92% in Vermont,⁵⁹ and 94% in California.⁶⁰

According to Harrison et al.,⁶¹ dairy workers and their family members immigrated to Wisconsin due to poverty or lack of jobs in their native country, war and its devastating

economic aftermath, desire to reunite with family members who have already migrated, and/or a family crisis, which is often medical in nature and creates debt and the need to find well-paying jobs. Even though many do not speak English on arrival, Harrison et al. reported that 37% of surveyed immigrant workers reported at least 8 years of education, with 15% graduating from high school, and nearly 11% having attended a university. Thirty-nine percent of immigrant dairy workers in Wisconsin reported having worked in agriculture in their home countries.⁶¹

Maloney⁵⁷ surveyed New York dairy farms employing Hispanic workers to identify employment practices related to language, recruiting patterns, wages, transportation, housing, and cultural issues. Maloney reported that solving the language-barrier problem is the greatest challenge, since few Hispanic workers speak English. Additionally, dairy managers must understand cultural differences to avoid misunderstandings and interpersonal problems. Maloney recommended that dairy farms establish employment policies and carefully communicate them so that all employees understand employer expectation for proper conduct on the job and farm property. Once established, employment policies are uniformly enforced with all employees.⁵²

Dávila et al. reported that Hispanic immigrant men in the United States, particularly those with limited English skills, worked in occupations with significantly higher rates of fatal and nonfatal injuries and illnesses than US-born Hispanic, non-Hispanic black, and non-Hispanic white men in 2000.⁶² Statistics show that Latino and foreign-born workers in the United States occupy lower-wage, higher-hazard jobs and sustain higher numbers of work-related injuries than non-Hispanic, native-born workers. Lower education levels, illiteracy, and limited English proficiency increase the possibility of injury or death associated with higher risk occupations.⁶³ Safety issues related to low English literacy levels of Hispanic workers on US dairy farms are a potential concern to employers. A survey of safety behaviors among US dairy producers known to employ Latino workers in a single county in a Midwest US state was conducted.

At least two thirds (total sample size of 19 dairy farms) of respondents rated 5 of 10 safety behaviors as of moderate, high, or extreme concern due to their employees' ability to read, write, speak, or understand English.⁶⁴ Inadequate safety education and inadequate instruction are two factors directly related to safety training, and can be compounded by a language barrier.⁶⁵ Smith et al.⁶⁶ suggest that cultural, linguistic, and attitude barriers should be addressed in safety trainings of foreign-born workers.

CONCLUSIONS

As modern dairy operations around the world expand, farmers have become increasingly reliant upon immigrant workers to milk cows and perform other essential tasks on the farm. Optimal dairy farming management should address milk production that is sustainable and responsible from the animal welfare, social, economic, and environmental perspectives (*Guide to Good Dairy Farming Practice*). Each of these aspects is interdependent with each other and with a sustainable, healthy, productive workforce. Physical health and well-being of owners, managers or hired labor are not often proactively addressed on modern dairy farms. There are very few studies addressing the effectiveness of risk management in the dairy industry. Managers on expanding dairy farms struggle with the transition to human resource management, expressing difficulty and low satisfaction with this aspect of farm management. There have been a few limited studies suggesting that labor management practices are a potential competitive advantage for dairy farms, but the connection with productivity and profitability has not been clearly demonstrated. The transformational leadership style (exhibiting idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration) has been associated with improved safety climate and reduced incidence of injury. On the contrary, nonpositive or passive leadership styles have opposite effects on safety climate and safety consciousness, and are associated with increased safety events and injuries. Lower education levels, illiteracy, and limited

language proficiency increase the possibility of injury or death associated with higher risk occupations such as dairy. There is a need to develop and evaluate the effectiveness of safety-specific transformational leadership among dairy managers and supervisors. A systematic approach to risk management should address worker health and safety as an integral component of production, food safety, and animal welfare. A successful program must address the cultural and linguistic barriers associated with immigrant workers.

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