

Assessment of Feeding Management in the National Dairy FARM Program

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Abstract

A number of animal welfare assurance programs have been developed in recent years to encourage the adoption of welfare standards across food animal industries and to assure the public that these standards are being followed. In contrast to the European Union, the United States has relied less on legislative action and has instead focused on the creation of retailer- and industry-driven audits and assessment programs to meet public expectations about animal welfare. An animal welfare assessment program used in the dairy industry is The National Dairy FARM Animal Care Program: Farmers Assuring Responsible Management. The mission of this Program is to provide assurance to consumers and members of the public that the dairy industry is committed to the use of best management practices to promote the highest level of animal care (www.nationaldairyfarm.com). The FARM Program provides evidence-based standards for various aspects of animal care and highlights the importance of proper feeding management practices to promote continuous improvement of the welfare of dairy animals. Feeding management of all animal groups is assessed using both animal-based measures (e.g., measurements taken directly from the animal, such as body condition score) and resource-based measures (e.g., measurements taken from the environment or management of the animal, such as milk quantity for pre-weaned

heifers, feed bunk space allowance for growing and adult animals, etc.). The purpose of this paper is to: 1) provide an overview of the FARM Program; 2) discuss the Program's evaluation of feeding management practices; and 3) review the supporting scientific literature.

Introduction

Animal welfare is a key social concern that must be addressed to safeguard the future viability of the dairy industry (von Keyserlingk et al., 2013). Compared to the European Union, the United States has minimal federal regulations for animal welfare; instead, food retailers and industry leaders have created animal welfare audits and assessment programs to assure consumers that animals raised for food have a good quality of life (Mench, 2003). To be sustainable, such audits and assessment programs must be evidence-based and reflect the shared values of relevant stakeholders.

The National Dairy FARM Animal Care Program

An animal welfare assessment program used by the U.S. dairy industry is The National Dairy FARM Animal Care Program: Farmers Assuring Responsible Management. The FARM Program was created in 2009 by the National Milk Producers Federation with the support of Dairy Management IncorporatedTM to bolster

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consumer confidence and demonstrate the dairy industry's commitment to animal care. The Program is an animal welfare assurance program that promotes a continuous improvement process to encourage the participation of dairy producers nationwide. According to the FARM Program, their basic standards and guidelines are evidence-based and incorporate the views of various stakeholder groups, as the Program's Technical Writing Group is comprised of animal welfare scientists, veterinarians, cooperative members, and dairy producers (NMPPF, 2015). Further, the Program incorporates the use of third-party verification (e.g., external evaluations conducted by trained individuals who do not have a conflict of interest with the operation or the outcome of the program) to promote social confidence and document the integrity of the Program's animal care standards and their on-going evaluation.

FARM Assessment of Feeding Management

The criteria for assessing animal welfare are generally divided into those that describe the physical environment and resources available to the animal (resource-based measures) and those that describe the state of the animal (animal-based measures; Mench, 2003). The FARM Program includes animal- and resource-based measures of welfare throughout their animal care standards and guidelines, as they pertain to: 1) nutrition, 2) animal health, 3) environment and facilities, 4) animal handling, movement, and transportation, and 5) special needs animals. This paper will focus on the nutritional component of the FARM Program for newborn and milk-fed dairy calves, growing heifers, and cows.

Evaluation procedure

After a dairy producer (e.g., individual producer, cooperative member) has shown interest in the FARM Program, the evaluator will contact the producer and schedule a date

to conduct the on-farm evaluation. On the day of the evaluation, evaluators will first conduct a short 'entrance interview' with the producer to communicate the goals of the Program and provide an overview of the evaluation procedure. Evaluators will then use the Management Checklists provided in the Animal Care Reference Manual to conduct the site evaluation and complete animal observations (NMPPF, 2013). After the evaluation is complete, evaluators review their findings, calculate observation numbers, and meet with the producer for a 'closing meeting' to discuss strengths of the operation and review areas of improvement, if necessary.

Animal-Based Measures of Nutrition

Body condition score

A direct method for assessing feeding management practices on-farm is to evaluate the condition of animals. A body condition score (**BCS**) is an assessment of the proportion of body fat an animal possesses and has been recognized by animal scientists and dairy producers as a means to assess feeding management practices (Roche et al., 2009). The FARM Program assigns BCS (1 = thin to 5 = fat; whole point increments) based on visual appraisal of the animal. Extreme BCS (either too thin or too fat) reflects an increased risk of compromised animal welfare (e.g., Roche et al., 2009). Emaciation increases the animal's risk of mild or severe lameness (Randall et al., 2015), and lower calving BCS is associated with reduced production (Waltner et al., 1993) and reproduction (e.g., Heuer et al., 1999). The FARM Program requires dairy producers to take corrective action for animals that receive a BCS score of 1. The Program goal for BCS in a herd is that 99% or more of all classes of animals score 2 or more.

Overconditioning predisposes cows to increased risk of periparturient metabolic disorders (ketosis: Gillund et al., 2001; milk fever: Roche and Berry, 2006; displaced abomasum: Dyk, 1995) and impaired reproduction (Roche et al., 2007). Further, BCS is negatively associated with DMI, particularly during the transition period (Roche et al., 2008). Although overconditioning is not directly assessed per the FARM Program, evaluators should consider the nutritional consequences of both BCS extremes. If necessary, high BCS can be scored separately from low BCS and discussed with the dairy producer during the closing meeting.

Resource-based Measures of Nutrition

Newborn and milk-fed dairy calves

The FARM Program considers a number of resource-based measures of feeding management practices on-farm. To provide clarity, the Program's assessment questions will first be provided, followed by a brief review of the supporting scientific literature.

Do “*all calves receive colostrum or colostrum replacer soon after birth, even if transported off the farm*” (NMPF, 2013, p. 15)? Colostrum management directly influences calf health and survival (Godden, 2008). During the on-farm data collection portion of the assessment, FARM Program evaluators are trained to look for evidence of proper colostrum management (e.g., written standard operating procedures, colostrometer, Brix refractometer, etc.). Components of a successful colostrum management program include: 1) calves should ingest their first meal of colostrum within 6 hr of birth; 2) colostrum should be of high quality (IgG concentration greater than 50 g/L); and 3) calves should receive 4 qt (or 10 % body weight (**BW**), whichever is greater) of high quality colostrum within 12 hr of birth (Davis

and Drackley, 1998). Dairy producers are also encouraged to work with their veterinarian to measure prevalence of failure of passive transfer (**FPT**) to assess colostrum management practices; calves are defined as having FPT if serum IgG concentration is <10 g/L when sampled between 24 and 48 hr of birth (Quigley, 2004).

Do “*calves receive a volume and quality of milk or milk replacer to maintain health, growth, and vigor until weaned or marketed*” (NMPF, 2013, p. 15)? The FARM Program emphasizes the benefits of increased milk allowance for calves during the pre-weaning period. Per the Program's Animal Care Reference Manual (2013, p. 15), “Feeding only four quarts per day of milk or milk replacer equivalent does not allow the calf to meet its nutritional requirements for maintenance, growth and development.” Holstein calves ingest 10.6 qt or more of whole milk per day when offered ad libitum (Jasper and Weary, 2002; von Keyserlingk et al., 2004), approximately twice the conventional milk allowance of 10% BW (Drackley, 2008). As a result of higher milk intake, ad libitum-fed calves have higher pre-weaning (0 to 36 d of age) average daily gain (**ADG**) compared to calves fed 5.3 qt/day (1.72 versus 1.06 ± 0.11 lb/day, respectively; Jasper and Weary, 2002). Similar weight gains have also been reported in calves fed milk ad libitum versus 10% BW (Appleby et al., 2001) and calves fed 20 versus 10% BW (Khan et al., 2007). Further, increased growth rates early in life have been associated with long-term benefits, such as reduced calving age (Raeth-Knight et al., 2009) and higher first-lactation milk yield (Soberon et al., 2012).

Providing calves more milk may reduce calf-starter grain intake during the pre-weaning period (Jasper and Weary, 2002). Fortunately, research continues to investigate methods of stimulating solid food intake pre-weaning to

reduce potential growth post-weaning (Khan et al., 2007; de Passillé et al., 2011; Khan et al., 2011). For instance, a feeding program where calves were initially offered a high milk allowance (20% BW) during the first 25 days of life gradually diluted milk with water (10% of volume/feeding) until a milk-feeding rate of 10% BW was achieved (day 26 to 30), thus calves were a low milk allowance (10% BW) in the weeks before weaning. This step-down milk-feeding program increased starter grain and hay intake and allowed calves to be weaned without experiencing a growth lag (Khan et al., 2007). Other approaches to increasing starter intake pre-weaning include group housing with calves of similar age (De Paula Vieira et al., 2010) or with older animals (De Paula Vieira et al., 2012).

Are “calves offered fresh, palatable starter feed”? Do “calves have access to palatable, clean, fresh water as necessary to maintain proper hydration” (NMPF, 2013, p. 15)? Although starter and water consumption are not directly assessed per the FARM Program, it is important for evaluators to ensure farms are offering ad libitum starter grain from the first week of life (Drackley, 2008). Evaluators should also examine feeding management protocols and confirm that farms are in compliance with standard operating procedures (SOP); for instance, if an SOP states that calves receive starter grain from 3 days of age, evaluators should verify that all calves 3 days of age or older have access to starter grain.

Growing heifers and cows

Do “rations provide the required nutrients for maintenance, growth, health, and lactation for the appropriate physiological life stage” (NMPF, 2013, p. 18)? Proper feeding management is necessary to ensure the health and welfare of all dairy animals, and promoting dry matter intake (DMI) to support milk production

is the cornerstone of successful dairying (NRC, 2001). The FARM Program encourages consultation with a qualified nutritionist to assist with ration formulation. Evaluators for the Program are encouraged to ask producers if they have an existing relationship with a nutritional consultant, how often they meet, etc. to provide evidence for the answer to this question during the evaluation.

Is “sufficient feed bunk space provided that allows all animals to feed at the same time”? Are “sufficient quantities of feed available for all animals during a 24 hr period” (NMPF, 2013, p. 18)? A majority of the literature investigates how changes in nutrient composition impacts DMI; yet, accessibility of feed (e.g., stocking density, feed distribution, etc.) may be more important than actual amounts of nutrients provided (Grant and Albright, 1995; Grant and Albright, 2001). Thus, the FARM Program guidelines focus on the animal’s ability to gain access to the feed bunk. Current industry-recommended best practices with regard to feed bunk space allowance for growing heifers 6-to-12, 12-to-18, and over 18 mo of age is 18, 20, and 24 in of linear feeding space/heifer, respectively (Dairy Calf & Heifer Association, 2010). For lactating cows housed in a freestall barn, at least 24 in of linear feeding space/cow (e.g., 1 headlock/cow) should be provided (Grant and Albright, 2001), and 30 in/cow is currently recommended for dry cows (Nordlund et al., 2006).

Although such recommendations have traditionally been considered adequate, total daily feeding time increases as feed bunk space allowance increases, especially during peak feeding times (e.g., from 25 to 36 in/cow; DeVries and von Keyserlingk, 2005). Cows are highly motivated to access freshly delivered feed (DeVries and von Keyserlingk, 2005). When feeding space is reduced, some cows

may be unable to eat when fresh total mixed ration (TMR) is delivered, which consequently shifts feeding time. Cows frequently sort TMR, which reduces feed quality throughout the day (DeVries et al., 2005). Therefore, cows forced to delay feeding due to overstocking may consume a poorer quality diet and be unable to meet their nutritional demands for milk production.

Reduced access to feed increases aggressive interactions and competitive displacements (i.e., an instigated displacement resulting in the complete withdrawal of another animal from the feed bunk) (DeVries and von Keyserlingk, 2006; Huzzey et al., 2006; Proudfoot et al., 2009), which has physiological consequences (Huzzey et al., 2012a, Huzzey et al., 2012b). Overstocking (dry cows: 1 freestall/2 cows and 13.6 in feed bunk space/cow) increases plasma nonesterified fatty acid (NEFA) concentrations and tends to increase fecal cortisol metabolite concentrations (Huzzey et al., 2012b). Cattle with lower displacement indices (e.g., cows that are frequently displaced but have difficulty displacing others) also have the highest (fastest) feeding rates (Proudfoot et al., 2009) and greatest physiological response to the stressor (Huzzey et al., 2012a). Thus, providing increased feeding space improves access to feed and reduces competition at the feed bunk, particularly for subordinate animals (e.g., often heifers).

Action Plan

After the completion of the animal care evaluation, a written Action Plan is developed if improvement is necessary. Action Plans: 1) identify opportunities for improving animal care; 2) facilitate the specific actions needed to implement improvement; and 3) provide a schedule and date for completion. For example, if only 95% of the animals scored 2 or more for BCS in a specific herd, the producer would

need to implement an Action Plan to improve individual- and herd-level BCS. The FARM Program recommends that the development of Action Plans should be a collaborative effort between the dairy producer, the evaluator, and the herd veterinarian. It is the responsibility of the FARM Program evaluator to determine whether a follow-up evaluation is necessary to assess improvement.

Conclusions

The mission of The National Dairy FARM Animal Care Program is to provide assurance to consumers that the dairy industry is committed to the highest level of animal care. The Program assesses feeding management of all animal groups through the evaluation of animal- (e.g., BCS) and resource-based measures (e.g., colostrum quality and quantity, feed bunk space allowance, etc). Action Plans are created to improve specific aspects of animal care and continuously improve the welfare of dairy animals in the U.S.

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