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Whole-milk feeding duration, calf growth, and profitability of group-fed calves in an organic production system

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ABSTRACT

The objective of this study was to evaluate the effect of early-life feeding duration on growth and economics of group-fed organic dairy calves. Heifer calves born during the spring of 2011 (n = 67) and the spring of 2012 (n = 57) were used to evaluate the effect of weaning age, growth, and profitability of group-fed calves fed once per day in an organic dairy production system. Calves were assigned to replicate feeding groups of 10 in super hutches by birth order, and were born at the University of Minnesota West Central Research and Outreach Center, Morris organic dairy. Breed groups were Holsteins (n = 15) selected for high production, Holsteins (n = 23) maintained at 1964 breed-average level, crossbreds (n = 54) including combinations of Holstein, Montbéliarde, and Swedish Red, and crossbreds (n = 32) including combinations of Holstein, New Zealand Friesian, Jersey, and Swedish Red. Groups of calves were weaned at 30 (EW, early weaning), 60 (MW, mid weaning), or 90 (LW, late weaning) d of age, and groups were fed 1.5% of birth weight of 13% total solids organic whole milk once daily and weaned when the group of 10 calves consumed an average of 0.91 kg of organic calf starter per calf per day for 4 consecutive days. Body measurements were recorded at birth, weekly during the preweaning period, at weaning, and monthly thereafter. Profitability was estimated as a function of the total cost for organic milk and organic calf starter for weaning groups to weaning and to the first 90 d of age. Preweaning group performance was weaning age, EW: 47.6 d, MW: 64.5 d, LW: 93.7 d; weaning weight, EW: 61.8 kg, MW: 79.2 kg, LW: 108.1 kg; and gain per day, EW: 0.51 kg/d, MW: 0.63 kg/d, LW: 0.75 kg/d. Body weight (BW) did not differ among weaning groups at 90 d of age; however, MW calves had lower 120-d BW than did LW calves. The EW calves did not differ from either MW or LW calves for 120-d BW. Total feed costs to weaning for groups were $1,092.97 for EW calves, $1,871.24 for MW calves, and $2,956.64 for LW calves. The cost per kilogram of gain was higher for the EW ($5.54) group of calves than for the MW ($4.60) or LW ($4.14) groups during the preweaning period. Total costs and cost per kilogram of gain for the first 90 d of age were lowest for EW ($1,595.59, $3.02) calves and highest for LW ($2,956.64, $4.13) calves, respectively.

Key words: group housing, organic dairy, profitability

INTRODUCTION

Dairy producers from around the United States have turned to an organic production system to capitalize from the higher milk price received for organic milk. The number of organic dairy farms has increased during the past decade (McBride and Greene, 2009), slowing the decline of smaller dairy operations in the Upper Midwest. According to the US Department of Agriculture (**USDA**), the number of certified organic dairy cows in the United States increased 271% from 2002 to 2008, and Minnesota had over 10,000 certified organic dairy cows in 2011 (USDA, 2012a). The number of organic dairy farms has increased due to the fact that during 2002, the USDA introduced the National Organic Program (**NOP**) as a method of standardization for organic agriculture (USDA, 2012b).

Raising heifers, either conventional or organic, is an expensive investment for a dairy operation; therefore, early-life feeding of calves is critical to the subsequent productivity and longevity of dairy cattle (Soberon et al., 2012). After feed costs, raising replacement heifers is the second largest expense on a dairy farm, accounting for 25% of the total cost of milk production (Zwald et al., 2007). The cost of feeding preweaned organic calves may depend largely upon how much nonsaleable or saleable milk is fed to calves. According to the NOP, organic dairy farms are required to feed only whole milk to dairy calves (UDSA, 2012b). This milk can be either nonsaleable (milk from newly freshened cows, sick cows, or high SCC cows) or saleable.

Currently, an increasing number of dairy producers are choosing group housing over individual hutches for calf rearing, but many questions remain in regards to costs and performance of calves raised in group housing.

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The benefits of group housing include reduced labor and bedding costs, socialization among calves, greater growth rates, and greater calf starter intake (Chua et al., 2002; Bernal-Rigoli et al., 2012). De Paula Vieira et al. (2010) reported that group-fed calves after weaning consumed more feed but had higher weight gains compared with individually fed calves.

The most common weaning age of calves on dairy farms in the United States is between 6 and 8 wk (USDA, 2010); however, de Passillé et al. (2011) found that calves weaned at 12 or 13 wk of age had greater growth rates and decreased signs of hunger during weaning and postweaning compared with early-weaned calves. On organic dairy farms in the United States, most dairy producers choose to wean calves much later than 8 wk and some later than 16 wk.

There are small differences in raising dairy calves between organic and conventional dairy farms; however, no organic milk replacers are available in the United States, and therefore, whole milk from high-SCC organic cows or bulk tank organic milk must be fed (UDSA, 2012b). The cost versus benefit of milk consumption and weaning age is very important to organic dairy producers and has not been researched with organic dairy calves. The hypothesis of the current study was that organic group-fed calves weaned at 90 d of age would have greater growth rates and higher costs of rearing to 90 d of age than calves weaned at 30 or 60 d of age. Therefore, the objective of this study was to investigate the effect of early-life feeding duration on growth and profitability of group-fed dairy calves in an organic dairy production system.

MATERIALS AND METHODS

Experimental Design and Collection of Data

This study was conducted at the University of Minnesota West Central Research and Outreach Center (**WCROC**; Morris, MN), and all animal procedures involving animal care and management were approved by the University of Minnesota Institutional Animal Care and Use Committee. The research dairy at the WCROC has a 200-head, low-input and organic grazing system. The research herd has implemented a crossbreeding approach since 2000, and details are thoroughly described in Heins et al. (2010), and the 1964 Holstein control population design is described in Hansen (2000). Data were collected for 124 organic dairy heifer calves from 2 spring-calving seasons: 67 heifer calves were born from March 13 to May 21, 2011, and 57 heifer calves were born from March 19 to May 29, 2012. Breed groups of calves were Holsteins (n = 15) selected for high production (**HO**), Holsteins (n = 23) maintained at 1964 breed-average level (**H64**), crossbreds (n = 54) including combinations of HO, Montbéliarde, and Swedish Red (**HMS**), and crossbreds (n = 32) including combinations of HO, New Zealand Friesian, Jersey, and Swedish Red (**HJS**). The distribution of calves by breed group and weaning group is presented in Table 1.

Table 1. Distribution of organic dairy calves by breed group and weaning group

	Weaning group[1]		
Breed group	EW	MW	LW
1964 Holstein	4	11	8
Holstein	4	6	5
HMS[2]	14	23	17
HJS[3]	12	10	10
Total calves	34	50	40

[1]EW = early-weaned calves (weaned at 30 d of age); MW = mid-weaned calves (weaned at 60 d of age); LW = late-weaned calves (weaned at 90 d of age).

[2]HMS = crossbreds of Holstein, Montbéliarde, and Swedish Red.

[3]HJS = crossbreds of Holstein, New Zealand Friesian, Jersey, and Swedish Red.

Calf growth and economics of crossbred dairy cattle has seldom been studied, and these data are not routinely recorded by dairy producers. Therefore, data from institutional research herds, although limited in scope, are valuable to assess traits such as growth and economics of group-fed calves in an organic production system. The breed groups varied in the number of calves; however, these observations were spread across 2 calving years, so they contributed meaningful information for breed group comparisons.

At birth, calves were separated from their dams, housed indoors in individual pens, and fed 1.89 L of colostrum per 41 kg of BW twice a day for 2 d. Calves that were healthy and aggressive were moved to group housing at 3 d of age after the morning feeding. For this study, all calves were healthy and moved to group housing. The pens or super hutches for group housing included an indoor area (3.66 × 6.10 m) bedded with organic wheat straw plus an outside access space that measured 3.66 × 6.10 m (7.32 m^2 per calf inside and outside).

Heifer calves were randomly assigned to 1 of 3 replicated weaning groups of 10 calves per super hutch based on birth order. The time for group formation ranged from 5 to 15 d in 2011 and from 2 to 21 d in 2012. Early-weaning (**EW**) groups were fed 1.5% of birth weight of 13% total solids organic milk (unpasteurized whole organic milk from high-SCC cows or from the bulk tank) once daily and weaned when the youngest calf in the group reached 30 d of age and consumption of organic calf starter averaged 0.91 kg/calf per day. Mid-weaning (**MW**) and late-weaning