Factors affecting Southeast Dairy Farmers' adoption of Management Intensive Grazing

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Abstract

Dairy farming remains a very significant agricultural sector in the Southeast and it is very essential for dairy farmers to provide their cattle with quality feed that benefit cattle's health and milk production. Cattle farmers practice different types of cattle feeding such as: confinement feeding, management intensive grazing (MIG), or traditional grazing; however, many researchers advocate for MIG practices for its many benefits. A dairy farmer survey was conducted in Georgia and Florida and a generalized logit model used to examine the factors that affect the adoption of MIG. The results showed that the farm herd size, numbers of years in key management, age, farmer's education, and farmer's off farm work affect the adoption of MIG.

Key words: generalized logit, technology adoption, management intensive grazing

Introduction

Dairy farming remains a very significant agricultural sector in the Southeast: a total of 4,319 million pounds of milk was marketed by Florida and Georgia producers in 2016 (USDA, 2017). In general, the main goal of a dairy farmer is to maximize milk production. Hence, it is essential for dairy farmers to provide their cattle with quality feed that benefit cattle's health as well as maintain the desired milk production. In order to accomplish this goal, dairy farmers need to have the best feed system for their herds from several feeding systems such as: traditional grazing, rotational grazing, or confinement feeding. Management intensive grazing (MIG) is a type of rotational grazing system where the grazing herd is moved to a new paddock within 3-4 days (UGA, 2017). This allows a rest period for other paddocks. Studies show MIG to have many benefits. Management intensive grazing operations were more profitable on per cow, and per acre basis, and less risky than confinement operations (Hanson et al. 2013; Lichtenberg et al. 2011). Hanson et al. (2013) found that veterinary, breeding, and medicine costs per cow were much less for cows that pastured than those raised in confinement systems. The study also found MIG to be a healthier practice for dairy cows. Another comparative study between moderate intensive grazing and extensive grazing systems revealed that the net income per cow was higher for dairy farms that employed moderate intensive grazing than for dairy farms that practiced extensive grazing (Hanson et al., 1998). Is MIG a compatible production system among southeast dairy farmers that require lower cost for equipment, storage, and housing infrastructure than confinement system (USDA-NRCS, 2007)? Or, is MIG a compatible production system among dairy farmers than

traditional grazing that manages the time and use of the forage and allows the grazed paddock a rest period that enhances forage regrowth?

Objectives

The objectives of this paper are:

1. To compare dairy farmer's satisfactions with three grazing systems.
2. To determine the factors that affect farmers' adoption of management intensive grazing in the Southeast region.

Data

The data for this study was collected through mail survey in 2013. The survey targeted dairy farmers throughout Georgia and Florida. A total of 126 completed surveys were returned. The survey asked "Did you use pasture as a source of forage for your milking cows?" To understand grazing practices, 83 farmers who said they used pasture as a source of forage were further asked "During the grazing season, how often did you move your milking cows to a fresh pasture/paddock when adequate forage was available?" The survey also included questions on herd size, milk production, land use, farmer characteristics, and satisfaction with current practices. The descriptive statistics indicate that 32% of the respondents used confinement feeding system and did not use pasture at all as a source of forage; 29% practiced intensive grazing where the milking cows were moved to a fresh pasture/paddock within three days or less during the grazing season when adequate forage was available; and the rest, 39%, considered as traditional farmers where the grazing was less intensive. Tables 1 and 2 represent the dairy farm, and farmers' characteristics. Dairy farmers provided detail information on the number of milking cows, dry cows, and heifers and calves in their farms.

Results

A generalized logit model was used to examine the factors that affect the adoption of MIG. Hence, the dependent variable considered were the three types of production: confinement feeding (CONF), MIG, or traditional grazing (TRAD). The variable MIG was kept as the reference category to examine MIG versus the two other types of production systems or to examine farmers' preferences among the three types of production. The Likelihood Ratio, score and Wald tests values of the model were 0.003, 0.007, and 0.060, respectively. Seven independent variables were tested for the three types of grazing systems: 'Herd size', 'How satisfied were you with your profit level?', 'How many years have you been making key management decisions for your farm?', 'What is your gender?', 'what is your highest education level?', 'Did your household have off-farm income?' "How old are you?'. The variable definitions are presented in Table 3, and the multinomial logit parameter estimates for the model are presented in Table 4. It was found that six independent variables were significant.

The herd size had positive impact on CONF vs MIG. Unlike the CONF system many MIG procedures were done manually. Adding more herd numbers need more labor work. Additionally, the pasture availability is a crucial factor for a MIG operation, and any increase in number of herd size requires larger pasture to accommodate the herd size. Improving pasture quality in the existing field may mitigate some of the concerns. As expected the variable 'education' had positive effect on CONF.

The variable 'Profit' was significant at 10% level; as the satisfaction increases the multinomial log-odds for preferring TRAD to MIG would be expected to decrease by 1.43 units while holding all other variables in the model constant. The coefficient for

CONF vs MIG was negative, though not significant. This may imply that CONF and TRAD farmers are stressed with the level of satisfaction with their farms' profit. Traditional grazing operators might have felt that due to continuous grazing the quality and quantity in forage availability has reduced. This might have led to reduced nutrient for animal, and reduced growth or milk production. As a result, MIG can be introduced for TRAD farmers that allow the grazing paddock a rest period and permits the forage for regrowth. By proper planning or management, the grazing quality can be improved which may in turn improve the milk production and the overall net return. Traditional grazing operators may be introduced with techniques such as inexpensive fences to divide the grazing field to initiate MIG. Policy emphasis with MIG's higher profit satisfaction can be lucrative for TRAD farmers. Farmers might consider MIG, if management training such as: moving the cattle from one portion to other, access to water resources, and easy access to shades are provided. We believe that the TRAD farmers' constraint may decline with additional management expertise and education that enhances both the acquisition and application of MIG system.

The variable 'age' was significant at 5% level. With increase in age the multinomial log-odds for preferring TRAD to MIG would be expected to decrease. Although CONF coefficient was not significant, the sign was negative. Older farmers may perceive MIG as promising for its many benefits. Also, older or matured farmers could be less risk averse and financially more aggressive regarding the MIG plans. Most probably the older farmers think that the long-term cost is lower in MIG because of reduced hay feed than TRAD system. Another reason could be that older age group appreciates benefits of MIG such as soil conservation and better weed control (USDA-NRCS, 2009). Overall, older

farmers are better at balancing between the production and longest and efficient use of forage.

Number of years in key management position had positive effect on TRAD vs MIG. Perhaps farmers with many years of experience are reluctant for change. Therefore, on-farm expositions for newer farmers may be effective in adoption of MIG in this region. Not having off farm income had negative impact on both TRAD vs. MIG and CONF vs. MIG. This outcome suggests that full time farmers are more likely to adopt MIG, since MIG adoption in general requires higher attention and higher workloads than TRAD.

Conclusion and Recommendations

Though major considerations need to be evaluated before changing to any other system, MIG system can be promoted in the Southeast for its numerous benefits. Satisfaction with farm profit may influence farmers to transitioning to MIG. The new farmers are more likely to adopt MIG. The research found that full time, and older/matured farmers may be at better advantage with MIG system. Future studies with larger samples with farmers' financial structures could provide better outlook on this matter.

Table1. Dairy farmers' characteristics.

Production system	Mean age	Male (%)	Female (%)	H.S. or equivalent (%)	College or vocational training (%)	Bachelor's degree (%)	Total (%)
CONF	53	29.6	2.6	4.4	8.8	16.0	31.6
MIG	56	28.7	0.9	11.4	4.4	9.7	29.8
TRAD	55	34.8	3.5	14.0	14.0	7.1	38.6

Table 2. Mean (Median) of farm characteristics.

Production system	Herd size	Acres	Milk production per cow(lbs/year)
CONF	2038(800)	1097(415)	24961 (21646)
MIG	765(370)	513(328)	20545 (16425)
TRAD	642(255)	445(265)	17942 (19000)

Table 3: Variable Definition and Descriptive Statistics

Variable	Description
MIG	Management Intensive Grazing
CON	Confinement
TRAD	Traditional
Herd Size	number of milking cows, dry cows, and heifers and calves
Profit	Satisfied with farm profit:4= neutral or satisfied; 0 otherwise
Gender	2= if respondent is a female; 1 otherwise
Experience	Number of years in key management
Education	Highest education level :4= Bachelor's degree or higher; 0 otherwise
Age	Age in years
Off-farm	Off- farm income : 2=yes; 1=No

Table 4: The Maximum Likelihood Estimates

Parameter		Production	Estimate	Standard Error	Pr > ChiSq
Intercept		CONF	0.7744	1.7887	0.6651
Intercept		TRAD	3.5714**	1.6835	0.0339
Herd Size		CONF	0.0004*	0.000235	0.0677
Herd Size		TRAD	0.0001	0.000251	0.5990
Profit	4	CONF	-0.3566	0.7334	0.6268
Profit	4	TRAD	-1.4314*	0.7649	0.0613
Gender	2	CONF	1.7871	1.3184	0.1753
Gender	2	TRAD	1.7558	1.2828	0.1711
Experience		CONF	0.0114	0.0289	0.6923
Experience		TRAD	0.0505*	0.0290	0.0812
Education	4	CONF	1.6716***	0.6482	0.0099
Education	4	TRAD	0.3637	0.5400	0.5006
Age		CONF	-0.0414	0.0370	0.2631
Age		TRAD	-0.0754**	0.0373	0.0431
Off-farm	1	CONF	-0.4587	0.6183	0.4581
Off-farm	1	TRAD	-0.9200*	0.5530	0.0962

*Note: Triple, double, and single asterisks indicate significance at the 1%, 5%, and 10% level, respectively.

Reference

Hanson, J.C., D. M. Johnson, E. Lichtenberg, and K. Minegishi. 2013. "Competitiveness of management-intensive grazing dairies in the mid-Atlantic region from 1995 to 2009". *Journal of Dairy Science*, 96(3), 1894-1904.

Hanson, G. D., L. C. Cunningham, M. J. Morehart, and R. L. Parsons. 1998. "Profitability of Moderate Intensive Grazing of Dairy Cows in the Northeast". *Journal of Dairy Science*. 81(3), 821-829.

Lichtenberg, E., K. Minegishi, J. C. Hanson, and D. M. Johnson. July 2011. "Economics of Intensive Grazing in Dairy Production in the Mid-Atlantic". Agricultural and Applied Economics Association Annual Meeting. Pittsburgh, Pennsylvania

UGA, College of Agricultural and Environmental Sciences (2017). "Determining the Number of Paddocks". Accessed at: http://caes2.caes.uga.edu/sustainag/grazing/grazingsysdes/determpadd.html

USDA, National Agricultural Statistics Service. Milk Production – 2017 (February 2017). Available at: http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1103

USDA, Natural Resource Conservation Service, Profitable Grazing-Based Dairy Systems – 2007 (May 2007). https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044245.pdf