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**A Comparison of Market Exit Prices between Kentucky Dairy Producers and Average
United States Dairy Producers**

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A Comparison of Market Exit Prices between Kentucky Dairy Producers and Average United States Dairy Producers

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Abstract: The number of dairy operations and cow numbers in the United States is declining. This leads to the question of whether the decline is nationwide or in specific areas of the country and what regional effects may cause a drop in cow numbers. This question was analyzed in many ways. Using the GLM procedure in SAS it was determined that total operating cost and profit margin were significantly different in regions of the country. Change in cow numbers however was not significantly affected by the total operating cost or profit margin received by dairy producers. Even though the southeast region experienced the highest profit margins they also accounted for the highest drop in cow numbers. These results suggest that region of the country is significant when analyzing operating costs and profit margins but does not explain the drop in dairy cattle.

Introduction and Background

The dairy market in the United States follows the pattern of supply and demand. Different from other goods, there is a lag time in the increase or decrease of productions. A producer of shoes is able to slow production if the demand is low simply by producing fewer shoes. Even in agriculture, if the demand for corn is low, a farmer can produce less by planting a different crop. This is not the case in the dairy industry. When the demand of milk drops suddenly, a producer cannot simply take milk off the market, cows still need milked every day. This abundance of milk on the market causes the price to drop. When a drop in milk price is complemented by a high operating cost, it can be detrimental to a farmer's income. Many times producers have to quit farming and leave the market.

Milk pricing and markets are very complex in the dairy industry. There are different markets for milk and depending on which market a producers milk sells to will affect the pricing of the milk. In the Southeast region of the United States, there is a large demand for fluid milk. This gives southeast dairy producers a great opportunity to sell milk at a higher price. Due to the differences in milk markets margins for dairy producers are different all over the county.

The differences are important in the dairy industry because it may determine milk check to the producers. The more demand for fluid milk, like in the southeast, the more a producer will receive for their milk. In areas of the country where milk is made into cheese, butter, or other dairy products the price a producer is lower. This will have an effect on the profitability of the dairy producer.

Objectives

There were several objectives to this study: The first was to determine if region of the country was a significant factor in the profit margin of dairy producers. The second objective of the study was to determine if region of the country was a significant factor in the total operating cost and if the different variables of operating cost were significantly different between each area of the country. The final main objective was to determine if total operation cost and profit margin was a significant indicator of the change in cow numbers from year to year, indicating dairy producers leaving the market. Other factors taken into consideration were if milk production or somatic cell count were significant indicators of profit margin and total operating cost.

Literature Review

Dixit (1989) explains that the model for market exit is $P < w$ where p is the price a producer is receiving for his commodity and w is the operating cost. Tauer (2006) takes the model explained by Dixit and applies it to a dairy production format. Tauer (2006) examined the market exit prices for a dairy producer in New York. Operation cost and milk prices per hundred weight of milk (**cwt**) were collected from 1993 to 2002. Tauer (2006) points out the little change in operation costs and explains that it is due to the fact there has been a continuous increase of milk production per cow. The market exit price was found to be between \$10.05 and \$13.48, depending on the farm size. The lowest milk price that was reported in the 10 year period was \$11.80 which Tauer described would lead to market exit of farmers below 250 cows. In the conclusion Tauer explains that dairy producers may not get out when the price of milk drops below the operating cost because the milk price often recovers and that non-financial considerations often come into play when determining to whether to exit the market.

The model in the current study analyzes market exit from different approaches. One way is the broadening of the area by analyzing the entire United States. Second by determining if there was a regional effect in the market exit variables described by Dixit (1989). Finally, to determine if the market exit variables were significant in market exit of the dairy industry, measured by the number of cows.

Data and Methods

Financial data from 2005-2013 was collected from United States Department of Agriculture National Agricultural Statistics Service. Data was collected from 23 states responding to the USDA survey. Milk production and somatic cell count records were obtained from USDA Animal Improvement Program data. Average milk production per cow and somatic cell count were recorded for each of the 23 states with financial records. States were grouped into different regions to determine a regional effect, shown in table 1. Data was analyzed using the GLM procedure in SAS (SAS Institute Inc., Cary, NC, USA). Profit margin, total operating costs, variables in the total operating costs, and change in cow numbers were all examined as the dependent variables. Independent variables included region, year, milk production, and somatic

cell count. Correlations between total operating cost and operating cost variables and correlations between total operating costs and milk production and somatic cell count were examined using the CORR procedure in SAS.

Table 1: The different regions included in the study and the states making up each region

West	Midwest	Northeast	Southeast
California	Illinois	Maine	Florida
Idaho	Indiana	New York	Georgia
Oregon	Iowa	Pennsylvania	Kentucky
Texas	Michigan	Vermont	Tennessee
Washington	Minnesota		Virginia
	Missouri		
	Ohio		
	Wisconsin		

Results

Region of the United States was significantly different for both total operating cost and profit margin. Table 3 displays the average profit margin and total operating cost for each area of the country. Regions were also significantly different when examining the different variables of the total operating cost. The purchased price of feed made up the highest percent of the total operating cost with an average of 46% of the total. The western region had the highest cost for purchased feed at \$8.91/cwt, whereas the Midwest had the lowest cost of purchased feed at \$6.21/cwt. Table 2 displays each variable of the total operating cost and the region with the lowest and highest cost for each variable. The milk price was the highest contributor to total income with an average of 88% of the total. The southeast region saw the highest milk prices with an average of \$18.99/cwt whereas, the west received the lowest with an average of \$16.98/cwt. When examining the effects of total operational cost and profit margin effects on the change in cow numbers neither profit margin nor total operational cost or their interactions with region of the U.S. was a significant factor. The total change in cow numbers for each region from 2005-2013 can be seen in table 3.

Table 2: Variables included in total operating cost and the regions that experiences the highest and lowest costs.

Variable	Price (\$/cwt)	
	Highest	Lowest
Purchased Feed	\$ 8.91 (W) ¹	\$ 6.21 (MW)
Homegrown Feed	\$ 5.73 (NE)	\$ 2.54 (W)
Grazed Feed	\$ 0.24 (SE)	\$ 0.12 (W)
Vet	\$ 0.98 (MW)	\$ 0.68 (W)
Bedding	\$ 0.50 (NE)	\$ 0.13 (SE)
Marketing	\$ 0.30 (SE)	\$ 0.23 (MW)
Custom Services	\$ 0.68 (SE)	\$ 0.50 (MW)
Fuel	\$ 1.02 (NE)	\$ 0.62 (W)
Repairs	\$ 0.82 (NE)	\$ 0.54 (W)
Interest	\$ 0.12 (NE)	\$ 0.10 (MW)

¹Region of the country is listed parenthesis.

Table 3: The total operation cost, profit margin and change in cow numbers broken for each region including the highest and lowest prices and which year those occurred.

Region	Total Operation Cost (\$/hundred weight of milk)	Profit Margin	Change in Cow Numbers (1,000's)
SE	\$ 15.92	\$ 5.39	-101
NE	\$ 17.29	\$ 3.44	-91
MW	\$ 15.32	\$ 4.56	370
W	\$ 14.45	\$ 4.57	138
Highest Year	\$ 20.61 (2013)	\$ 7.63 (2007)	4.97 (2008)
Lowest Year	\$ 12.42 (2006)	\$ 0.79 (2009)	(7.21) (2010)

Discussion and Conclusions

Even though the southeast region of the United States saw the highest profit margins and a lower operating cost, the region still dropped the most in cow numbers. This may suggest that there are more farms in this region leaving the dairy market. Even though a different approach to the subject was taken, results may support the theory by (Tauer, 2006) in that more than profit is a major decision on when to exit the market. Seeing that the southeast region of the United States is the most profitable region in the dairy industry more research is needed to determine why the drop in dairy cattle is so dramatic.

References

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