An Analysis of Perceived Important Challenges Currently Facing the U.S. Grass-fed Beef Industry

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Abstract

A survey was conducted to determine U.S. grass-fed beef producer perceptions of important challenges facing the industry. The most important challenges facing grass-fed beef producers were shortage of processors, lack of a clear marketing system, pasture management problems, and the long period of time required to get animals to the desired market weight.

Key words: Grass-fed beef, grain-fed beef, challenge, industry

Introduction

According to FeedInfo News Service (2010), alternative beef production systems supply approximately 3% of the U.S. beef market, producing natural, grass-fed, and organic beef. Grass-fed beef market is substantial and expanding (Spiselman, 2006). Despite increased consumer demand for grass-fed beef, the industry still faces a number of challenges, some of which include: higher operating costs, a shortage of processors, loose standards for the definition of "grass-fed", lack of consistent quality, and consumer wariness about taste and texture (Cross and Light, 2011).

Availability of pasture and land for grazing is another challenge facing the industry. The growing population has reduced the amount of land available for pasture and other forage needed for grass-finishing (Mathews and Johnson, 2013). The number of all farms in the U.S. in 2012 was estimated at 2.2 million, down 11,630 from 2011 (USDA-NASS, 2013). Total land in farms decreased from 917 million acres in 2011 to 914 million acres in 2012, down by 3 million (USDA-NASS, 2013). According to USDA-NASS (2013) reports, grazing land for livestock accounted for about one-fourth of the privately held land in the U.S. Operational adjustments such as reducing cattle numbers, obtaining additional land, and perhaps adopting forage improvement technologies are needed for small farms to transition to grass-finishing (Young et al., 2013). Such adjustments tend to be expensive for small scale grass-fed beef producers. Production-related challenges faced by forage-finishing beef systems are inconsistency in their supply of cattle for slaughter (seasonality), forage quality, and availability of grazing land (Martin and Rogers, 2004; Wilson 2001). Production systems have been adjusted to accommodate new market segments of health-conscious and environmental-sensitive consumers. Competition from grain-fed beef, lack of clear marketing systems, high costs of production, long

period of time needed to bring grass-fed beef to harvest weight are some of the challenges that this study explores.

Concerns raised by Martin and Rogers (2004) are closely connected with the challenges addressed in this study. In their review of challenges and potential for grass-fed beef producers, Martin and Rogers (2004) identified insufficiency of grass-fed beef supply to satisfy packer capacity, transportation costs of grass-fed beef to market, inadequate distribution channels, and low consumer demand for grass-fed beef as the main challenges facing the industry. Using data from a nation-wide survey conducted in the U.S., this paper examines 11 challenges faced by grass-fed beef producers. Some of the aforementioned challenges will be investigated in the current study as a way of evaluating steps that can be taken by stakeholders in the U.S. grass-fed beef industry in addressing them.

Materials and Methods

This study used data from a 2013 mail survey of U.S. grass-fed beef producers. The survey questionnaire was developed following procedures outlined by Dillman et al. (2007). Information on farm management practices such as breeding, animal selection, and pasture management; marketing information; goal structure of grass-fed beef producers; and producers opinions of major challenges facing the industry were solicited.

The survey was sent to a total of 1,052 U.S. grass-fed beef producers on August 10, 2013, following the Tailored Design Method as recommended by Dillman et al. (2007). Names and addresses of the grass-fed beef producers to be contacted were obtained from an extensive Internet search. A directory containing U.S. grass-fed beef farms and ranches was obtained from the website, www.eatwild.com. Other internet sources included the American Grass-fed Association (AGA), Market Maker, and some individually advertised grass-fed beef farms. A

total of 384 usable surveys were received. Returns from individuals no longer in the grass-fed business and non-deliverable addresses totaled 117. After adjusting for non-deliverable returns and those from farmers who were no longer in the grass-fed beef business, a 41.1% return rate was obtained. A similar return rate was obtained by Gillespie et al. (2007) in their conventional beef producer survey.

The survey group was comprised of farmers and ranchers from a wide demographic range in terms of size of operation and number of animals. Cow-calf as well as seedstock producers were identified in the study. Information regarding farm sizes, other farm enterprises operated, major breeds kept, and certified organic status were solicited in the survey. Important to our present study was the question addressing their perceived important challenges facing grass-fed beef producers: "*To what extent do you agree or disagree that the following challenges are having significant negative impacts on grass-fed beef producers in your area? Please select a number in each category based on the headings provided.*" The numbers were associated with the following respective responses: *strongly agree*, *somewhat agree*, *neutral*, *somewhat disagree*, and *strongly disagree*. The following were the listed challenges: (1) High cost of grass-fed beef production, (2) lack of a clear marketing system for grass-fed beef, (3) strong market competition from feedlot beef, (4) lack of steady demand for grass-fed beef, (5) pasture management problems, (6) limited land available for grazing, (7) diseases, (8) long period of time required to get animals to slaughter weight, (9) shortage of processors close by that will handle grass-fed beef, (10) grass-fed beef production is labor intensive relative to cow-calf production, and (11) transportation and distribution problems of grass-fed beef.

Extensive review of literature on topics that focus on beef production and marketing challenges was undertaken (Gwin, 2009; Martin and Rogers, 2004; Mills, 2003; Mathews and

Johnson, 2013). Furthermore, personal interviews with 10 Louisiana grass-fed beef producers provided insights to important challenges they faced.

To start our analysis, summary statistics comprising means, modes, and standard deviations are presented for responses to each of the challenges provided. Ordered probit models are estimated to determine the drivers of perception of the importance of challenges that grass-fed beef producers believe pose negative impacts on producers in their areas.

Ordered Probit Model

Ordered probit model allowed us to determine the factors that impacted farmers' perceptions of the importance of each of the eleven challenges. This model is useful in multivariate analysis with an ordinal dependent variable (Greene, 2003, p.875). Each statement contains five possible responses, with "1" associated with strong disagreement and "5" associated with strong agreement with the advanced statement. The undesirable consequence of using a linear regression model for such a problem is its implicit assumption of equality of scales in describing closely related attributes. For instance, linear regression assumes the difference between a *strongly disagree* response and a *somewhat disagree* response to be the same as that between a *somewhat disagree* and *neutral* response. Since responses in our case reflect ordinality, we lack sufficient evidence that the differences are the same (Daykin, and Moffatt, 2002).

The ordered probit assumes that individual respondents have a score, s_i, represented by the ordered probit regression equation, $s_i = X\beta + \varepsilon$, where the error term ε is normally distributed, β is a vector of parameters estimated, and *x* is a vector of respondent characteristics relevant in explaining attitudes. The score, s_i, represents individual *i*'s response to the survey question with values 1, 2. . . 5. The score and the cutpoints are used to generate probabilities for

each respondent's weight placed on each of the 11 challenges. Likelihood ratio tests are estimated to test overall significance of the explanatory variables used. The signs on the ordered probit parameter estimates provided directional effects of the explanatory variables on producer response.

The following variables were used to explain grass-fed beef producers' responses to the 11 challenges: *Cow-calf Producer* is a dummy variable indicating whether or not the respondent produced weaned calves. *Certified Organic* indicates whether or not the farmer operates a certified organic farm. *Land size* is the total number of hectares on the farm. *Number of Cattle Kept* is the total number of cattle kept on the farm during the study period. *Direct Sale to Consumers* is a dummy variable indicating whether or not the farmer sold meat directly to consumers. *Age* is the age of the producer. *College Degree* is a dummy variable indicating whether or not the farmer holds a 4-year college degree. *% Income from Grass-fed Beef* is the percentage of annual net farm income from grass-fed beef enterprise. Regional variables included: *Northeast*, indicating the farm was located in CT, MA, MD, ME, NH, NJ, NY, PA, or RI; *Northwest*, indicating the farm was located in AK, CO, ID, MT, OR, WA, or WY; *Southeast*, indicating the farm was located in AL, FL, GA, LA, MS, NC, SC, TN, VA, or WV; and *Southwest*, indicating the farm was located in AZ, CA, NM, NV, TX, OK or UT. The base was the *Midwest*, indicating the farm was located in IA, IL, IN, KS, KY, MI, MN, MO, NE, OH, SD, or WI.

Results and Discussion

Eighty percent of the respondents were involved in the cow-calf segment. The mean operated hectares was 337 with a standard deviation of 891. The average number of cattle kept was 127 with a standard deviation of 372. Ninety-six percent of respondents rotated their

animals. The majority of grass-fed beef producers, 95%, sold meat, with the remaining 5% selling only live animals. Of the 95% producers selling meat, 96% sold directly to consumers. The average age of producers who responded was 54, with 70% holding 4-year college degrees. On average, 49% of annual net farm income came from the grass-fed beef operation. Of the 5 regions of the U.S., 30% were located in the *Midwest*, which represented the highest percentage of all the regions specified. The *Northeast* followed with 21%, 17% were located in the *Northwest* and the *Southeast* (each), and 15% were located in the *Southwest*.

Summary statistics for each of the 11 important challenges faced by grass-fed beef producers are provided in Table 2. The four most important challenges to the respondents were: shortage of processors, lack of clear marketing systems, pasture management problems, and long period of time required to get animals to the desired slaughter weight. Table 2 provides the percentage responses for each level of agreement for the 11 advanced challenges, their mean values, and the modal levels.

The values of the log-likelihood at each stage of the iterative process were observed. The first log-likelihood, normally treated as the restricted log-likelihood, sets all the slope parameters equal to zero. The importance of this step is to set up a starting point to be compared with the maximized unrestricted log-likelihood value. Because we used 15 explanatory variables in our model, the likelihood ratio statistic is distributed χ^2 (15) under the null hypothesis that none of the 15 variables have an effect. Strong overall significance of the model was indicated by the *p* value less than .01.

Shortage of Processors

Results in Table 2 indicate a general agreement that a shortage of grass-fed beef processors was having a negative impact on grass-fed beef producers. The mean response was

3.77 and the modal response was "strongly agree". Ordered probit parameter estimates (Table 3) provide the overall directional effects of the explanatory variables on the probability of producer response. Parameter estimates show that larger-scale (in terms of hectares operated) producers, those who sold beef directly to consumers, those who were more specialized in grass-fed beef (earned a higher percentage of annual net farm income from grass-fed beef), and older and/or college-educated producers were less likely to agree that a shortage of processors was having a negative impact on grass-fed beef producers in their areas.

Lack of Clear Marketing Systems for Grass-Fed Beef

Grass-fed beef producers generally agreed that lack of a clear marketing system for grass-fed beef negatively impacted their operations. The mean response was 3.72 and the levels that received relatively high responses, 25% each, were strongly agree, somewhat agree, and neutral levels. Grass-fed beef producers who were certified organic, those who operated larger farms, and those who direct marketed their beef were less likely to agree with the statement that lack of clear marketing system negatively affected grass-fed beef production in their areas.

Pasture Management Problems

The mean and the modal levels for pasture management as a challenge facing grass-fed beef producers was 3.71 and "strongly agree", respectively. Larger-scale producers were more likely to agree that pasture management was negatively impacting grass-fed beef producers in their areas. Producers from the *Midwest, Northeast, and Northwest* were more likely than those in the *Midwest* to agree that pasture management problems were negatively impacting grass-fed beef producers in their areas. Producers from the *Southeast* were less likely than those from the *Midwest* to agree with this statement.

Long Period of Time Required to Get Animals to Slaughter Weight

Grass-fed beef producers generally agreed that the long period of time required to get grass-fed beef cattle to slaughter weight was negatively affecting grass-fed beef producers in their areas. The mean response was 3.66, just below "somewhat agree", with the modal level as "strongly agree". Larger-scale producers, cow-calf producers, and those who were more specialized in grass-fed beef were more likely to agree that this challenge was negatively impacting grass-fed beef producers in their areas. Unlike cattle finished conventionally on grain, grass-fed beef animals generally take a relatively longer time to be ready for harvest.

Limited Land Available for Grazing

Grass-fed beef producers generally agreed that limited land available for grazing was negatively affecting producers in their areas, with a mean response of 3.45 and a modal response of "somewhat agree." Cow-calf producers were more likely to agree that limited land for grazing negatively impacted grass-fed beef operations in their areas. Relative to respondents from the *Midwest,* those located in the *Northeast* were more likely to perceive limited land for grazing to be a challenge to producers in their areas, perhaps due to population pressure in this region.

High Cost of Grass-fed Beef Production

Grass-fed beef producers generally agreed that high costs involved in grass-fed beef operations negatively impacted their enterprises. The modal level was "somewhat agree" with a mean response of 3.22. Larger-scale grass-fed beef producers were less likely to agree that high costs of production negatively impacted grass-fed beef operations in their areas. A plausible argument for the result from the larger-scale grass-fed beef producers would be the economies associated with their scale of operation.

Labor Intensive Relative to Cow-calf Production

Thirty-eight percent of respondents agreed that labor intensity of grass-fed beef operations negatively affected grass-fed beef production in their areas. Among the challenges identified by Young et al. (2009) as being important to grass-fed beef industry was the high level of labor required to operate grass-fed beef systems. The mean value was 3.12 associated with "somewhat agree" as the modal level. Cow-calf producers were more likely to agree that labor intensity of grass-fed beef negatively impacted grass-fed beef producers in their areas.

Transportation and Distribution Problems

The modal response for transportation and distribution problems was "neutral." Thirty-seven percent of respondents agreed that transportation and distribution problems were having significant negative effects on grass-fed beef producers in their areas; 33% disagreed with the statement. Cow-calf producers, those who direct marketed beef, those who were more specialized in grass-fed beef, and those from the *Southwest* (relative to the *Midwest*) were more likely to agree with the statement.

Strong Market Competition from Feedlots

Forty-seven percent of respondents disagreed that market competition from feedlot beef was negatively affecting producers in their areas. The mean value was 2.76, and the modal response was "somewhat disagree." Certified organic grass-fed beef producers were less likely to agree that there was strong market competition from feedlot beef.

Lack of Steady Demand for Grass-fed Beef

Respondents generally disagreed that a lack of steady demand for grass-fed beef was negatively impacting grass-fed beef producers in their areas. The mean response for the statement was 2.43. The modal level was "somewhat disagree" with 32% of responses.

Diseases

Sixty-seven percent of respondents disagreed with the statement that diseases were negatively affecting grass-fed beef producers in their areas. The mean response was 2.09, which reflects the "somewhat disagree" level. Older respondents were more likely to agree with the statement that diseases significantly affected grass-fed beef producers in their areas.

Summary and Implications

Four challenges were identified to have significant negative effect on grass-fed beef operations. These challenges were: shortage of processors, lack of a clear marketing system, pasture management problems, and long period of time required to get animals to the desired slaughter weight. The first 2 of the top 4 challenges are institutional in nature and thus call for institutional solutions developed by the industry and supported by integrated research and extension efforts by agricultural economists and animal scientists. Establishment of decentralized processing facilities across different states will solve the shortage of processors problem. Whereas research and extension efforts are needed for the remaining three problems. It should be noted, however, that other challenges also had significant associated levels of agreement, suggesting that these challenges are of importance for at least some segments of the grass-fed beef industry.

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Tables and Figures

Table1. Summary Statistics of Variables Used.

Variables	N	Mean	SD
Production and Marketing			
Cow-calf (= 1 if cow-calf, 0 otherwise)	384	0.80	0.40
Organic (= 1 if organic, 0 otherwise)	383	0.10	0.30
Land size (in hectares)	376	336.64	890.50
Number of cattle kept (head)	383	126.78	371.69
Direct sell to consumers (= 1 if yes, 0 otherwise)	369	0.96	0.19
Demographic			
Age (years)	380	54.66	13.73
College degree (=1 if have a college degree, 0 otherwise)	384	0.70	0.46
Income			
% of net income from grass-fed beef operation	375	49.20	-
U.S. Regions			
Midwest, MW (=1 if from MW region, 0 otherwise)	384	0.32	0.47
Northeast, NE (=1 if from NE region, 0 otherwise)	384	0.21	0.41
Northwest, NW (=1 if from NW region, 0 otherwise)	384	0.17	0.38
Southeast, SE (=1 if from SE region, 0 otherwise)	384	0.17	0.34
Southwest, SW (=1 if from SW region, 0 otherwise)	384	0.15	0.28

Table 2. Responses to Important Challenges Facing the Grass-fed Beef Industry.

Challenge	Mean	[2]SD	[1]Mode
Shortage of processors	3.77	1.42	Strongly agree
Lack of clear marketing system	3.72	1.19	Strongly agree
Pasture management problems	3.71	1.36	Strongly agree
Long period of time required to get slaughter weight	3.67	1.24	Strongly agree
Limited land available for grazing	3.45	1.36	Somewhat agree
High cost of grass-fed beef production	3.22	1.22	Somewhat agree
Labor intensive relative to cow-calf production	3.12	1.22	Somewhat agree
Transportation and distribution problems	3.04	1.21	Neutral
Market competition from feedlot beef	2.76	1.29	Somewhat disagree
Lack of steady demand for grass-feed beef	2.43	1.23	Somewhat disagree
Diseases	2.09	0.98	Somewhat disagree

Table 3.Ordered Probit Results of Important Challenges Currently Facing the Grass-fed Beef Industry

	Shortage of grass-fed beef processors close by		**Lack of clear marketing system for grass-fed beef**	
Variable	**β**	**SE**	**β**	**SE**
Certified organic	-0.163	0.213	0.361*	0.217
Cow calf producer	-0.164	0.150	-0.085	0.147
Land size	-0.230*	0.227	-0.347**	0.204
Number of cattle kept	0.001	0.010	-0.001***	0.171
Direct sell to consumers	-0.481**	0.214	-0.489*	0.285
% of income from grass-fed	-0.067*	0.039	-0.003	0.038
Age	-0.007*	0.004	-0.004*	0.005
College degree	-0.229*	0.128	-0.013	0.128
NE	0.264	0.203	-0.283	0.202
SE	-0.199	0.233	-0.284	0.238
NW	0.149	0.207	-0.192	0.202
SW	-0.185	0.271	0.332	0.311
Observations	359		359	
Pseudo R^2	0.024		0.019	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.

Table 3. Continued.

	Pasture management problems		**Long period of time required to get animals to slaughter weight**	
Variable	**β**	**SE**	**β**	**SE**
Certified organic	0.089	0.251	-0.309	0.209
Cow calf producer	-0.082	0.137	0.345**	0.151
Land size	0.069	0.218	-0.440**	0.229
Number of cattle kept	0.011*	0.105	0.003	0.013
Direct sell to consumers	0.323	0.335	0.223	0.273
% of income from grass-fed	0.018	0.037	-0.069*	0.036
Age	0.002	0.004	-0.003	0.004
College degree	0.030	0.129	0.046	0.122
NE	0.178**	0.161	0.126	0.225
SE	-0.761***	0.227	-0.076	0.272
NW	0.657***	0.224	-0.036	0.238
SW	-0.376	0.295	-0.449*	0.243
Observations	359		360	
Pseudo R^2	0.014		0.021	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.

Table 3. Continued.

	Limited land available for grazing		High cost of grass-fed beef production	
Variable	**β**	**SE**	**β**	**SE**
Certified organic	0.278	0.226	-0.220	0.217
Cow calf producer	0.218*	0.139	0.221	0.136
Land size	0.011	0.001	-0.001*	0.204
Number of cattle kept	0.011*	0.105	0.003	0.013
Direct sell to consumers	-0.358	0.281	0.022	.0287
% of income from grass-fed	0.043	0.036	-0.081*	0.037
Age	0.005	0.004	-0.007	0.004
College degree	0.027	0.130	0.011	0.131
NE	0.476**	0.139	-0.393	0.162
SE	-0.468**	0.181	-0.080**	0.176
NW	0.657***	0.224	-0.036	0.238
SW	-0.093	0.262	0.090	0.236
Observations	359		360	
Pseudo R^2	0.014		0.021	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.

Table 3. Continued.

	Transportation and distribution problems		Labor intensive relative to cow-calf production	
Variable	**β**	**SE**	**β**	**SE**
Certified organic	0.436**	0.191	0.238	0.220
Cow calf producer	-0.207	0.147	-0.315**	0.154
Land size	-0.346*	0.206	-0.343	0.224
Number of cattle kept	0.017**	0.023	0.173	0.051
Direct sell to consumers	0.673***	0.246	0.201	0.289
% of income from grass-fed	-0.088**	0.038	-0.055	0.038
Age	-0.004	0.005	0.004	0.005
College degree	-0.028	0.128	-0.073	0.125
NE	-0.046	0.216	0.049	0.213
SE	-0.204	0.256	0.140	0.233
NW	-0.034	0.218	0.269	0.216
SW	0.692***	0.259	0.597**	0.250
Observations	359		359	
Pseudo R^2	0.034		0.023	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.

Table 3. Continued.

	Lack of steady demand for grass-fed beef		Strong market competition from feedlots	
Variable	**β**	**SE**	**β**	**SE**
Certified organic	-0.386*	0.213	0.568***	0.201
Cow calf producer	0.097	0.145	-0.288**	0.150
Land size	0.049	0.203	0.068	0.214
Number of cattle kept	-0.001**	0.000	-0.008	0.121
Direct sell to consumers	0.211	0.349	-0.210	0.349
% of income from grass-fed	-0.028	0.037	-0.021	0.036
Age	0.008**	0.005	-0.003	0.004
College degree	0.025	0.123	-0.047	0.125
NE	-0.115	0.156	-0.081	0.153
SE	0.133	0.237	-0.089	0.237
NW	-0.070	0.199	-0.110	0.219
SW	-0.139	0.219	0.069	0.241
Observation	359		359	
Pseudo R^2	0.011		0.013	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.

Table 3. Continued.

	Diseases	
Variable	**β**	**SE**
Certified organic	-0.013	0.157
Cow calf producer	-0.217	0.229
Land size	-0.065	0.216
Number of cattle kept	0.009	0.007
Direct sell to consumers	0.202	0.195
% of income from grass-fed	0.058	0.037
Age	-0.007*	0.004
College degree	-0.116	0.129
NE	0.144	0.158
SE	0.120	0.192
NW	-0.229	0.164
SW	-0.213	0.252
Observations	359	
Pseudo R^2	0.016	

***, **, and * indicates statistical significance at 1%, 5%, and 10% respectively.