

Market Analysis: Using GIS to Analyze Areas for Business Retail Expansion

Kimberly M. Cannon

Department of Resource Analysis, Saint Mary's University of Minnesota, Minneapolis, MN 55404

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Abstract

This paper illustrates how Geographic Information Systems can be used to expand a pet food product into new market areas. A correlation analysis of pet feed in tons sold against demographic variables helped to identify a customer profile. Determining pet feed potential and estimated gross revenue was then estimated and analyzed spatially. The customer profile was then compared to areas higher in gross revenue to determine areas for Land O'Lakes Purina Feed, LLC to conduct further research to determine if these locations would be suitable for market expansion.

Introduction

Land O'Lakes Purina Feed, LLC was created by a merger between Land O'Lakes and Purina Inc. in 2001. As a result of this merger, Land O'Lakes Purina Feed, LLC became the largest feed manufacturer in North America. The company manufactures and sells animal feed for 26 different species.

The feed division is divided between livestock and lifestyle feed areas. Livestock feed produces and sells feed for farm animals such as beef cows, milk cows, and swine. The lifestyle area produces and sells feed for pets, such as dogs, cats, horses, and exotic animals. The focus of this paper will be the lifestyle sector of the feed division; specifically dogs, cats, birds, and equine.

The pet food industry has grown substantially and is expected to continue growing. According to the American Pet Products Manufacturers Association, Inc. (APPMA) survey conducted in 2005/2006, it is estimated that 63% of US households own a pet. This

percentage is up from the 1998 study that APPMA conducted which estimated 56% of households owned a pet. Annual sales figures for pets, supplies, and care are estimated at \$40.8 billion in 2007. Sales figures have nearly doubled from 10 years ago when sales figures were \$21 billion. Of this \$40.8 billion, approximately 16 billion is spent annually on pet food (APPMA, 2007).

Geographic Information Systems (GIS) is increasingly becoming more important in the business world because it allows decision makers to leverage their spatial data more efficiently, by visually bringing together relationships between customers, suppliers, and competitors (Mennecke, 2007). Business applications for GIS include: facilities management, logistics, inventory control, target marketing, market analysis, and site location. This paper will focus on market analysis and site selection.

Background

The purpose of this project was to research where Land O'Lakes Purina Feed, LLC should expand their pet food line in the California marketplace. California is considered a highly valuable market in the pet food industry. According to the US Census, California has over 12 million households. It is estimated that pet ownership in California is at the US average with an estimated 63% of households owning at least one pet (AVMA, 2002). With an estimated 7.5 million pet owning households, California is an extremely important market in the pet food business.

Although there are several species of pets ranging from cats and dogs to the more exotic animals such as ferrets, this study will only focus on 4 species. These species are dogs, cats, birds, and horses.

Other objectives were to find established retail feed locations to potentially approach about providing pet food. This will be accomplished through spatial analysis to determine the best areas in which pet food will best thrive.

Methods

Software Requirements

ArcView 3.x and the ArcView 3.x GStats extension (Figure 1), available from www.esri.com, were used to create the correlation matrix. The GStats extension created a table with correlation to each demographic variable. ArcGIS was used for the remainder of the analysis.

Data Collection

Several groups of data were used to conduct the analysis. The first of which were the demographic variables at the

census tract level. There were 147 variables from the census that were analyzed. These variables included population, age, ethnicity, total households, home ownership, income levels, education levels, marital status, and industry data. These variables were purchased from Applied Geographic Solutions (AGS) and are forecasted through 2006. Since a customer profile had not previously been created, it was important to analyze a large amount of variables in order to ensure that proper consideration was given to each potential variable.

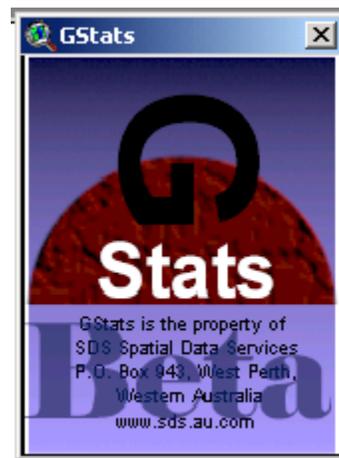


Figure 1. GStats extension.

Internal sales data were also used. This data included existing dealerships and their locations and the tons that each location sold in 2006. The data were then analyzed spatially, which was needed in order to compute the correlations against the demographic variables to determine the customer profile.

The next set of data that was used was the internal horse database. This database encompassed 3.5 million registered horses. The data was gathered from various horse associations and the US Census of agriculture and was gathered at the county level.

The final set of data were the Dunn and Bradstreet list of feed dealers in California. This list was gathered using the Standard Industry Classification Code (SIC). Those companies in the database that identified themselves as a feed company were extracted from the master database.

Analysis

The first step of analysis was to analyze existing sales. This was completed to compare sales tons to demographic variables. A ten-mile buffer was created around existing dealerships; when census tracts intersected the buffer, those demographic variables were then included in the study.

From here, the data was analyzed to determine if a correlation existed between the tons sold at a dealership and the demographics composition within the 10 mile buffer around that dealership. This part of the analysis was conducted in ArcView 3.x using the GStats extension downloaded from the ESRI website. This extension allows a user to perform several statistical analyses on point data; such as, regression, correlation, sum, count, mean, median, etc. For this analysis, the extension was used to create a correlation matrix. The correlations variables found included:

1. In a family household
2. Bachelors degree or higher
3. Household with 3+ persons
4. Homeowners between 35 and 54
5. Homes that were owner occupied
6. Income greater than 65,000

With these variables identified, the customer profile became clearer. Each of the aforementioned demographic variables was imported into ArcGIS 9.2

for further data manipulation. The variables were then converted from vector data to raster data. The tables were then reclassified taking only the top 50% in each variable. The final step consisted of raster calculations. The raster calculation was used to identify only those areas in which all of the identified demographic occurred (Figure 2).

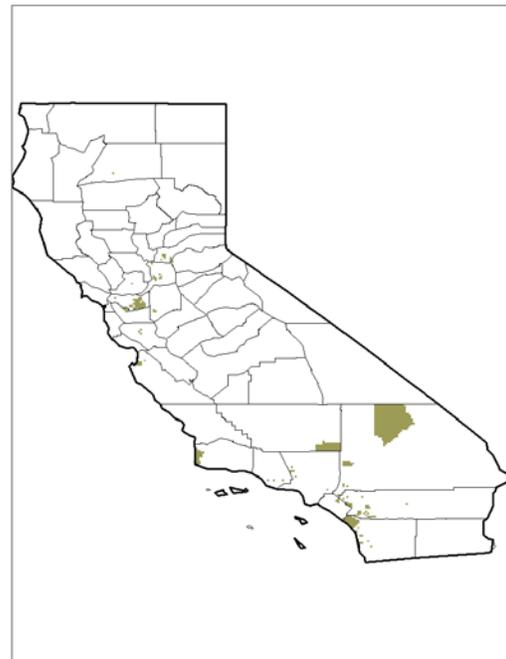


Figure 2. Areas that match the customer profile.

The next step of the analysis was to determine where the greatest density of animal populations existed. Using the AVMA U.S. Pet Ownership and Demographics Sourcebook, pet population estimates were created. The AVMA conducts a pet ownership survey every five years. From this survey they are able to estimate pet ownership at the state level and create formulas that estimated pet ownership and pet populations at a neighborhood level. To estimate pet ownership and pet population the national formulas provided by the AVMA were used. Four formulas were used based on

households, size of households, household income and home ownership. The first formula calculated pet population based on a percentage of total households in an area. The other three formulas calculated the number of pet owning households. This was completed by applying a percentage to household size, household income, or home ownership.

Once the number of pet owning households was determined it was multiplied by the average number of pets per household to estimate the pet population. Once the population was determined for each species, an average was taken of the four results to derive a final estimate of pet population. This was completed for the following species: dogs, cats, and caged birds. Horse inventory numbers were derived from the horse inventory database.

The next step was to determine an average feeding rate for each animal. After conferring with several experts at Land O'Lakes Purina Feed, LLC, including John Mahoney, D.V.M., marketing specialists, James Flipp and Ginny Sobcinski, and production manager, Craig Peterson it was determined that the way to estimate feed potential was to multiply the pet inventory by the average pounds consumed by that species annually. That result was then divided by 2000 to convert the final result into potential feed tons. The following formulas were used to estimate feed potential for each species.

$$\text{Dog} = (\text{Inventory} * 400) / 2000$$

$$\text{Cat} = (\text{Inventory} * 60) / 2000$$

$$\text{Bird} = (\text{Inventory} * 40) / 2000$$

$$\text{Horse} = (\text{Inventory} * 1900) / 2000$$

These formulas produced the total potential in feed tons in California. The

result of this formula was then summed to yield a total feed potential for pets. Horse feed potential was figured in a separate field in the table.

Once the feed potential was calculated, gross revenue was calculated using the total feed potential. This was done by multiplying the total feed potential by the average cost per pound that the feed could be sold for. This process was calculated for pets and horses separately.

After the gross revenue was calculated, the spatial analyst was used to reclassify the data. The data were reclassified first for pets and then for horses. Since the goal of the project was to identify what areas would be the most profitable for expansion, only the areas with the top 25% in gross revenue were used. This step resulted in the following areas that had the higher gross revenue in pet food (Figure 3) and for horse feed (Figure 4).

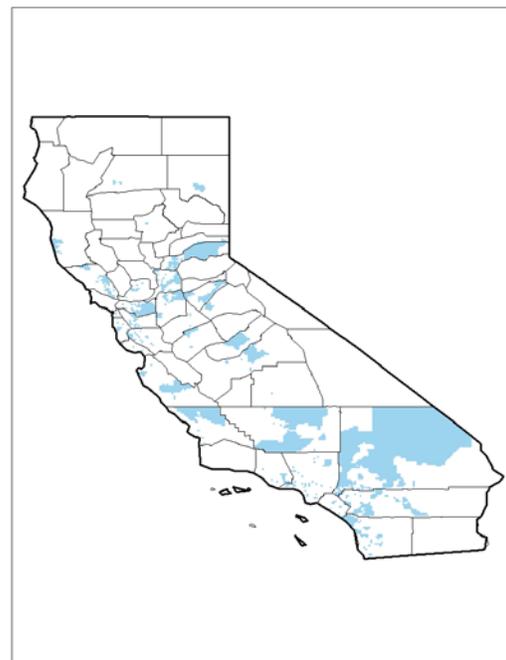


Figure 3. Areas with the top 25% pet food gross revenue.

Raster calculations were used to combine the areas with the greatest potential of gross revenue with the customer profile to identify the most suitable areas for market expansion.

Secondly, the pet potential and horse potential were each separately aggregated with the customer profile. The differences were primarily in northern California (Figure 6 and 7).



Figure 4. Areas with top 25% horse feed gross revenue.



Figure 6. Customer profile areas that are also high in pet feed gross revenue.



Figure 5. Customer profile areas that are also high in pet and horse feed gross revenue.

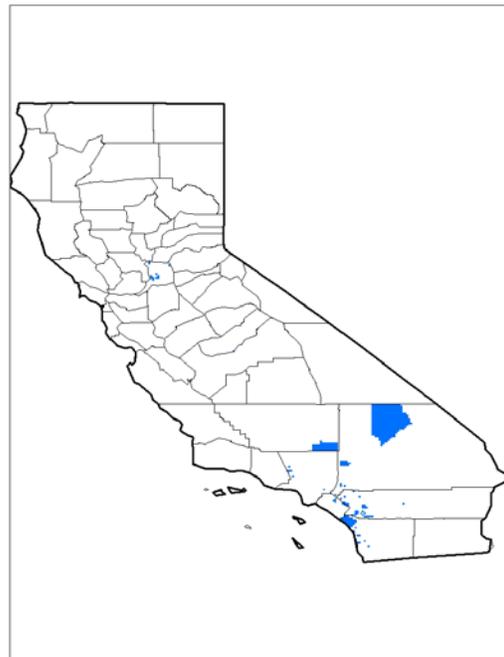


Figure 7. Customer profile areas that are also high in horse feed gross revenue.

After these areas were identified, a list was generated of possible locations to introduce the Land O'Lakes Purina pet and horse brand feed. These locations were chosen because of their proximity to the areas of interest. The list of feed dealers in southern California is the same for both pets and horses (Table 1). In Northern California the results differ

slightly. The list of potential places to introduce horse feed (Table 2) is much smaller than the potential location to introduce pet feed (Table 3). There was also a large area in Northern San Bernardino County that appeared to be an untapped/under-served market (Figure 8). This is an area to focus on for market expansion.

Table 1. Southern California List of potential dealers to sell horse and pet feed.

Hay Connection	1152 6th St	Norco	CA	92860-1445
Lindas Feed and Supplies Inc	1234 6th St	Norco	CA	92860-1447
Southwest Animal Products	408 Olive Hill Way	Fallbrook	CA	92028-8986
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Mead Valley Feed	21623 Cajalco Rd	Perris	CA	92570-8432
Roseo Feed & Supply	27545 Greenwald Ave	Perris	CA	92570-8976
Rasmussens Hay & Grain	26730 State Highway 74	Perris	CA	92570-8774
Oyc Feeds LLC	45555 Via Jaca	Temecula	CA	92592-1307
Evergreen Pellet Co	28780 Front St	Temecula	CA	92590-2847
Harlan Teklad	1681 Sierra Madre Cir	Placentia	CA	92870-6627
Feed Works	P O Box 1849	Rosamond	CA	93560-1849
Canyon Discount Feed	30555 Trabuco Canyon Rd	Trabuco Canyon	CA	92679-3002
Fiber Fresh Feeds	25210 Sherman Rd	Sun City	CA	92585-9352
Imperial Western Products Inc	P O Box 1295	Corona	CA	92878-1295
Dakin Rhodes Equine	82051 Higgins CT	La Quinta	CA	92253-7533
Feed Alike	600 Central Ave	Lake Elsinore	CA	92530-2740
Cal By-Products	7000 Merrill Ave Ste 67	Chino	CA	91710-9079
Benwood Feed & Mercantile	29465 The Old Rd	Castaic	CA	91384-2902
El Mirage Feed	2476 El Mirage Rd	Adelanto	CA	92301-9680
Nutrition Specialties	23524 Pico Ave	Sun City	CA	92585-9627
Carters Hay & Grain Inc	10227 Palm Row Dr	Lakeside	CA	92040-2308
Western Farm Service Inc	1015 Linda Vista Dr	San Marcos	CA	92078-2613
Pleasant Feed Supplements	7000 Merrill Ave Ste 8	Chino	CA	91710-9027
Boin Animal Feed Co Inc	532 League Ave Ste 2	La Puente	CA	91744-3453
Central Feed Store	400 E San Jacinto Ave	Perris	CA	92571-2833
Kahoots Inc	11965 Bernardo Plaza Dr	San Diego	CA	92128-2537
Country Feed Grooming Room	2111 E Vista Way	Vista	CA	92084-2703
Menifee Market & Feed	26035 Scott Rd	Menifee	CA	92584-9043
Osuna A L Hay	28875 Memory Ln	Winchester	CA	92596-9751
Tj Hay	27550 Smith Rd	Hemet	CA	92545-9714
Guy Hay	10932 Grand Fork Dr	Santee	CA	92071-1936
Imperial Hay Sales Inc	16300 Chino Corona Rd	Chino	CA	91708-9209
D & M Hay Sales	P O Box 1617	Chino	CA	91708-1617
Pacific Hay Co Inc	P O Box 1001	Chino	CA	91708-1001
Wmb Corporation	10759 Civic Center Dr	Rancho Cucamonga	CA	91730-3806
Moreno Ranch Supply	28900 Spruce Ave	Moreno Valley	CA	92555-6602
Feed Bag	18185 Valley Blvd	La Puente	CA	91744-5842

Table 2. Northern California list of potential dealers to sell horse and pet feed.

Sierra Hay & Feed	8740 Golden Spur Dr	Granite Bay	CA	95746-9618
Shelleys Feed and Tack	3390 Riego Rd	Elverta	CA	95626-9308
Bradshaw Feed Saddle & Tack	7285 Bradshaw Rd	Sacramento	CA	95829-1040
Elk Grove Milling Inc	8320 Eschinger Rd	Elk Grove	CA	95757-9739
Ceccardis Feed	8980 Greenback Ln	Orangevale	CA	95662-4633
Sun-Up Forest Products Inc	3301 Business Dr	Sacramento	CA	95820-2169

Table 3. Northern California list of potential dealers to sell pet feed.

Sierra Hay & Feed	105 Flocchini Cir	Lincoln	CA	95648-1771
Martinez Hay & Feed	1788 McCourtney Rd	Lincoln	CA	95648-9426
Foothill Feed & Gift	3293 Taylor Rd	Loomis	CA	95650-9582
Wild Birds Unlimited Dublin CA	7182 Regional St	Dublin	CA	94568-2324
Feed Plus Inc	P O Box 12	Penryn	CA	95663-0012
Silver Fern Ranch Feed &	8875 Dublin Canyon Rd	Castro Valley	CA	94552-9655
Roseville Livestock Auction	1401 Church St	Roseville	CA	95678-2108
Rodies Feed & Country Store	8863 Marsh Creek Rd	Clayton	CA	94517-9544
Enzion Laboratories Inc	9250 Walerger Rd	Roseville	CA	95747-9724
Ron Hunt Ranch	7 Petar CT	Clayton	CA	94517-1712
Concord Feed	5288 Clayton Rd Ste B	Concord	CA	94521-8202

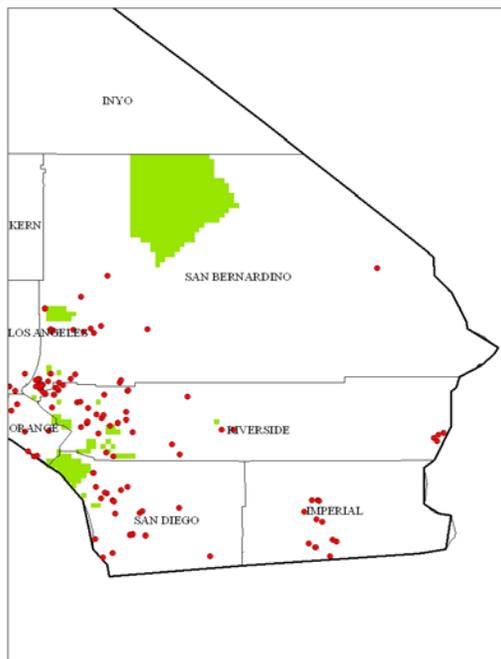


Figure 8. Potential untapped market in San Bernardino County.

Results

The results of this study identified the following:

1. A customer profile
2. Areas that have that particular demographic makeup
3. Areas with high gross revenue in both pet feed and horse feed
4. Areas with a highly favored demographic composition in pet and horse feed

5. Lists of feed dealers in those areas of interest
6. An untapped/undeserved market in which a feed retail location would be favorable

Conclusion

Site selection is usually conducted by analyzing customer data. Land O'Lakes Purina Feed does not collect customer data; therefore, other methods were employed for determining retail expansion. This was conducted by analyzing demographic variables of the areas surrounding existing retail locations in order to create a demographic profile. This process, along with calculating gross revenue estimates, areas of interest were identified for further research. Hernandez and Bennison (2000) warned that site location could not be solely done by sitting in a cubicle. Therefore, this research provided a more narrowed focus on where to conduct additional future research for retail expansion.

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Resources

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