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EDITOR'S NOTE

Dear Readers,

Welcome to our yearly issue celebrating papers from the IFAMA Best Paper competition held in Atlanta during the 2013 annual conference, last June. We have a power packed issue with ten articles. Instructors take note, there are three case studies that may be useful for your classes. A teaching case study, *"Corporate Social Responsibility in Swedish Food Retail: The Case of Tiger Shrimp."* written by Julia Rotter and Cecilia Mark-Hebert of the Swedish University of Agricultural Sciences, was the case used in IFAMA's 2013 International Student Case Competition. A second case, *"Helping Consumers "Know Who Grows" Their Coffee: The Case of THRIVE Farmers' Coffee,"* written by a team led by Norbert Wilson of Auburn University, was featured in the Harvard Style case study workshops. Finally Professor John Siebert of Texas A&M has teamed up with Clay Jones to write a great case study entitled, *"Building the Certified Angus Beef Brand."*

The IFAMR supports the organizers of the symposium by promoting the submission of full research manuscripts and teaching case studies. The annual Best Paper competition not only helps elevate the quality of presentations, but simultaneously allows scholars to fast track their article to publication and have a chance to win a cool looking award. Plan to submit a full manuscript to the 2014 Best Paper competition that will be held in Cape Town, South Africa—June 14-15, 2014. The call for papers will be issued soon.

We also have a call underway for case studies focused on African food and agribusiness enterprises. This Special Issue, entitled *African Agribusiness on the Move*, is edited by Mary Shelman of Harvard Business School, Aidan Connolly of Alltech, Inc., and Mandla Nkomo of Technoserve. It will be published in March, 2014. The call has a unique twist in that we will match academic scholars with firms to help them tell their story. So managers should not be intimidated at the thought of writing a 1000-1500 word case study. We have help for you. And academics who would like to work with a manager should drop us an email at ifamr@ifama.org to volunteer. Complete details can be found here: https://www.ifama.org/publications/journal/cmsdocs/SI_Africacall.pdf

Finally, beginning in 2014, there will be a change in the IFAMR publication fees. The IFAMR is financed solely by publication fees, issue sponsorship, and advertising. We are open access so we maximize the impact of your work, and as a result, over 15,000 articles are downloaded every month. Open access means we do not receive library fees. We currently assess a $750 fee per article. Starting in 2014 we will continue to charge $750 per article, but there will be a $50/per page charge for every article greater than 15 pages. The change in fees better reflects the additional costs of publishing lengthy articles.

Enjoy the issue,

Peter Goldsmith, Executive Editor, IFAMR

Information Bias Condemning Radical Food Innovators?
The Case of Insect-Based Products in the Netherlands

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Abstract

In this paper we analyze whether information bias is affecting consumers' WTP for radical food innovations. We collect data in the Netherlands on consumers' WTP for insect-based products. We used product attributes directly affected by information and EU legislation such as the visualization of insects on the products, the use of logo and health claims, different information treatments on positive environmental and social effects of eating insects as meat-substitutes. Results indicate that visualization negatively influenced consumers' WTP while information treatments do not mitigate this effect. We derive that EU legislators need to move fast in clarifying the status of insect-based foods.

Keywords: radical innovation, insect-based food products, consumer acceptance, the Netherlands.

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Introduction

New food products and ingredients have been continuously under debate in the last two decades. Nutraceuticals and functional foods, genetically modified organisms (GMOs), nanotechnologies, irradiated foods are just few examples of radical food innovations which have created substantial concerns and controversy among food managers, consumers and policy makers (Sylvester et al. 2009; Rollin et al. 2011). Still, research and development on new food products and ingredients is expected to be one of the "hot frontiers" within the food innovation landscape.

Within this landscape, insect-based foods constitute an emerging food category. A unified and worldwide accepted classification of insect-based food products does not exist yet. To illustrate the European Novel Food Regulation (EC) 258/97 (ENFR) is still assessing the status of insect-based food products, basically "tolerating" commercialization in the European market of products in which insects are used as a whole (thus not processed or used as ingredients), while forbidding commercialization of processed insect-based ingredients or products. In general, insect-based foods can be defined as products that are prepared using insects. Within this category we have products where insects can be visualized, often presented as delicatessen or appetizers, or less visualized, but never completely processed and used as source of ingredients (mainly proteins and micro-ingredients).

The increased attention for this category of food products is due to raising concerns about downsizing meat-related consumption, especially in western society, and search for potential alternative sources of protein (meat-substitutes), to both enlarge and enrich the nutritional quality of human diets (Sileshi and Kenis 2010; Derkzen et al. 2011; Belluco et al. 2013; Hoek et al. 2013). However concerns related to the acceptability of those products for (western) consumers are also raising (Elzerman et al. 2013).

While acceptance at the societal level is lagging, the scientific community is increasingly looking at insects as an important potential source of nutrition and protein (Derkzen et al. 2011; Belluco et al. 2013). Insects form a sustainable source of proteins because of their energy-efficient metabolism and the potential to feed on (food) waste streams (Derkzen et al. 2011; Oonincx and de Boer 2012). Though approximately 1500-2000 species of insects and other invertebrates are consumed worldwide (Yen 2009), insects are still not regarded as food in Europe as well as in other western societies. Insects are not eaten and responses of disgust towards insects are common in developed countries in the northern hemisphere.

Similarly to all radical food innovations, the main issue is that the introduction of insect-based foods will not necessarily lead to acceptance or adoption by consumers per se (Ronteltap et al. 2007). Consumers often show unsupportive attitudes towards novel foods, thus associating more negative than positive attributes to radical food innovations (Rollin et al. 2011). More specifically consumer acceptance seems to be driven by risk-perceptions, especially associated to health related risks and technological uncertainties (Siegrist 2008). Moreover consumer acceptance of novel product is strongly influenced by the amount, type and source of information provided (Rollin et al. 2011).

From a consumer acceptance point of view, insect-based products seem to generate even more concerns than other radical food products. For example socio-cultural barriers, such as *food taboo*, as well as psychological barriers, such as *neophobia*, can be considered as main factors of rejection or, at least, of low-speed adoption (Fessler and Navarette2003; Meyer-Rochow 2009). Thus resistance to accept insect-based foods can easily be re-enforced by information bias provided by both regulators and business players. This can hamper business opportunities and "condemn" radical innovators to be unsuccessful. This risk is even more relevant in the food innovation landscape of the European Union (EU) because consumers, regulators and business players are particularly risk-averse, thus creating an environment less open to radical innovations if compared to other areas in the world (i.e. the US or Asia) (Borrás 2006; Wijnands et al. 2007; Bunte et al. 2011; Rollin et al. 2011).

In this paper we try to better understand the role of information on consumer acceptance of radically novel foods, using insect-based food products in the Netherlands as a case study within the EU. More specifically we test whether different information frames provided to consumers influence their preferences and willingness to pay.

There are several reasons to carry out this study: firstly, to our knowledge, no other study has been conducted to investigate the role of *information bias* on consumer's consumer willingness to pay (WTP) for insect-based food products. Second, insect-based food products are potentially challenging western food cultures therefore our results might contribute to understanding consumers reaction to information, and cultural-related aspects of those products is fundamental for their success in the market. Finally, the findings from this study will be useful to improve marketing and management strategies for radical food innovators in the EU and worldwide.

In our study, we have implemented a choice experiment using a sample of 122 Dutch consumers. We introduced three different information treatments: a first group of consumers who hasn't been treated with any specific information (baseline group); a second group of consumers who has been treated with "neutral" information about insect-based products, thus describing the main features of these products (treatment 1 group); finally a third group of consumers who has been treated with "positive frames" about insect-based products, thus emphasizing the environmental benefits of meat-substitutes (treatment 2 group). We also control for other factors potentially creating information bias such as the use of a logo and health claims (Grunert and Wills 2007). Moreover we control for the role of visualization of insect on the food products.
Our results suggest that even though visualization (thus disgust and taboo) is the more negatively impacting feature on consumer's WTP, information treatments also produce significant negative effect on consumers' evaluation, implying that communication frames may lead to even more severe rejection and prevent market introduction of radically novel food.

Consumers Acceptance of Insect-Based Products as Radical Food Innovation

The raising interest for insect-based food products is related to the fast development and exploitation of new market segments for meat-alternatives (Hoek et al. 2013). In industrialized countries, meat production and consumption are considered one of the most relevant sources of health costs related to diabetes, cardiovascular disease and obesity, mainly due to over-consumption (UNFPA 2012; Oonincx and de Boer 2012; Hoek et al. 2013). Thus, there is

increasing awareness in the scientific as well as in the business community to reduce meat consumption and find ways to develop large-scale based meat-alternative products. Particularly in the EU, a growing number of food scientists, entomologists, and business players believe that the answer to this issue is to change "westernized diet" and to include an alternative source of proteins such as insects (Oonincx and de Boer 2012; Veldkamp et al. 2012). Moreover, from a business perspective, insect-based products can represent a profitable venture due to the potentials of the meat-substitutes market (Elzerman et al. 2013).

However the main barrier to this trend is represented by western consumers (potential) concerns on insect-based foods. To a large extend consumers concerns to accept insect-based foods resemble issues of acceptance for many other radical food products (DeFoliart 1997; 1999; Derkzen et al. 2011). Scholars have emphasized that new food technologies, such as nutraceuticals and functional foods, GMOs, nanotechnologies or irradiated foods, are potentially challenging consumers decisions because perceived as risky and unknown (Rollin et al. 2013). More specifically previous studies highlight how consumer decision to accept a new food product is related to a number of factors, such as perceived costs/benefits; perceived risk and uncertainty, knowledge and source of information, perceived behavioral control and subjective norm (Ronteltap et al. 2007; Rollin et al. 2011). All those factors seem to play a role when it comes to analyze acceptance of insect-based food products. For example the nutritional benefits of insect consumption are still not clear from a scientific perspective, while risks and hazards are still persistent (Belluco et al. 2013).

Besides risks and hazards western consumers are concerned to accept insect-based food products from a cultural and psychological perspective too (Derkzen et al. 2011). For example in the EU, eating insects is mainly framed as related to niche and ethnic products, sometimes as alternative to meat or within health-seeking diets. Still the great majority of European consumers do not associate insects to food (Verkerk et al. 2007; Derkzen et al. 2011). This is reinforced by the fact that in many European social contexts, entomophagy is a *cultural taboo* (Derkzen et al 2011). Changing such a taboo is a slow process given that westernized societies are still reluctant to use insects, despite being a good source of animal protein (Yen 2009). Thus, the main attitude towards insects as (part of) food products in European societies is related to either fear or disgust (Verkerk et al. 2007; Derkzen et al. 2011), or curiosity (Yen 2009). In many European countries, insects are still perceived as a primitive food and the visualization of insects in a food product is associated with issue of deterioration, contamination and generally low quality (DeFoliart 1999). In this context information biases can play an important role, potentially reinforcing issues of risk, uncertainty and eventually rejection. This is because consumer acceptance of novel product is strongly influenced by the amount, type and source of information provided (Rollin et al. 2011).

Insect-Based Food Industry in the Netherlands

Insect-based foods can be marketed in the EU only if not processed. If processed they are considered "novel foods" by ENFR, thus requiring a full pre-market assessment procedure (Belluco et al. 2013). The EU commission has started an update of the ENFR in 2012, in order to

clarify the "legal status" of insect-based food products.[1] At this stage, insects can be marketed in the EU as whole, for both human and animal consumption, but they cannot be processed and used as ingredients in food products (e.g., as source of proteins or micro-nutrients) (Belluco et al. 2013). However, the use of insects as whole may not be advantageous to producers since this would mean that whole insects can be visualized on food products, thus creating several concerns among the business community about high risk of consumer rejection due to disgust and/or neo-phobia. This is indeed not helping the industry to take off and the entrepreneurs and investors to fully exploit opportunities of researching, developing and marketing insect-based products.

Besides these regulatory constrains the insect-based food industry already represents a reality in the EU and more specifically in the Netherlands. In this country many insect breeders are already operating, working in the feed and food sector, and the first European producer organization (Venik) has been established (http://www.venik.nl/site/?lang=nl). Since its foundation in 2008, Venik is actively working on mitigating potential barriers for the acceptance of insect-based food products in the Netherlands and in the EU. Venik is also operating in the sector of feed and *pharma*, supporting research about nutritional features of insect-based food products and engaging in networking activities with NGOs and other stakeholders.

The Dutch government is also supporting researchers with grants concerning issues of legislation for governing insect farms, health and safety standards, and marketing through retail outlets. Insects as food products have been on the national news many times since the 2008 (http://www.venik.nl/index.php?res=high). In the Netherlands it is possible to find restaurants serving insect-based foods.

Therefore the Netherlands represents an ideal setting to start performing field research on insect-based food products, because the EU-wide regulatory vacuum has not discouraged entrepreneurs, researchers and public authorities to invest in this domain.

Methodology

Attributes and Choice Experiment Design

Choice Experiment (CE) is the most widely used stated preference multi-attribute method in valuing products or attributes. In CE, respondents are asked to examine a sequence of designed choice tasks. In each choice task, consumers are asked to choice between alternatives described by a selected number of product profiles, each of them is described in terms of attributes with different levels (Louviere at al. 2000). Some of the reasons for CE's popularity include its flexibility to take into account several attributes which can be estimated simultaneously and its consistency with random utility theory and Lancaster's consumer theory.

We implemented a choice experiment with consumers in the Netherlands in the cities of Wageningen, Utrecht and Den Bosch during December 2011 through March 2012. As said the

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[1] At the time we are writing this paper, no such update has been put in place yet.

Netherlands is an ideal setting because it is a frontrunner country in this specific business. We randomly recruited 122 participants in different locations across the cities using a sampling procedure (by age and gender). The product we used in our study is an insect-based product that looks like a sushi, which is usually eaten in some Dutch restaurants and that has been "advertised" through the national media (http://www.venik.nl/index.php?res=high) (see Appendix 1). Therefore it represents the most potentially familiar insect-based product to the Dutch consumers.

For this product, we identified four attributes: the first attribute refers to the price of the product, with four different levels (1.50, 2.50, 3.50 and 4.50 euros) for 4 sushi pieces. The first price level represents the base price, which reflects the average market price for an insect sushi box in a retailer shop in the Netherlands. The other price levels reflect possible premium price associated with those products.

The second attribute is related to product design which is capturing the role of legislation. Because EU legislation is "imposing" use of insects as a whole in the insect-based foods, we emphasize the role of visualization to assess whether the current legislation is affecting consumers' WTP. A positive contribution will mean that the visualization of insect as a whole is not hampering the potential capacity of this product to be appreciated by consumers and their WTP for this attribute. However we expect a negative impact due to visualization because it has been clearly considered as a strong element in determining issue of disgust (cultural-driven) or neophobia (psychological-driven) (Derkzen et al. 2011). To fully assess the role of visualization we used two alternative product designs, one in which the insect is clearly visible, and an alternative design where the insect is not visible but used in the form of processed meat (see Appendix 1).

The third attribute refers to the logo which is named "*Chrysalide*" and it is representing a stylized butterfly chrysalides. In many studies the use of food logos has been indicated as a relevant attribute for conditioning consumer choice and WTP, for example increasing the quality perception of the product (Golan et al. 2001; Grunert and Wills 2007, Gao and Schroeder 2009). Therefore we used a logo as third attribute with a clear reference to insects.

Finally, the fourth attribute is a nutritional claim because it refers to the content of Omega 3 in the product. We decide to include this attribute because this (micro-)nutrient is considered as one of the most promising nutritional features of insect-based food products.

Given the four attributes and its levels, in order to build our choice design, an orthogonal main effect plan was calculated using the SPSS *orthoplan*, which generated 8 profiles of product in option A. Then, given these 8 profiles, we use the generators derived from the suggested difference vector (1 1 1 1) by Street and Burgess (2007) for four attributes with 4, 2, 2 and 2 levels, respectively, and the two options to obtain the 8 profiles for the second option B. Hence, we obtained 8 pairs (which constitute our choice set) being this design 97.2% D-efficient compared to the optimal design. Participants were asked to answer a series of choices questions (i.e. choice tasks). Each respondent was asked to make choices in the 8 choice tasks. Each choice task consisted in three alternatives and consumers had to choose among them. To illustrate, the first two alternatives (option A and option B) are described by a selected number of product

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profiles, each of which is described in terms of attributes with different levels. The third alternative (option C) is the no-buy option used just in case individuals choose not to pick either of the two option A and B for each choice task.

Treatments' Description and Hypothesis Testing

Our main objective is to investigate whether different information frames influence consumer's WTPs for insect-based products. Therefore, we designed a between-subject design where each respondent participated only in one of the treatments. In the first baseline treatment (BL), no information on insect-based products was provided to respondents before asking them to respond to the choice questions (tasks). However, in the second treatment (NE) neutral information on the use of insects in other part of the world indicating that eating insects is not common in the western countries but elsewhere was provided to individuals (see Appendix 1). Finally, the third information treatment (PO), consists in a positive frame about the positive social and environmental impacts of scaling up insect consumption as meat-substitutes (see Appendix 1).
In order to achieve the objective of our study, (whether consumers exposed to neutral or positive information frame on consumption of insect-based products showed higher WTP for them), we test two hypotheses.

The first null hypothesis is whether the WTP for the different insect-based products stated by those consumers who did not receive any frame information (BL) are equal to the WTP for the different insect-based products stated by those consumers who received neutral information (NE):

$$(1)\ H0_1 : (WTP^{NE} - WTP^{BL}) = 0 \qquad\qquad H1_1 : (WTP^{NE} - WTP^{BL}) > 0$$

Likewise, the second null hypothesis is whether the WTP for the different insect-based products stated by those consumers who did not receive any frame information (BL) are equal to the WTP for the different insect-based products stated by those consumers who received positive information (PO):

$$(2)\ H0_2 : (WTP^{PO} - WTP^{BL}) = 0 \qquad\qquad H1_2 : (WTP^{PO} - WTP^{BL}) > 0$$

If we reject the first hypothesis it means that neutral information on insect could drive consumers to pay more for these products. Moreover, if we reject the second hypothesis, we can confirm that providing more positive information to consumers drive them to have a higher WTP for these products.

Model specification

To assess consumers´ preferences for insect-based products, we consider the utility function derivate by Lancastrian Theory (Lancaster, 1966) and assuming a linear random utility function defined by:

$$(3)\qquad U_{njt} = nobuy + b_1 \operatorname{Pr}ice_{ijt} + b_2 Visual_{ijt} + b_3 Logo_{ijt} + b_4 Claim_{ijt} + \varepsilon_{ijt}$$

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where "nobuy" is the alternative specific constant coded as a dummy variable that takes the value 1 for the no-buy option and 0 otherwise. It is expected that the constant "nobuy" is negative and significant, indicating that consumers obtain lower utility from the no-buy option than from the designed alternatives (A and B). "Price$_{ij}$" is the price attribute of alternative j for subject i, while the rest of attributes "Visual", "Logo" and "Claim" are dummy variables which takes the value 1 if the corresponding attribute was present in the alternative A or B, and 0 otherwise. Finally, ε_{ijt} is a stochastic disturbance of alternative j for subject i distributed following an extreme value type I (Gumbel) distribution, i.i.d. over alternatives and is independent of attributes that is known by the individual but unobserved and random from the researcher's perspective.

Consumers are assumed to choose the alternative which provides the highest utility level from those available. Following other studies (Lusk and Schoroeder 2004; Tonsor and Shupp 2011), we estimated the Random Parameter Logit Model (RPL) (Train 2003) where the non-monetary variables (VISUAL, LOGO and CLAIM) were random following a normal distribution and individuals can differ from each other in terms of intensity of taste. Following Layton and Brown (2000) and Revelt and Train (1998), we also assume that the price coefficient is invariant across the individuals. Moreover, because we are using different samples (treatments), it is important to investigate if differences in parameter estimates across treatments are indeed due to the underlying preferences or to differences in variance. Hence, we tested if estimates insect attributes from the RPL are equivalent across the three treatments. Therefore, we pooled the data in one model by specifying an extended utility with the appropriate set of treatment dummy variables:

$$
\begin{aligned}
U_{njt} = {} & nobuy + b_1 \, Price_{ijt} + b_2 Visual_{ijt} + b_3 Logo_{ijt} + b_4 Claim_{ijt} + b_5 (Price_{ijt} \times dtreat_{NE}) + b_5 (Price_{ijt} \times dtreat_{PO}) + \\
& + b_6 (Visual_{ijt} \times dtreat_{NE}) + b_7 (Visual_{ijt} \times dtreat_{PO}) + b_8 (Logo_{ijt} \times dtreat_{NE}) + b_9 (Logo_{ijt} \times dtreat_{PO}) + \\
& + b_{10} (Claim_{ijt} \times dtreat_{NE}) + b_{11} (Claim_{ijt} \times dtreat_{PO}) + \varepsilon_{ijt}
\end{aligned}
$$

(4)

Where *dtreat$_{NE}$* and *dtreat$_{PO}$* are coded as 1 for the neutral (NE) and positive (PO) treatment, respectively and 0 otherwise. The significance of the estimated b_5, b_6, b_7, b_8, b_9, b_{10}, and b_{11}, and their signs will enable us to test differences in attribute coefficients between neutral (NE) and positive (PO) treatments and baseline treatment (BL) in the hypothesis to be analyzed. To do this, we can use the z-test on the coefficient estimate. If the coefficients are statistically different from zero at 5% level, it means statistically difference in preferences for insect-based attributes exists between neutral and positive treatment with the baseline treatment.
We estimated the model using Nlogit5 software.

Results

In table 1, the results of the chi-square tests of the socio-demographic variables across the three treatments are presented. Findings suggest that the null hypothesis of equality between the socio-demographic characteristics across the three treatment samples cannot be rejected at the 5% significance level for gender (chi-square= 0.178; *p-value* = 0.91), age (chi-square=3.017; *p-value*=0.807), education (chi-square=3.604; *p-value* = 0.165) and income (chi-square= 0.543; *p-value* = 0.762). Therefore, we can conclude that our randomization was relatively successful in equalizing the characteristics of participants across the treatments. Moreover we can notice that

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most of the participants were female (around 51%) and around 60% of participants had university studies. Moreover, most of participants belonged to range age between 18-35 years and about 16% of the participants had a net monthly income higher than 3,500 €.

Table 1. Definition and Average values of Demographic Variables (%)

Variable Definition	Name (type)	BL	NE	PO
Number of participants		45	31	36
Gender				
Male	FEMALE (dummy	48.9	48.4	44.4
Female	1=female; 0 otherwise)	51.1	51.6	55.6
Age (years)	Between 18-35 years	46.7	58	50.0
	Between 35-54 years	17.8	6.4	16.7
	Between 55-64 years	28.9	29	30.6
	More than 64 years	6.7	6.5	2.7
Education of respondent High School	HIGHSCHOOL (dummy 1=high school; 0 otherwise)	57.8	54.8	75
Income High income	HINCOME (dummy 1= more than 3,500 €; 0 otherwise)	15.6	12.9	19.4

Table 2 reports the mean coefficient estimates of pooled model of three treatments. Firstly, it can be noticed that the price variable is negative and statistically significant in accordance with economic theory. Moreover, the rest of estimated mean values are statistically significant different from zero at 5% level. To illustrate VISUAL estimate coefficient is negative and statistically significant at 1% significance level, indicating that consumers had lower utility when an insect was showed on the food product. Moreover, LOGO estimate coefficient is positive and statistically significant, implying that consumers gained higher utility when a logo is indicated the existence of insects in their products. In the same way, CLAIM estimate coefficient is statistically significant and with a positive sign, suggesting that consumers' utility was positive when a nutritional claim on OMEGA 3 is present in the product. Finally, the standard deviation parameter estimates are statistically significant, meaning that heterogeneity around the mean of the random parameters indeed existed.

Table 2. Random Parameter Logit Model estimates and WTPs.

	Coeff. (z-value)
NOBUY	-1.626 (0.000)
PRICE	-0.636 (0.000)
VISUAL	-3.377 (0.000)
LOGO	1.106 (0.003)
CLAIM	1.181 (0.002)
Standard Deviation	
VISUAL	4.330 (0.000)
LOGO	1.591 (0.000)
CLAIM	1.787 (0.000)
N. obs.	2,688
Log-likelihood	-692.98

Table 3 reports the estimated parameters and the corresponding z-values for the dummy treatment variables to test our hypotheses[2]. Firstly, we notice that none of estimated coefficients of dummy treatment variables interacted with attributes variables are statistically different from zero at 5% level. According to our results, we can confirm that our first (H0$_1$:(WTP^{NE} – WTP^{BL})=0; H1$_1$: (WTP^{NE} –WTP^{BL})>0) and second H0$_2$: (WTP^{PO} –WTP^{BL}) =0; H1$_2$: (WTP^{PO} – WTP^{BL})>0) hypotheses of equality are failed to be rejected for the three analyzed attributes (i.e., VISUAL, LOGO and CLAIM), thus confirming that the preferences and the WTPs in the information treatments (NEU and PO) are not statistically different from our baseline treatment (BL).

These results suggest that even if consumers were framed both neutral or positive information about the consequences of consumption of insect-based products, their WTPs for insect-based attributes were not statistically different from those ones who did not receive any kind of information about the insect

Table 3. Random Parameter Logit Model estimates and hypothesis testing outcomes

	Coeff. (z-value)
$PRICE \times dtreat_{NE}$	-0.077 (0.470)
$PRICE \times dtreat_{PO}$	-0.024 (0.817)
$VISUAL \times dtreat_{NE}$	-1.318 (0.268)
$VISUAL \times dtreat_{PO}$	0.302 (0.790)
$LOGO \times dtreat_{NE}$	-0.023 (0.964)
$LOGO \times dtreat_{PO}$	-0.192 (0.706)
$CLAIM \times dtreat_{NE}$	-0.109 (0.850)
$CLAIM \times dtreat_{PO}$	-0.474(0.424)

Finally, we also calculated the WTP values for the pooled model. Because the non-monetary attributes are dummy variables with two levels, the mean WTP values for individual attributes are calculated by taking the ratio of the mean parameter estimated for the non-monetary attributes to the mean price parameter multiplied by minus one. Table 4 reports the mean and the

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[2]The total number of observations of pooled data set is equal to the total number of participant multiplied for the number of choice tasks (eight) and number of alternative in each choice task (three: option A, B, and C)

z-values of WTPs for different insect-based products. Results generally indicate that consumers were willing to pay a premium price of 1.31€ for a box of 4 sushi insect-based products when the logo "Chrysalide" is shown; and they were willing to pay 1.55€ more for a box of 4 sushi insect-based products when they knew that the product contained Omega 3. In contrast, consumers were willing to pay 7.40€ less (thus they were willing to be compensated) for the products with visualization of the insect.

Table 4. WTPs for different attributes of insect-based products

Population mean WTP $-(\beta_{attribute} / \beta_{price})$ (€/4 sushi pieces)

	BL+NE+PO treatment	BL treatment	NE treatment	PO treatment
VISUAL	-7.408 € (-6.73)	-6.16 € (-2.66)	-6.95 € (-3.47)	-7.84 € (-3.02)
LOGO	1.315 € (4.26)	1.58 €(2.82)	0.88 € (2.85)	1.43 € (1.38)
CLAIM	1.558€ (4.64)	1.83 € (3.40)	1.24 € (2.47)	1.68 € (1.82)

Discussion and Concluding Remarks

This study investigates the role of information bias on consumer acceptance and WTP for an emerging category of radical food innovation in the EU context such as insect-based products in Netherlands. Because food products with processed insects are not allowed by European legislators, food players are forced to sell these products with a specific design, thus using non processed insects and usually having the insects clearly visible on product. As showed by our study this is undermining the possibility of business actors to increase the value-added of these products, while increasing the risk of consumers' rejection. An intensive use of positive frames associated to social and environmental benefits of consumption of insect-based foods is not significantly impacting the WTP of interviewed consumers. This result suggests that the negative effects of visualization is difficult to mitigate and represent a serious threat for future success of any marketing strategy.

From a managerial point of view this study has highlighted how sensitive radical innovations in the food sector can be to issues related to cultural barriers and information treatments. This seems to have a relevant impact on the type of marketing strategy to implement. In this sense the insect-based niche seems to be characterized by two polarized approaches: on one hand, we have companies that are heavily using visualization as a fundamental element of their marketing strategy because they intentionally want to position their insect-based products as "ethnic" or "eccentric" foods. On the other hand, we have other companies that are trying to frame insect-based foods as "normal" foods, thus trying to position them within the growing segment of protein-substitutes and meat-alternatives. While the first group of companies is looking at premium products, the second is more interested in working towards "large volumes", thus implementing strategy for mass-production and economies of scale. Our results indicate that the actual EU legislation will "impose" visualization, the second type of radical innovators is more likely condemned to be unsuccessful.

Thus from a policy making perspective this study highlight the urge for a clear plan of actions from the EU Commission. A first step should be to clarify whether insect-based food should be considered as a novel food. Accordingly the second step should be to identify the main conditions, and an effective timeline to let insect-based food be a suitable product to compete in the meat-alternative markets.

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Appendix 1

Choice Experiment

You are about to participate in a study designed to understand how people like you value a variety of different insect-based food products (meat) sold in different supermarket.

Short explanation:

1. The food product we focus on can be consumed as appetizer or part of the main meal. Please realize that both products are insect-based!
2. The price of the product is based on a package of 4 pieces.
3. The logo states that the product has a certification and is free of diseases and can be eaten safely.
4. Omega 3 is a fatty acid that prevents from cardiovascular diseases and enhances the immune system. Therefore, it is clearly stated when the product contains Omega 3.

Which alternative do you prefer?

Product A	Product B	Answer Options
		Product A
		or
Price: €1,50 per 4 pieces		
	Contains:	**Product B**
	Omega 3 (essential fatty acids that prevent from cardiovascular diseases and enhance the immune system)	**or** **Neither**
	Price: €2,50 per 4 pieces	

Treatment NE: About 1,400 species of insects are edible to man, and insects form a common food source for 80% of the world's population. Also, in Europe insects are already used as food and directly consumed, for example as delicatessen or appetizers, while potentially suitable for being incorporating as processed foods, or be used as a basic ingredient such as sugar or flour.

Treatment PO: As the world population is growing and increasingly urbanizing, the question of how to feed the world is becoming critical. Meat consumption is increasingly the focal point in the debate about worldwide environmental degradation, food security in developing countries and health costs in developed countries. Examples are the environmental degradation of subtropical and tropical forests related to fodder production for the western livestock industry, problems of embedded water in agriculture especially in meat-related products, health problems such as obesity, diabetes and elevated cholesterol, and in developing countries, inadequate access to food, which is threatening the livelihoods of billions of poor households. New sources of proteins are increasingly needed and already pursued by many food companies. Insects are a good example of an alternative and a sustainable source of proteins. About 1,400 species of insects are edible to man, and insects form a common food source for 80% of the world's population. Also in Europe insects are already used as food and directly consumed, for example as delicatessen or appetizers, while potentially suitable for being incorporating as processed foods, or as a basic ingredient such as sugar or flour.

New Age, New Learners, New Skills: What Skills Do Agribusiness Graduates Need to Succeed in the Knowledge Economy?

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Abstract

In a rapidly changing economic environment, graduate skills required evolve in their relative importance. This raises the question: what set of skills do today's agribusiness graduates need to be successful in the tomorrow's economy? The goal of this study is to examine the emerging paradigm of skills perceived as essential in the knowledge economy by using a choice experiment. Results of the study point out towards a shift in the needs for skills of agribusiness graduates, with skills such as creativity and critical thinking becoming quite important in the labor market. These results have direct implications for agribusiness programs and managers in the food and fiber industry.

Keywords: Graduate Skills, Creativity, Critical Thinking, Choice Experiments, Hierarchical Bayesian

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Introduction

It is widely recognized that changes in the nature of work and the workplace in the modern economy are transforming the kinds of knowledge, skills, and attitudes needed for successful employment and work performance (OECD 2011). In recent decades, increasing specialization and trade have blurred the lines between the domestic and global economies (CEA 2009). Technology has shifted critical factor of production from capital to knowledge (Halal 1998) and has created the knowledge economy. Economists are now arguing the transformation of the knowledge economy and emergence of a new creative economy (Florida 2002; Florida 2006). The main premise of the creative economy that operates in the presence of borderless capital is that creativity and innovation are the crucial drivers of economic growth. Changes related to technology, management innovations, global competition and sustainability concerns are raising questions about the kind of skills and competencies that society and young people will need in order to succeed in this changing environment.

The perceived demand for different skills has prompted policymakers to develop frameworks to ensure that educational institutions deliver skills that will be able to meet labor market demand. Raising the skills of national workforces through education and training has thus become a primary objective of economic policies aimed at developing national competitiveness (OECD 2011). The Council of Economic Advisors notes that in today's economy there is an increased need for highly skilled workers who can perform complex, ever-changing tasks. Thus, educating the next generation with 21st century knowledge and skills and creating a world-class workforce is one of the four building blocks of American innovation (CEA 2009). Perhaps no institution is more pivotal to responding to the needs for new skills than higher education. As noted by the World Bank report (2002) the role of higher education in particular, is now more influential than ever in the construction of knowledge economies, in the creation of the intellectual capacity on which knowledge production and utilization depend and to the promotion of the lifelong-learning practices necessary for updating people's knowledge and skills.

In a rapidly changing environment, skills and attributes required may evolve and/or vary in their relative importance. This raises the question: what set of skills do today's graduates need to be successful in the tomorrow's economy? The answer to this question guides continually the curriculum design and revision in the institutions of higher education. Research points out that a successful alignment of higher education with workforce needs can be reached based on careful action by educational institutions to embed skills and attributes within instructional programs (Yorke and Harvey 2005).

The goal of this study is to examine the emerging paradigm of skills perceived as essential for the success of agribusiness graduates in the knowledge economy. This study contributes to the literature by bringing new evidence to the discussion of agribusiness graduate skills. The study hypothesis is that there have been changes in the top rated skills for agribusiness graduates as a result of the dynamics that are taking place in the food and fiber industry. A different paradigm of skills is emerging and new skills are becoming important to employers and the labor market. Central to this new paradigm are generic skills, such as creativity and innovation deemed critical for the successful future of the economy.

Results from this study should be of interest and offer useful insights to both agribusiness programs, as well as managers in the food and fiber industry. The administrators and the faculty are responsible for continually refocusing and restructuring agribusiness programs so that the relevant skills identified by employers are being taught effectively in the agribusiness programs. Findings from this study also highlight the changing role of the manager today with key implications for employee management. Forward thinking managers should adjust their activities to meet company's goals in the new age that requires new skills. It will be necessary that they develop and implement strategies based on different criteria to hire, evaluate, motivate and manage the new employees.

Human Capital, Skills and Education

OECD (2001) defines human capital as the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic wellbeing. A vast literature has shown the critical and direct impact of human capital and education on economic output, economic growth, productivity and progress of the society. A greater amount of educational attainment implies more skilled and productive workers, who in turn increase an economy's output of goods and services (Barro and Lee 2001). Understanding the skills and attributes that can help people contribute to innovation and advancement of society increasingly motivates the efforts to understand the types of skills needed that support innovation and the best ways to develop them (OECD 2011). Though there is no consensus on the definitions of skills, according to Esposto (2008, 100) skills are "those generalizable attributes of individuals that confer advantage in the labor market." For Tether et al. (2005, 5) skill is "an ability or proficiency at a task that is normally acquired through education, training and/or experience". A mixture of these definitions is useful because looking at skills that have returns in the labor market allows for easier measurement and comparison, while a focus on those acquired through education and training has clear policy relevance (OECD 2011). Stasz (2001) and OECD (2011) discuss the broadening meaning of skills in the workplace today. A frequent grouping of skills in four categories is used in literature: *cognitive skills* are usually acquired through formal education (skills such as such as problem solving, critical thinking, and creativity) and are transferable to work situations; *generic skills* that include things such as communication and team working are thought to be broadly transferable across work settings; *technical skills* refer to specific skills needed in a particular occupation or job; and work-related attitudes or *soft skills* that are hard to conceptualize and define and not easily measured. Often, these are considered and grouped as generic skills and include motivation, leadership, ethics, entrepreneurship, management, charisma, negotiation, coordination. A wider grouping of skills combines cognitive skills, generic skills and soft skills under the umbrella of *generic* skills (Biesma et al. 2007). This study follows the later grouping of skills that combine higher cognitive skills with interpersonal skills under the generic skills. From an economic perspective, skills are considered discrete attributes acquired overtime that improve one's labor market success. If skills demanded in the workplace are identified, then education should be able to design curricula to ensure that students acquire the proper building blocks (Stasz 2001).

Recently in the discussion of skills and desired attributes, one skill that is gaining importance is creativity. With the current pace of change, the workplace is constantly faced with new demands and situations that require creative abilities to provide new adequate solutions. Creativity is

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perceived as a complex construct (Villalba 2010) and as such there is no general definition of creativity. However, there is agreement that *creativity* involves thinking that aims at producing ideas or products that are relatively novel and can add value to the firm and society. Further, creativity requires a foundation of specific (technical) knowledge without which it cannot develop, and more importantly, creativity can be advanced and promoted (Sternberg 2006). By linking creativity to technological innovation and economic prosperity, Florida (2002) argues that universities should cultivate and develop creativity in their graduates. Robinson (2006) maintains that creativity is as important in education as literacy and should be treated with the same status. However, he argues that educational systems are not equipping students with the right skills to function in the knowledge economy and have been criticized of damping creativity, and promoting conformity (Sternberg 2006; Robinson 2006; Gibson 2010).

Graduate Readiness and Agribusiness Graduate Skills

Over the years, the context of work for professionals in the food and fiber industry has changed dramatically due to processes like globalization and advances in technology. King et al (2010, 566) note that "agribusiness organizations are becoming more flexible and complex, more decentralized and yet reliant on collective action and cohesiveness." Boehlje et al. (2011) argue that development and implementation of technology and new innovations are becoming vitally critical to long-term success of the food and agribusiness industry.

Readiness to enter the workforce is one of the most prevalent problems seen by potential employers. The rapid pace of organizational and technological change has meant that employers are increasingly demanding of graduates than ever before. Policymakers express widespread concern that schools are failing to impart the kind of skills that employers need. The lack of skills among graduates today is a key concern for employers that blame the education system for not preparing graduates that can hit the ground running (WSJ 2011). Despite the growing global demand for new essential competencies, employers repeatedly report that many new graduates are not prepared to work as they lack important skills such as critical thinking, writing and problem-solving essential for today's workplace (USDE 2006). This raises the question of the effectiveness of education system in preparing graduates with the necessary core skills and attributes. Graduates need to exhibit more and more attributes and have the ability to respond to rapid change if they are going to be successful in the workplace. A direct implication for agribusiness programs is to find ways to provide their graduates with the right set of skills and attributes to meet these demands and hit the ground running.

Various studies have explored the topic of essential skills and attributes of agribusiness graduates and their relative value in the workplace. A pioneer study came from Litzenberg and Schneider (1987). Through a wide survey with agribusiness companies, they explored the skills and characteristics of agribusiness graduates needed for three different positions: entry level, middle managers and top management. A total of 74 skills and characteristics were considered and measured through relative rankings. Skills were grouped in six categories as follows: business and economics, computer, quantitative, and management information, technical skills, communication skills, interpersonal qualities, and employment, work, and general experience. Regression results indicated that the category of interpersonal characteristics (such as self-motivation, positive work attitude, high morals/ethics, team player, self-confidence, etc.) had the

highest overall rank, with communication skills ranked slightly lower, followed by business and economic skills, technical skills, computer, quantitative and management information, and lastly, previous work experience. Further, their results indicated that the relative need for all skills increased with the level of importance of the employee. Litzenberg and Schneider concluded that though all agribusiness sectors look for good interpersonal traits and communications skills, each sector has its own "shopping list" for technical skills and capabilities of graduates and a better coordination between industry and academics is needed to develop required graduate skills. Siebert et al. (2002) explored the relationship between above average starting salaries and various characteristics using a survey with a diverse group of agribusiness firms. Results showed that work experience and leadership experience were attributes highly valued by agribusiness employers. An important study from Boland and Akridge (2004) explored how employers' expectations of skills, capabilities, and experiences of agribusiness graduates had evolved over time. Results showed that interpersonal and communication skills, teamwork capability, and critical thinking skills were rated as the most valued skills in future leaders of the industry. Knowledge of marketing, accounting and finance, macroeconomics and trade were rated lower. They conclude that critical thinking and communication skills were more important to employers than industry-specific knowledge. Norwood and Henneberry (2006) similarly to previous studies (see Barkley 1991 and Barkley, Stock, and Sylvius 1999) examined the relationship between starting salaries and agribusiness graduate attributes employing a choice-based conjoint experiment with two hypothetical job candidates. Candidate attributes included study major, service and academic awards received while in college, leadership positions held while in college, internship and work experience, language skills, communication skills candidate's character, interviewing skills, passion and dedication to career goals, GPA, and willingness to relocate. After the ranking of the desired attributes, the value of each attribute was measured in the context of willingness to pay, which is how much more employers were willing to pay for an attribute. Results showed that employers highly value candidate's character, passion and dedication towards career goals, and communication skills. GPA of the candidate had the largest impact on starting salaries. Another study by Gunderson et al. (2008) on the skills of financial agribusiness students found that employers highly value graduates' problem-solving skills.

To summarize, literature on the skills of the agribusiness graduates has focused both on the valuation and ratings of graduate skills by agricultural employers, as well as the role that various skills play on salaries of agribusiness graduates. This body of literature provides very important insights on the topic of graduate skills. However, concerns expressed continually by employers indicate a current interest to revisit this subject and obtain new evidence to continue the conversation on graduate skills.

Data

A Web-based survey was administered to employers of agribusiness college graduates. The employer database was compiled from three separate sources. The first source was a combined database of employers who hired graduates from California Polytechnic State University – San Luis Obispo, California, maintained by the University, and of employers who offered internships to agribusiness students maintained by the Agribusiness Department, Cal Poly San Luis Obispo. The second source was a directory of California, Florida, Oregon and Washington agricultural employers made available by the weekly publication *Red Book Credit Services*. A third source

included employer- members of the California League of Food Processors. The combined database cleared of double entries contained a total of 1,050 employers. The survey questions were developed, field tested and revised based on input from food and fiber employers, members of the Industry Advisory Board of Cal Poly's Agribusiness Department. Employers received an email link to the questionnaire. The survey was made available to them from December 2011 through April 2012. Employers had to identify the type of organization they represented such as input provider, food processor, retailer, financial institution, wholesaler, farm, durable goods manufacturer, broker- shipper or service provider, etc. The survey collected information also on the revenue, size of the company and title/role in the company of the survey respondent.

To solicit employers' opinion on the importance of key skills for agribusiness graduates, a discrete choice experiment was created. Based on the skill literature examined above and conversations with key industry representatives, a list of most valued skills and attributes was created. Although many skills were included as important in the list, only the top rated ones were used in developing hypothetical candidate profiles. Specifically, each profile included different level combinations of the following skills: *critical thinking, communication, teamwork, creativity* and *knowledge of marketing,* and *knowledge of finance*. An overview of these attributes and levels used to describe the candidate are presented in Table 1. As part of the choice experiment, employers were asked to imagine the situation of hiring for an entry-level position requiring an undergraduate degree at their firm. They were presented with three hypothetical profiles of job candidates at a time (a choice set), and each time they had to select the best candidate for the job. Though there is no consensus in the literature about the 'appropriate' number of choice sets per respondent, most studies ask respondents to evaluate up to sixteen choice sets (Louviere et al. 2000). A fractional factorial randomized design with main effects only that optimized the D-efficiency was used to select 16 choice sets for each respondent. A sample choice set from the survey is presented in Appendix 1.

Table 1. Graduates' Attributes and Attribute-Levels Used in Choice-Based Conjoint Questions.

Attributes	Levels	Definitions
Critical Thinking Skills	Basic	Elementary or Base Level
	Good	Average or Satisfactory Level
	Advanced	Specialist or High Quality Level
Communication Skills	Basic	Elementary or Base Level
	Good	Average or Satisfactory Level
Teamwork Skills	Basic	Elementary or Base Level
	Good	Average or Satisfactory Level
Creativity	Yes	Creative
	No	Not Creative
Knowledge of Marketing	Basic	Elementary or Base Knowledge
	Good	Average or Satisfactory Knowledge
	Advanced	Specialist or High Quality Knowledge
Knowledge of Finance	Basic	Elementary or Base Knowledge
	Good	Average or Satisfactory Knowledge
	Advanced	Specialist or High Quality Knowledge

Methodology

McFadden (2001) observes that the interaction between economic choice analysis and market research through the use of experimental methods such as conjoint analysis has resulted in a better understanding of the decision-making process and the ability to predict decision making. Conjoint analysis is an attribute-based measure of utility or benefit that assumes that products can be described by their attributes and, that an individual's valuation depends upon the levels of these attributes (De Bekker-Grob et al. 2010). Lately, choice experiments have been increasingly used to study the relationship between key attributes and choices (Adamowicz et al. 1998, Lusk and Schroder 2005, Lusk and Norwood 2005, Lusk and Parker 2009). In the context of employability of graduates, Norwood and Henneberry (2006) used choice experiments to study salary increases associated with certain attributes. Biesma et al. (2007) used conjoint analysis to estimate the relative value employers place on generic skills and field specific skills in the graduates. The current study builds upon studies by Biesma et al. (2007) and Norwood and Henneberry (2006) and employs an experimental approach to estimate employers' preference on a range of college graduate attributes.

Data from the choice experiment were analyzed within a random utility framework. Each graduate candidate presented to the employer can be described by some vector of choice attribute values. Assume that employer i faces a choice among J alternatives in each of K choice situations. He chooses alternative j that will provide him with the highest utility. Utility function of employer i is given by:

$$(1) \qquad U_{ij} = \beta'_i X_{ij} + \varepsilon_{ij}$$

Where X_{ij} is a vector of non-stochastic independent variables, such as attributes of the alternative j in a given choice situation. β is a vector of parameters measuring individual marginal utilities to be estimated and ε represents the random element that includes all the unobservable factors that influence individual choices outside of the deterministic part. Both terms β_i and ε_{ij} are unobservable and considered stochastic. The utility of each alternative is the sum of the marginal utilities of its attribute levels.

A Hierarchical Bayesian logit model was used to analyze the survey data. Hierarchical Bayesian method has the ability to provide estimates of individual marginal utilities given only a few choices by each individual. This ability is quite valuable especially when data collection is done with online surveys where the effects of respondent fatigue are more prominent (Savage and Waldman 2008). The Bayes model is considered hierarchical as it models choices as a step function of an upper level (pooled across respondents, or across-unit) model and a lower individual-level (within respondents, or within-unit) model that allows for the combination of aggregate and individual level specification parameters (Rossi et al. 2005). At the lower level (within-unit), it is assumed that individual-level choices are described by a multinomial logit model. The probability of the individual employer i choosing the k alternative in a certain choice situation, conditional on the observed attributes for each of the alternatives is given by the following:

(2) $Pr[k|X, \beta] = \exp(X_k'\beta_i) / \sum_j \exp(X_j'\beta_i)$

Where: X_j is a vector of attributes describing the alternative j in that choice situation.
At the upper level (across-unit), it is assumed that respondents are drawn from a multivariate normal distribution, with marginal utilities β_i distributed with a mean vector μ and covariance matrix V:

(3) $\beta_i \sim Normal(\mu, V_\beta)$

Individual parameters were estimated using Monte Carlo chain simulation, which proceeds iteratively and recursively to generate draws of model parameters.

Results

A total of 159 completed surveys were returned. The sample size was further reduced to 137 observations based on the number of respondents who answered all choice-based conjoint questions. Excluding partial and incomplete responses resulted in 13% response rate, not unusual given the lengthy nature of the conjoint experiment used in the study[1]. As mentioned above, to minimize sampling errors, each respondent answered 16 customized choice sets providing 2,192 choice tasks available for analysis.

Respondents to the survey represented a broad cross-section of employers in the food and fiber industry. All participating firms had an average combined total of $15.25 billion sales per year[2]. Companies differ in size as measured by number of employees and average sales, and location. The respondents also represented various positions in the firm including CEO, manager or supervisor, HR administrator or other responsible for making hiring decisions in the firm. Though the majority of employers were located in California, the sample included several firms with operations in Florida, Oregon and Washington. Summary statistics of the sample of respondents are reported in Table 2.

Individual marginal utility estimates using the Hierarchical Bayesian model are reported in Table 3. Alongside are presented marginal utilities at the aggregate level estimated using a multinomial logit model.

The estimated marginal utilities reported in Table 3 are scaled in a way that they add up to zero, with a negative number implying that this level of attribute is on average less preferred than a level with an estimated utility that is positive. All estimated coefficients are statistically significant in affecting the respondent choice.

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[1] See for example, Norwood and Henneberry (2004) collected data using a choice experiment survey and had a 13% response rate.
[2] The value of agricultural products in California was $43.5 billion in year 2011.

Table 2. Description of Survey Respondents (*n= 137*).

Company	Absolute Number	Percentage (%)
Company Type		
Input Provider	3	2%
Food Processor	11	8%
Retailer and Wineries	14	10%
Financial Institution	16	12%
Wholesaler	4	3%
Broker-Shipper-Packer	24	18%
Service Provider	13	9%
Farm	26	19%
Durable Goods Manufacturer	8	6%
Other (NonProfit, Government, Biotech Manufacturing, Consulting)	18	12%
Revenue		
Up to $1 million	24	18%
$1 million - $50 million	62	45%
$51 million - $100 million	10	7%
$100 million - $300 million	16	12%
More than $300 million	25	18%
Number of Employees		
Up to 10 employees	33	24%
11-100 employees	46	34%
101-500 employees	40	29%
More than 500 employees	17	13%
Role of respondent in the Company		
CEO	44	33%
Manager/Supervisor	56	42%
HR Administrator	10	6%
Other, responsible of making hiring decisions	27	20%

Table 3. Marginal Utility Estimates for the Food and Agribusiness Employers
Using the Hierarchical Bayesian Model and the Multinomial Logit Model.

Attributes	Marginal Utilities Using the HB Model	Marginal Utilities Using the Multinomial Logit Model and Standard Deviations
Critical Thinking Skills		
Basic	-1.389*	-0.588* (0.046)
Good	0.357*	0.160* (0.041)
Advanced	1.032*	0.428* (0.041)
Communication Skills		
Basic	-1.225*	-0.540* (0.031)
Good	1.225*	0.540* (0.031)
Teamwork Skills		
Basic	-0.854*	-0.390* (0.030)
Good	0.854*	-0.390* (0.030)
Creativity		
Yes	1.549*	0.609* (0.031)
No	-1.549*	-0.609* (0.031)
Knowledge of Marketing		
Basic	-0.408*	-0.157* (0.042)
Good	0.104*	0.085* (0.041)
Advanced	0.304*	0.072* (0.041)
Knowledge of Finance		
Basic	-0.264*	-0.105* (0.042)
Good	0.156*	0.094* (0.042)
Advanced	0.108**	0.012* (0.041)
		-0.588* (0.046)

Note. Standard errors are in parentheses. * and ** denote statistically significant variables at 5% and 1% levels respectively.
Log-likelihood for this model = -1,580.18
Consistent Akaike Info Criterion = 3,237.39
Chi Square Statistic = 1,053.91

Results are consistent with *a priori* expectations. Employers prefer graduates that possess advanced critical thinking skills, have good communication and good teamwork skills and are creative thinkers. They value advanced knowledge of marketing, but prefer a good grasp of finance in the graduates rather than advanced knowledge in the field of finance. The availability of individual-level marginal utility estimates allows the accurate calculation of importance scores of any attribute considered in the employer's choices. The quantification of attribute importance using the Hierarchical Bayesian marginal utility estimates provides interesting and useful insights into employer's decision making process. Attribute importance scores were computed using the following method:

Attribute importance scores were computed using the following method:

$$(4) \quad I_i = \frac{Uhigh_i - Ulow_i}{\sum_{j=1}^{n} Uhigh_j - Ulow_j}$$

Where: $Uhigh$ and $Ulow$ represent respectively the highest and lowest utility level within a given attribute i. The importance of attribute I_i is interpreted as the percent decision weight of this attribute in the overall choice process. The importance scores are reported in Table 4.

Table 4. Importance Scores for Agribusiness College Graduate Attributes*.

Attributes of Graduates	Attribute Importance Sores (0-100%)	Rank of Importance
Creativity	**29%**	**1**
Communication Skills	**23%**	**2**
Critical Thinking Skills	**22%**	**3**
Teamwork Skills	16%	4
Knowledge of Marketing	7%	5
Knowledge of Finance	4%	6

*The estimated relative importance of attributes depends critically on the experimental design of the study, as well as the sample of the respondents. In particular, if the distance between the most extreme levels of any given attribute is increased, the overall importance of that attribute will most certainly increase as well. Due to the aggregate nature of the estimates, importance's from the logit model can be misleading and were not computed.

Interestingly, estimated results indicate that creativity is the most important attribute with the strongest impact on employer's choices. What make creativity increasingly important to the future are the unlimited horizons it may open through multidisciplinary creative processes and innovation (Dasgupta 2003). Communication skills and critical thinking skills compete closely as the second and third most valued attributes by employers. Ability to work in teams skills came across as the next important attribute for employers. Specialized technical knowledge in marketing and finance were ranked relatively lower by employers. Boland and Akridge (2004) also found communication skills, teamwork, and critical thinking skills rated as the most relevant skills, while specialized knowledge or agricultural science courses were not as important.

Clearly, labor market places a higher value on generic skills, like creativity, interpersonal communication, critical thinking, and ability to work in teams compared to technical skills. Globalization and the quest to find new sources of growth for the future may affect these skill requirements. The new economic trends seem to place greater emphasis on skills that add value and facilitate communication, collaboration and team work. Tether et al. (2005) suggest that as production becomes increasingly globalized, employees must have skills that allow them to adapt, be willing to engage in innovation and redeployment. Such skills may be best obtained through a generalist education. Mastery of a highly specialized discipline alone will no longer be sufficient to ensure success and meet the needs of the market. More general abilities and worker flexibility are required and must be nurtured as they are critical given the dynamic nature of the labor market and ongoing technological change (Gardner 2006; CEA 2009). These results are similar to findings from Biesma et al. (2007). Biesma et al. found problem solving and creativity skills combined to be the most important attribute for employers. This was followed by teamwork, communication, and flexibility. Similarly, field-specific knowledge was rated as the least important attribute considered in the study.

In this study, creativity was treated as a separate attribute and was found to be the most significant skill that influences employers' hiring decisions. All together these findings, point out to the fast changing nature of the food and agribusiness industry and a different set of skills needed to meet the future needs. It is clear that the ability to be creative, to think critically and to communicate effectively, are all attributes of paramount importance today to society and labor market.

Choice Modeling

To better understand labor market preferences for worker attributes, the estimated marginal utilities were included in various choice modeling scenarios. Simulations provide an intuitive tool to predict decision making behavior. Both individual estimates from the Hierarchical Bayesian method and aggregate estimates from the multinomial logit model were used in the choice modeling to convert respondent preferences into simulated shares of choice. Hierarchical Bayesian results were used in the Randomized First Choice model, while aggregate multinomial estimates were used in the Share of Preference model. Results from a choice modeling scenario with three competing job candidates are displayed in Table 5. Candidates differ specifically in the level of critical thinking skills, creativity and communication abilities.

Table 5. Choice Modeling Base Case Scenario.

Attributes	Candidate A	Candidate B	Candidate C
Critical Thinking	Basic	Good	Basic
Communication	Good	Good	Good
Team Work	Good	Basic	Good
Creativity	No	Yes	Yes
Marketing	Good	Basic	Basic
Finance	Good	Basic	Basic
Preference Share (Hierarchical Bayes)	**24%**	**40%**	**36%**
Preference Share (Aggregate Logit)	**21%**	**42%**	**36%**

Results show that candidate B which is creative and displays good thinking and good communication skills is the preferred candidate. Candidate C that is creative and has good communication and teamwork skills is the second preferred worker. Candidate A with good technical and communication skills but with no creativity and basic problem solving abilities is the least preferred employee. Results from both randomized first-choice and share of preference models provide consistent ranking of the candidates, though differences are observed in terms of respective share of preference for each candidate. Simulation results again point out to the importance of generic skills, specifically creativity and communication in the labor market.

Discussion and Conclusions

While the links between higher levels of human capital and skills as the foundation of increased productivity and improved performance are well known (OECD 2011), what specific set of skills are required and what this implies for higher education are questions that still need to be

addressed. The goal of this study was to increase the current understanding of labor market demands for various skills and attributes of agribusiness college graduates. As a result of changes taking place in the food and fiber industry, agribusiness programs are continuously redesigning their curriculum. The identification and the effective response to these changes requires that agribusiness higher education revisits the issue of relevant skills and labor market, and finds the best ways to transfer them to agribusiness college graduates. A choice-based conjoint experiment was used to identify labor market preferences for agribusiness college graduate attributes. A web survey with employers in the food and fiber industry was carried out. Using an experimental design, hypothetical candidate profiles were created and used in the interactive conjoint survey. Hierarchical Bayesian method was used to estimate individual-level marginal utility estimates for college graduate attributes.

Results of the study point out towards a shift in the needs for skills of agribusiness graduates, with new skills emerging as important to the knowledge economy. These results provide evidence that supports the initial hypothesis that there have been changes in the top rated skills for agribusiness graduates. Employers value most workers who can think creatively. The quest for creative ideas and solutions in the today's economy is becoming more and more pervasive.

Creativity is considered the new source of economic growth, a key to solving some of the today's social challenges (OECD 2011, Florida 2002, Pink 2005, Villalba 2010), and at the firm level an extremely important skill in creating competitive advantages. Although it is a talent-oriented process, yet, creativity can be taught and learned in schools (Livingston 2010).
Recent results from the Critical Skills Survey conducted by the American Management Association (AMA, 2013) are in full agreement with the findings of this study, indicating that employers need a workforce that is well equipped with the "four Cs": critical thinking, creativity, communication, and collaboration skills. Employers believe that these skills will become even more important in the near future, given the fast pace changes in the business environment and globalization. Further, they indicate that it is easier to develop vital skills such as critical thinking in students while in college, rather than in experienced workers in the workplace.

The shift in labor market needs for graduate attributes presents new challenges and implications for agribusiness higher education and food and fiber employers. On one hand, findings point out to the need for agribusiness programs to acknowledge the critical role that new skills, such as creativity will play in the knowledge economy and start to address the needs for these skills. Results also show that food and fiber employers seek individuals with strong critical thinking, good communication skills, with the right attitudes, who can work and collaborate in teams. Specialized knowledge in narrow fields is not as highly valued. According to WSJ (2012) the biggest complain of employers for academic programs was the extra focus on technical skills (such as finance and accounting) rather than development of deeper critical thinking and problem solving skills.

It seems that labor market demands workers that possess generic skills, who can think creatively and critically, solve problems and are flexible enough to work in ever changing conditions. Soft skills, such as interpersonal communication, ability to collaborate and work in teams are gaining value and importance in the new economy. These findings concur with the recommendations of CEA (2009). CEA pointed out that today's graduates will be better prepared for ever-changing

opportunities and for the jobs of tomorrow if they have strong analytical and interpersonal skills and the best way to prepare them is via a quality education. Academia is responsible to provide an environment conducive to a graduate equipped with a new and more sophisticated set of skills ready to respond to the needs of the economy. The timely identification and the effective response to these changes require that the issue of the set of skills essential to the food and fiber sector is reexamined, and the best ways to transfer them to agribusiness college graduates are identified and implemented. An efficient coordination of efforts of agribusiness programs to labor market needs will strengthen and enhance the value of the program, while boosting agribusiness graduates' employability.

On the other hand, results have implications for employers and managers in the food and fiber industry. A more complicated and difficult role for managers emerges. This new role requires managers to find effective ways to enable creative employees to be productive and motivated in the workplace. Managing for creativity and innovation requires a management style different from the typical, traditional style used in many companies. Findings emphasize the importance of the attribute of creativity as a competitive tool for employers. It can be argued that without creative employees, it will be difficult for food and fiber firms to maintain or gain competitive advantage. Literature has shown that creativity is influenced primarily by intrinsic motivators, such as interesting, exciting and satisfying work. A balanced approach between intrinsic motivators and common extrinsic motivators such as compensation and rewards can stimulate and increase significantly creativity among employees. Speaking of this new role, Amabile and Kramer (2012, a) suggest that to properly motivate creativity among employees, managers need to communicate clear, strategic and meaningful goals, while allowing employees real autonomy to apply their skills and talents to achieve these specific goals. Managers need to create an environment where ideas are freely an openly exchanged, where continuous, informative and constructive feedback is present and potential failures are considered a necessary part of doing creative work and carry in themselves useful lessons and opportunities for the future. In summary, managers have the responsibility to adopt what Amabile and Kramer (2012, b) call a mindset of "*checking in*" with employees rather than "*checking up*" on them, so they can be successful in managing for creativity in the knowledge economy.

Critical thinking skills were ranked as another very important employee skill. In a fast changing business environment, employees who have critical thinking skills become a very valuable resource for companies. Critical thinking employees are able to analyze situations, make decisions and solve problems on their own. Those companies that can attract, retain, motivate and develop critical thinkers have a significant and measurable competitive advantage in the business world. Managers need to have a very good understanding of these skills in order to find the best ways to hire, to motivate and manage the independent critical thinker. Behaving more like a facilitator of synergetic processes, that hires and brings together the right employees, engages them continuously in planning stages, and allows them to make decisions and solve problems might prove to be a successful new role for the 21st century manager.

Study Limitations and Implications for Future Studies

Results of this study are based on the preferences of a cross-sectional of California food and fiber employers. While the estimation technique employed minimizes measurement bias, one could

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argue that sample bias might still affect results obtained in this study, thus limiting somewhat their general applicability. Although how the sample of employers considered in this study compares to the population of food and fiber employers is not quite known, if the midpoint intervals of sales and number of employees are used, one finds that the sample represents a significant share of California food and fiber employers. Further, given the size, importance, the level of technology development and the adoption history of California's food and fiber industry evidence gained from California agribusiness firms should provide helpful insights about the direction of the US food and fiber industry and the evolving skills needed in the knowledge economy. Future studies using a larger and geographically diverse employer sample, however should explore whether similar results hold true and if they can be generalized for US companies. Also, research that takes into consideration the complex, international and dynamic interactions brought by globalization is needed to bring fresh and important insights in the skill discussion. Studies that explicitly take into consideration factors such as culture, economic indicators and food security, trade issues, sustainability etc., can shed light on the global applicability of the results of this study.

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Appendix 1

Sample of Choice Question Presented to Employers

We will present you various profiles of potential candidates for your next hire for an entry level position and ask you to choose which one you would hire.

Each profile represents a specific combination of various attributes that the candidate possesses. Please note that even though more characteristics might be important to you during hiring process, do assume that candidates possess satisfactory levels of the omitted characteristics.

Each attribute is associated with several levels as following:

Basic = Elementary or Base Knowledge
Good = Average or Satisfactory Knowledge
Advanced = Specialist or High Quality Knowledge
Yes = Attribute is Present
No = Attribute is Not Present

Attributes	Candidate A	Candidate B	Candidate C
Critical Thinking	Advanced	Basic	Good
Communication	Basic	Good	Good
Teamwork	Basic	Good	Basic
Creativity	No	No	Yes
Knowledge of Marketing	Advanced	Basic	Good
Knowledge of Finance	Basic	Advanced	Good

Please Indicate Your Preferred Candidate   O   O   O

Analysis for Strategic Planning
Applied to Ethanol and Distillers' Grain

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Abstract

While traditional economic analysis is a look back on past events and relationships, the motivation for strategic planning is to look forward. An example, based on the ethanol and distillers' grain industry, illustrates the kind of analysis that can used for strategic planning by agribusiness firms and non-governmental organizations. It is expected that the current U.S. monetary policy of expanding the money supply, a Renewable Fuel Standard mandating 15 billion gallons of ethanol, and a growing export market for distillers' grains could potentially result in the future production of ethanol and distillers' grain that would be well above a normal trend. The corresponding derived demand for corn, relative to the normal increases in supply, would significantly affect the price levels for corn.

Keywords: strategic planning, ethanol, distillers' grain, renewable fuels, exchange rates, corn, prices, scenarios

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Introduction

When an agribusiness engages in strategic planning it begins a process of identifying goals and objectives for the future; determining how to accomplish the same; and to complete the process - estimating the resources needed. The process is both qualitative—what are the likely scenarios, and quantitative—what are the numerical measures of outcomes. Taking the process from a conceptual framework to specific application requires an analysis of current conditions and future scenarios which serve as boundaries for the goals and objectives. When an agribusiness retreats to engage in the process, senior management selects a cadre of managers who have experience with a collection of industry and public policy events over time. Those experiences result in the learning and internalizing of conditions that affect the agribusiness. It is a valuable and irreplaceable wisdom that contributes to a manager's historical perspective.

When analyzing conditions in U.S. agriculture, there were a few historical periods when a collection of events brought about significant structural changes for row crop farmers, livestock producers and the agribusinesses that serve them. One of those periods was 1971-72.

In August of 1971, President Richard Nixon unilaterally cancelled the direct convertibility of the U.S. dollar to gold, in effect going off the long-standing gold standard of $35 an ounce. The U.S. dollar was devalued by 7 percent. In April 1972, the new Secretary of Agriculture, Earl Butz, led a delegation of U.S. government officials to Moscow, the Soviet Union, to offer a line of credit for the purchase of U.S. grain over a three year period. Russian grain crops had not come through the winter very well and might be in short supply. With large surpluses of wheat, corn and soybeans in the U.S., the delegation was prospecting to see if the Soviet Union was interested in buying. Initially, they did not think the terms of the deal were favorable and declined to do anything. A few months later, on June 25, 1972 a crop report came out for the production estimates in the Soviet Union. This may have been a tipping point (Gladwell 2000). Within a few days the U.S. State Department received an urgent request to issue visas for Soviet officials to come to the U.S. ostensibly with the intent on buying grain (Morgan 139-160).

In July and August 1972, the United States sold the Soviet Union about 440 million bushels of wheat, more than the total U.S. commercial wheat exports for the year beginning in July 1971. The sales were equivalent to 30 percent of average annual U.S. wheat production during the previous five years and more than 80 percent of the wheat used for domestic food during that period. Immediately following the sales announcements, the domestic price of wheat began to rise, and within a few months the prices of feed and food grain, soybeans, and livestock turned upward (Luttrell, p. 2). See Figure 1.

The Soviet Union came to the U.S. after 1972 and continued to purchase grain sustaining the higher price levels. These events and changes also led to higher price volatility as shown by the wider range of prices in the figure. The U.S. agriculture economy became less supply-managed by the government and much more export led. As a side note, international agricultural trade and the use of futures markets to manage price risk emerged as important areas of study in academia.
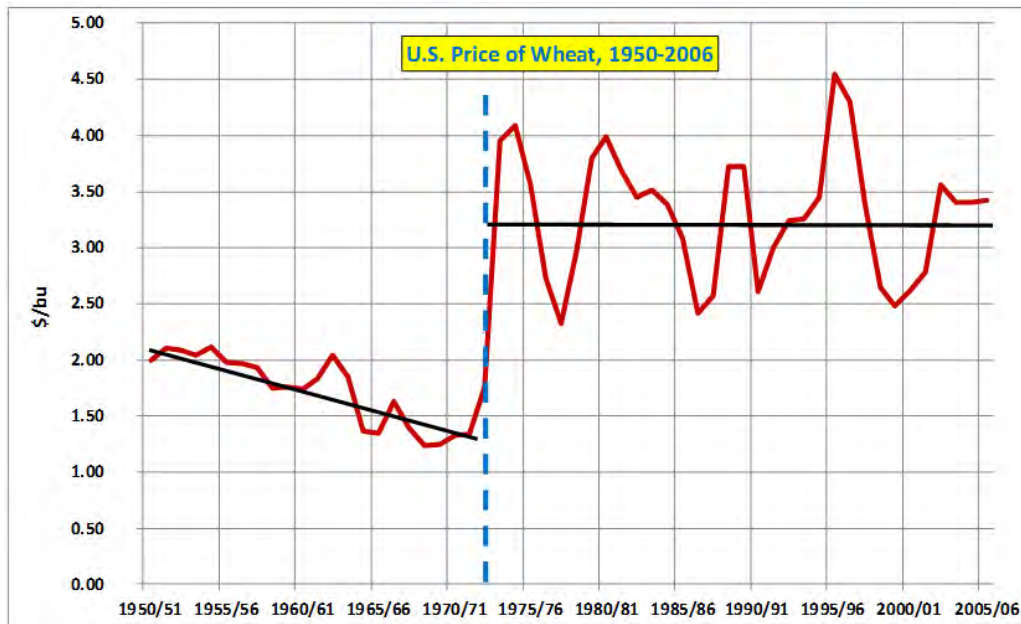
Figure 1. U.S. Price of Wheat, 1950-2006.

In more recent times, another example provides a historical perspective for use in strategic planning. Again, a collection of events during the years 2002-06 brought about structural changes for row crop farmers, livestock producers and the agribusinesses that serve them. This time the changes were triggered by the use of ethanol. Ethanol had been around for a long time. Henry Ford designed the Model T in 1908 to run on ethanol, gasoline or both. But the oil industry provided less expansive gasoline and ethanol didn't become part of the motor gasoline supplied until decades later.

On December 17, 1963 President Lyndon B. Johnson signed the Clear Air Act into law. It was designed to control air pollution at a national level and required the Environmental Protection Agency (EPA) to develop and enforce regulations protecting the public from airborne contaminants known to be hazardous to human health. In 1992, amendments to the Clear Air Act required reduction of carbon monoxide emissions, primarily from vehicles. This led to the widespread use of methyl tertiary butyl ether (MTBE) as an oxygenate additive to gasoline. However, once it was discovered that MTBE contaminated groundwater, the additive was banned in almost 20 states by 2006. Suppliers were concerned about potential litigation stemming from a 2005 court decision denying legal protection for MTBE. This was likely a tipping point for the ethanol industry because ethanol became the oxygenate of choice for gasoline.

Concurrent federal legislation contributed to the rapid growth in ethanol consumption with the goals of reducing oil consumption and dependence on foreign sources. The Energy Policy Act of 2005 required the use of 7.5 billion gallons of renewable fuel by 2012, and the Energy Independence and Security Act of 2007 raised the requirement to 36 billion gallons by 2022. Of this requirement, 15 billion gallons are to be ethanol by 2015. The following figure shows the

decline in MTBE production starting in 2002 and the corresponding increase in ethanol production in response to the above changes.
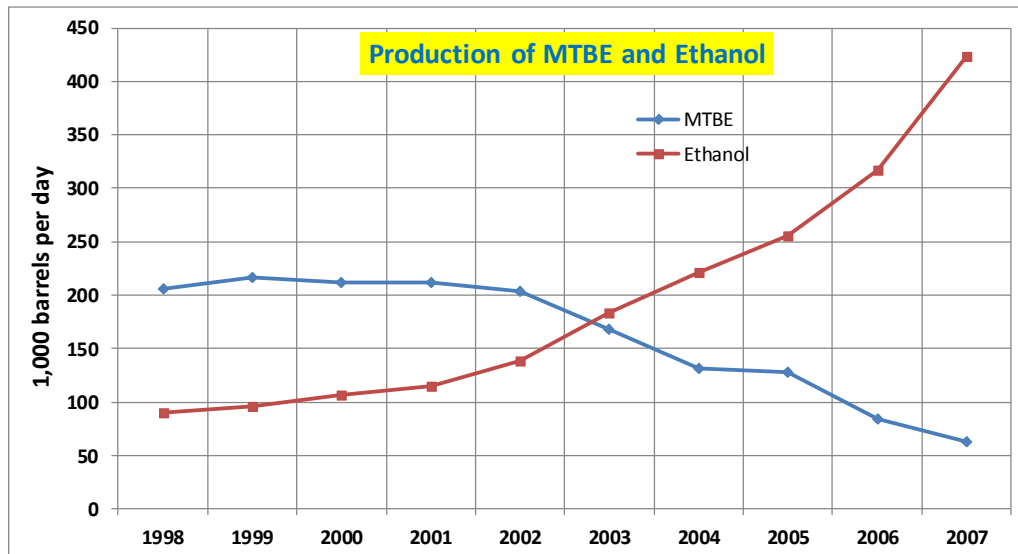

Figure 2. Production of MTBE and Ethanol, 1998-2007.

Strategic Planning

The two examples from agriculture bring us to the question, "When doing strategic planning is it useful to do a scan of historical events where each one by itself may not make a difference, but taken collectively, can result in structural change?

The literature on strategic planning is wide and deep and the flowchart in Figure 3 provides a general model. The **Business Mission** is a statement about the purpose of the business and what it wants to accomplish over a long-run time period. The **Internal Environmental Analysis** is an assessment of those factors internal to the organization that management and employees have some control over and can change, as needed. The boxes of **Goal Formulation, Strategy Formulation, Implementation,** and **Feedback & Control** are familiar and self-explanatory. The **External Environmental Analysis** is an assessment of those factors outside the organization that managers have very little or no controls over, yet could impact the business. Industry and public policy events are prime examples. The focus of the research illustrated in this article is centered on this box. It is about an approach, or a way of watching for events, and a collection of events, that contributes to an external environmental analysis.
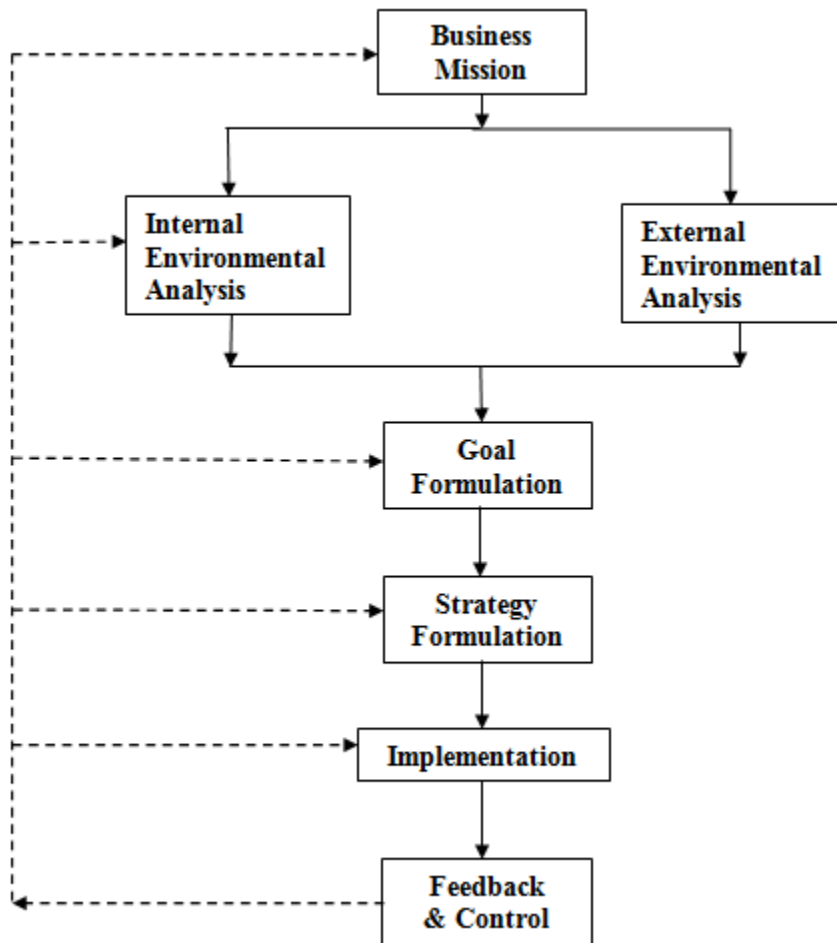
Figure 3. Strategic Planning Flowchart.

Methods

Business and industry analysts doing an **External Environmental Analysis** differ in their methods from those in academia who do traditional economic analysis. Academic researchers look for more sophisticated and complete methods of statistical estimation, quantitative representation of economic behavior, and general model building. This perspective characterizes the dialogue that goes on among academic peers in journals and papers presented at professional meetings. It is motivated by an explicit culture that dominates academic organizations. As an example, the traditional analysis uses historical data as a known empirical source along with knowledge of events that have already occurred. Econometric models are constructed to try and find a causal relationship between selected independent variables and a dependent variable. This approach also relies on economic theory to logically test if the relationship between independent and dependent variables are of the right sign or direction. Because a traditional analysis is a look back in time[1] to explain historical causal relationships, this builds in a relatively high degree of certainty into the results.

In strategic planning the challenge is to look forward and do an analysis that describes probable scenarios. Unlike the conditions of certainty in the past, strategic planning is an attempt to manage or mitigate the uncertain conditions of the future. In so doing the industry analyst needs to consider the knowledge and experiences acquired by managers and boards of directors, and to use methods that are credible to them. These methods are generally structured differently than the traditional analysis seen in academia.

Agribusiness managers and boards of directors acquire knowledge of their industry in a characteristically human manner - they talk and listen to those people who they think have insights into the future. Common behavior is to attend industry association events and conferences (such as the one hosted by the International Food and Agribusiness Management Association) and interact with their peers seeking their opinions, and giving their own, to gain insights into changing environmental conditions. If time permits they may read trade publications.

One method that industry analysts regularly use is called the "balance sheet" approach. It includes data describing the historical supply and disappearance of a commodity and corresponding prices or price ranges. The World Agricultural Supply and Demand Estimates (WASDE) reports published by the U.S. Department of Agriculture (USDA) are the most notable commodity balance sheets. The reports are read closely by those in agriculture and agribusiness throughout the world. They give historical data in a balance sheet and also include short-run projections by USDA analysts on supply and disappearance of commodities along with estimates on a price range.

The balance sheet approach is more open-ended than traditional analysis and gives the analyst the flexibility to craft probable scenarios based on the current environment and expectations about the future. This approach to looking forward appeals to managers because they know how to interpret a commodity balance sheet, such as the WASDE, and from it can follow the formulation of probable scenarios. In contrast, traditional economic analysis with structured models is usually not readily understood by managers, or a board of directors. To them there is a "black box" effect where something goes in, is processed, and the results come out. Because they cannot follow or track what happens and why, they are inclined to not trust the results.

Objective

Based on an astute awareness of external environmental factors such as proposed government policy, consumer tastes and preferences, emerging technology, etc., the question is, "How can this information be used to craft future business scenarios that have a reasonable probability of occurrence?" Related to this question is the challenge to explain to industry managers and boards of directors the economic behavior and outcomes in a way that is clear and they can accept with

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[1] Even though the traditional economic analysis is a look back and based on certainty, it is by no means useless. It helps the industry analyst identify critical variables worth watching in the current environment, and gives some relative weight to those variables. When a causal relationship is empirically confirmed with historical data and econometric models, the analyst can make use of it in developing future scenarios. Indeed, the statistically significant and logically correct variables provide a good starting point for anticipating the events, or conditions, that may make a big difference - that is, may lead to structural change.

some degree of confidence. Derivation of future behavior and outcomes needs to be transparent and resonate with their historical experiences.

The objective of this article is to illustrate, by example for both academic and industry audiences, the kind of analysis needed for strategic planning. The following example shows how critical knowledge of external environmental factors and a historical perspective of events can be used to develop probable outlook scenarios.

Problem Statement

The U.S. ethanol industry has grown from a production level of 1.6 billion gallons in 2000 to a high of 13.7 billion in 2011 - over an 8 fold increase in twelve years. Based on a Renewable Fuel Standard that mandates 15 billion gallons of ethanol from corn by 2015, some experts think that will be the upper limit in the long term. However, if history provides any lessons the increasing trend suggests future ethanol production could reach the mandate before the 2015 deadline. That history signals production levels being determined by market conditions and not mandates.

While the rapid growth in ethanol production and consumption in recent years has focused the industry and public's attention on ethanol's contribution to the fuel supply, distillers' grain early on was considered only a by-product of the production process to be disposed of at market clearing prices. The nutritional value is higher than for corn as a feed grain, yet the price on distillers' grain was discounted to that of corn. Over time livestock feeders adopted distillers' grain in place of corn and the price now reflects a small premium to that of corn. Not only have U.S. feeders adopted distillers' grain but so have their counterparts in foreign countries.

The developing export situation leads to questions by agribusiness managers, livestock producers and industry representatives about the future impacts on the ethanol industry and more fundamentally on the price of corn. What could be the projected levels of distillers' grain exports over the next five years? What would be the associated levels of ethanol production needed to satisfy the domestic and export demand? What impact would higher levels of ethanol production, derived from higher export demand for distillers' grain, have on the prices of corn over the next five years?

Scenario Objectives

In response to the preceding questions, the objectives for developing scenarios are to:

a) Project three levels of ethanol production out to 2017 based on the Renewable Fuel Standard and Environmental Protection Agency (EPA) regulations.

b) Establish two scenarios on distillers' grain exports out to 2017 based on projected exchange   rates related to U.S. monetary policy.

c) Estimate the historical relationship of the price of corn to ending stocks in the U.S. from 1989 through 2012.

From the above, derive results that project price outlook scenarios for corn out to 2017.

Objective 1

In December 2007 the U.S. Congress passed the Energy Independence and Security Act which was subsequently signed into law by President Bush. The Act mandated a Renewable Fuel Standard (RFS) of 36 billion gallons of biofuels from multiple sources by the year 2022. The target mandate for corn as a source was 15 billion gallons by 2015.

In October 2010, the U.S. Environmental Protection Agency (EPA) expanded the permissible volume of ethanol in a gallon of gasoline from 10 percent (E10) to 15 percent (E15) for motor vehicles manufactured since 2007. The EPA did additional testing to determine if E15 can be used in vehicles manufactured in the 2001 - 2006 time period and subsequently gave approval. Under these conditions, estimates are that more than 50 percent of the U.S. vehicle fleet could use E15.

One motivation for E15 was to move the "blend wall" confronting the ethanol industry because of the recent rapid growth in production. With the Renewable Fuels Standards mandated at 15 billion gallons of ethanol from corn, but motor fuel consumption projected to only reach 140 billion gallons by 2015, the 10 percent blend, or 14 billion gallons of ethanol, would be below the mandate - hence the "blend wall". See Figure 4. Raising the blend level to 15 percent would allow ethanol production to reach and even exceed the mandated 15 billion gallons in the near term. At the higher level, the trend increase shows that the blend wall would not become constraining until around 2017, if at all.
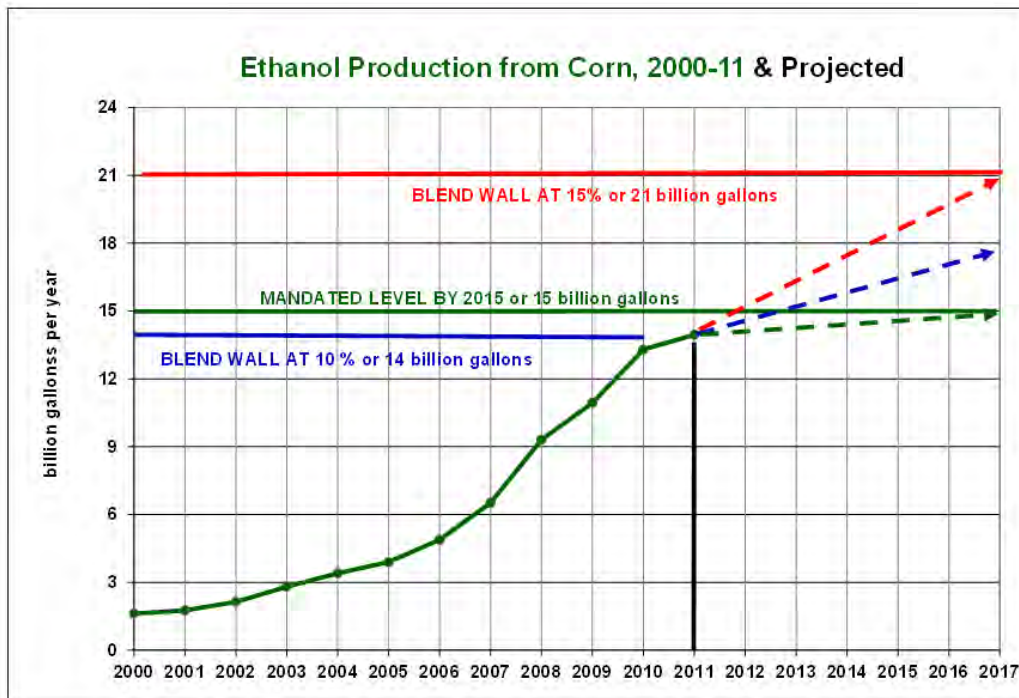

Figure 4. Ethanol Production from Corn, 200-2011, and Projected to 2017.

Objective 2

U.S. monetary policy is implemented by the U.S. Federal Reserve System (FED). Due to the severe recession that started in 2008, the current policy has a macroeconomic focus intended to reduce uncertainty in the financial sector by guaranteeing liquidity and reducing unemployment that was around 8 percent – a level considered too high by about double. The policy was implemented using a program of Quantitative Easing that increased the monetary base from $831 billion in 2008 to $2.742 trillion by January 2013 - an increase of $1.9 trillion to more than triple the base in 2008. See Figure 5.
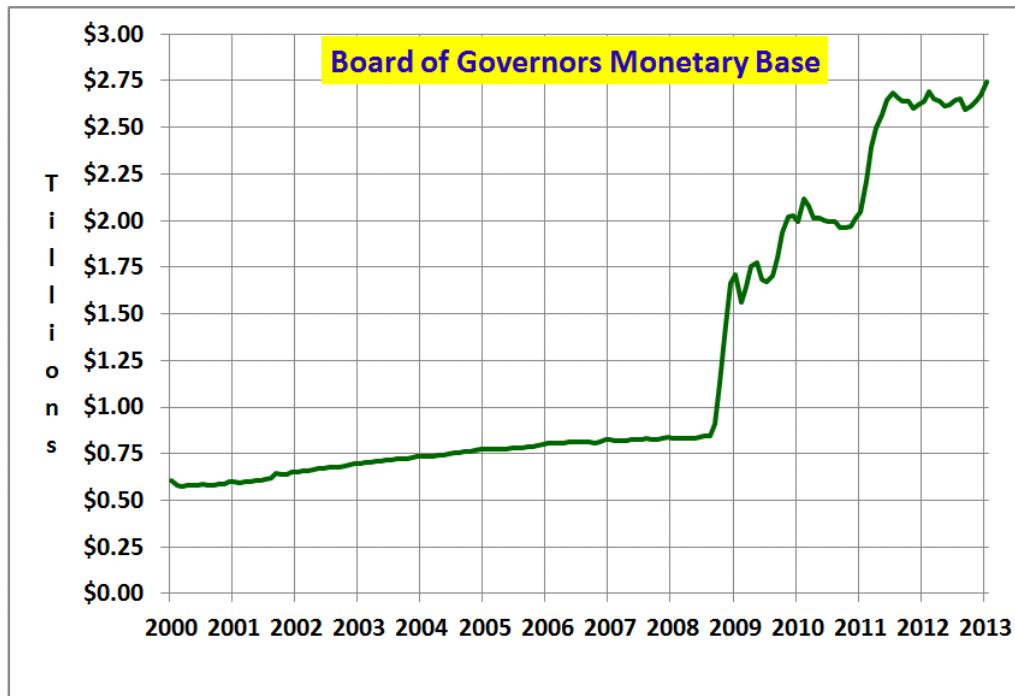

Figure 5. Federal Reserve Board of Governors Monetary Base, 2000-2013.

The ongoing increases in money supply have kept long term interest rates at record low levels, and the FED declared it will keep interest rates low for the next few years. This also affects the value of the dollar as a currency used in international trade. The trade weighted exchange rate for corn is shown in the following figure. (Distillers' grains are a direct feed substitute for corn.) The exchange rate index has been declining for the past eleven years which made U.S. exports of corn, and similarly distillers' dried grains (DDGs), less expensive to foreign buyers. Extending out to 2017, the exchange rate index is projected to be 77 by the year 2017.
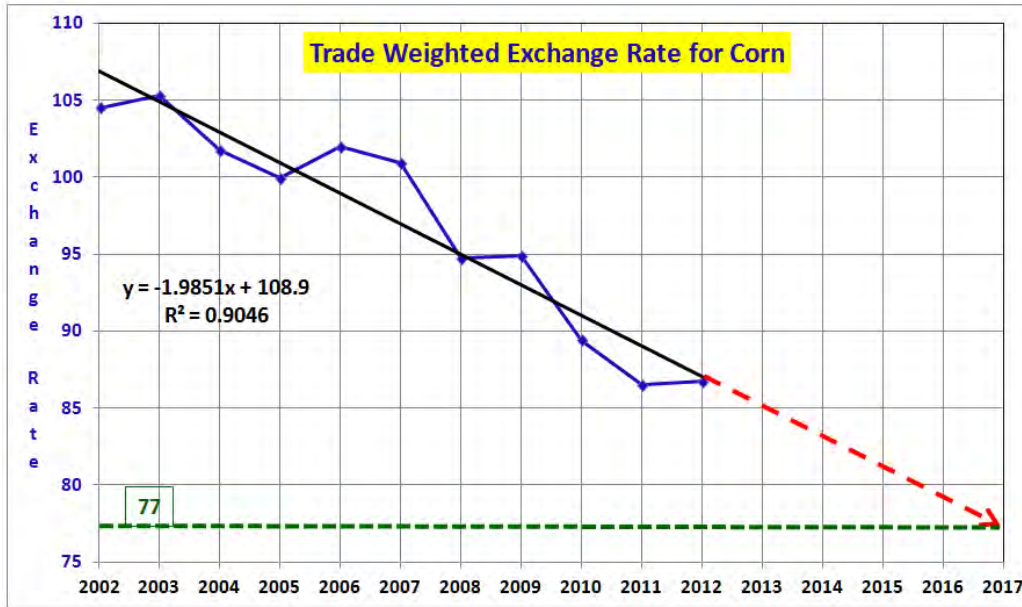
Figure 6. Trade Weighted Exchange Rate for Corn.

As background information, during the years 2006-12 there emerged a significant export market for distillers' dried grain, notably to China, Mexico and Canada. See Figure 7.
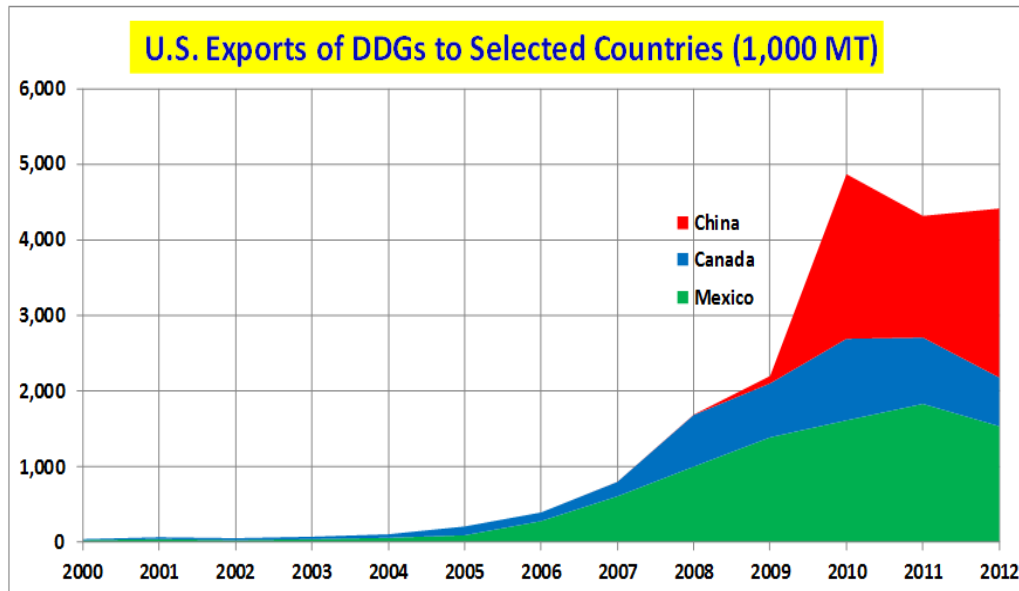
Figure 7. U.S. Exports of Distillers' Grain to Selected Countries, 2000-2012.

Total exports of DDGs were plotted against the trade weighted exchange rate for corn over the past 12 years and are shown in Figure 8. In the 2011 and 2012 marketing years, exports were around 8.0 million metric tons (300 million bushels) when the exchange rate index was around 87. Applying the projected trade weighted exchange rate of 77 shown in Figure 6 out to 2017 results in estimated exports of 12.7 million metric tons (500 million bushels).
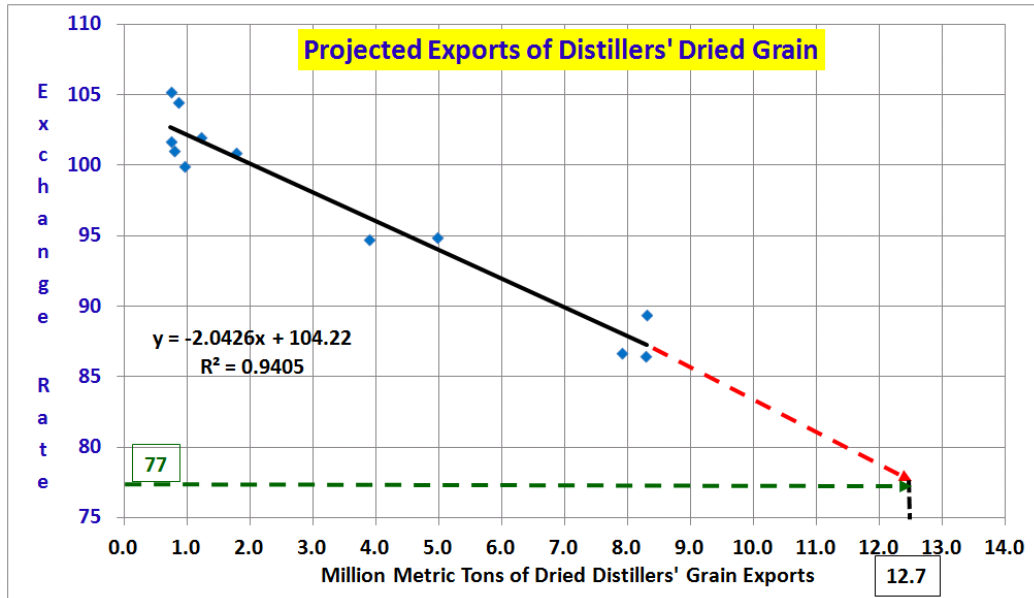
Figure 8. Projected Exports of Distillers' Dried Grain.

Figure 9 shows historical exports of distillers' dried grain along with projections out to 2017. Two scenarios were posited:

a) exports remain at 8.0 million metric tons (300 million bushels) to 2017, or
b) exports increase to 12.7 million metric tons (500 million bushels) based on an expected decline in exchange rates.
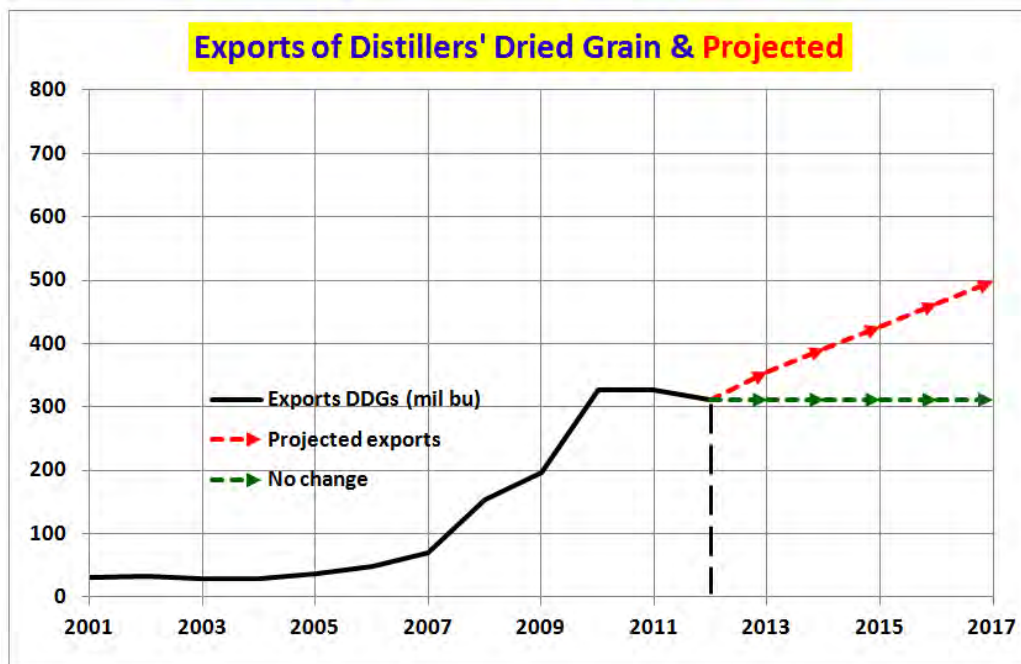

Figure 9. Projected Exports of Distillers' Dried Grain to 2017.

Objective 3

Data was collected on the historical and current supply and disappearance of corn from USDA's *World Agricultural Supply and Demand Estimates (WASDE)*. The relationship of prices to ending stocks was graphed as shown in Figure 10.

In the lower part to the graph for the 17 year period of 1989-2005 the relationship of the farm price to ending stocks was fairly stable. When ending stocks would range from 1.6 billion bushels up to 2.1 billion the price would be in a narrow range of $2.05 to $1.90, respectively. An easy rule of thumb to remember was that an ending stock of 2 billion bushels resulted in a price of $2.00. Ending stocks in the 0.80 to 1.5 billion bushel range would be higher and range from around $2.80 to $2.20, respectively. In the one rare year, 1995, where the ending stock was below 0.5 billion bushels, the price exceeded $3.00.

In 2006 the relationship of prices to ending stocks began a structural change. The ending stock was 1.34 billion bushels but the farm price for corn ended up being $3.04. One dominant factor was the earlier mentioned ban on the use of MTBE as an oxygenate in fuel. Ethanol replaced MTBE but was in short supply at the time resulting in high prices. This caused a strong derived demand for corn and bid up its price. Another dominant factor could have been the declining value of the dollar and the favorable exchange rates for importers of corn. Exports did not decline from previous years even with the higher price of corn.
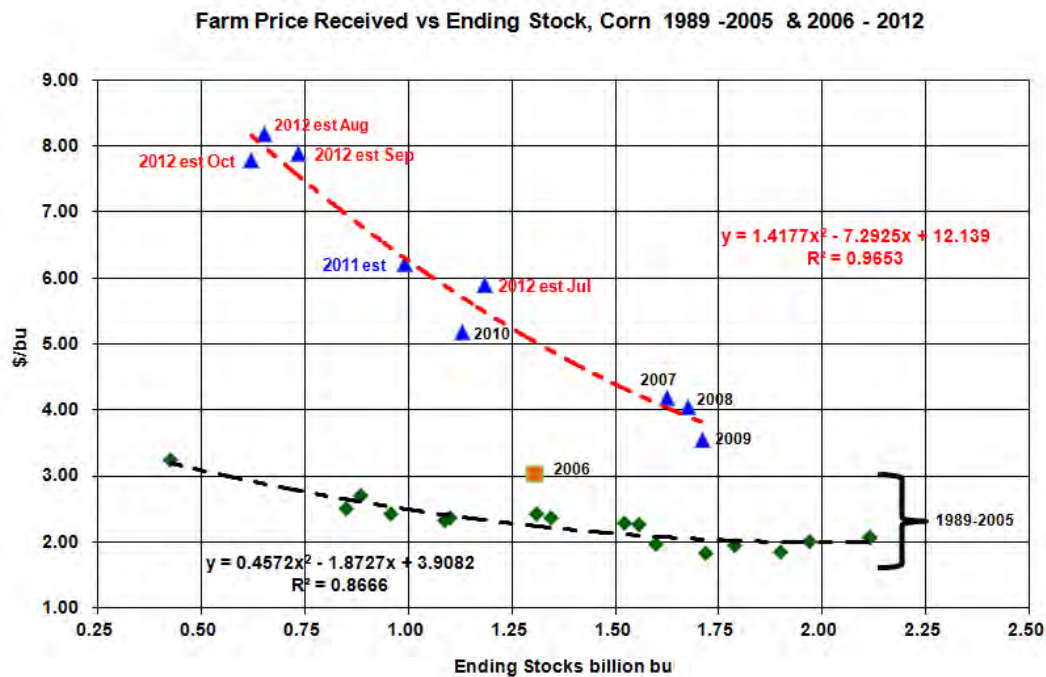

Figure 10. Farm Price for Corn versus Ending Stock, 1989-2012.

Scenario Results

Scenario I: Attached in the Appendix is USDA's *Long-Term Projections* Report with Table 18 on page 66 showing marketing year supply and disappearance of corn out to 2021/22. The utilization of corn for ethanol in 2017 is projected at 5.175 billion bushels. This would yield 14.5 billion gallons of ethanol and still be under the RFS mandate of 15 billion gallons by 2015. Over the period of 2012/13 to 2017/18 ending stocks are in the 1.48 to 1.68 billion bushel range. USDA's projected prices for corn are $4.30 to $5.00 and would be about $0.50 higher than prices derived from the relationship in Figure 10 above. The lower set of projected prices, based on Figure 10, are shown in Figure 11 and would still be the 1st New Normal range.

This scenario would be considered a baseline situation where economic conditions and external environmental variables are in a normal state. Events like drought or other critical events are absent. However, it is the deviation from the normal state that senior managers and board members want to know about. What are the underlying assumptions, relationships, possible changes and insights that bring about a deviation, and what are the expected outcomes? This leads us to Scenarios II and III.

Figure 11. Scenario I - Projected Farm Prices versus Ending Stocks, 2013-17.

Scenario II: Also based on USDA's long-term projections for corn out to 2017, what if ethanol production <u>reaches 15 billion gallons</u> and meets the RFS mandate? The higher level of ethanol production would use more of the projected supply of corn. Ending stocks would decline to the 1.15 to 1.50 billion bushel range. Based on Figure 10 projected corn prices would be <u>$4.40 to $5.50</u>. The prices are still in the 1st New Normal range shown in Figure 12.
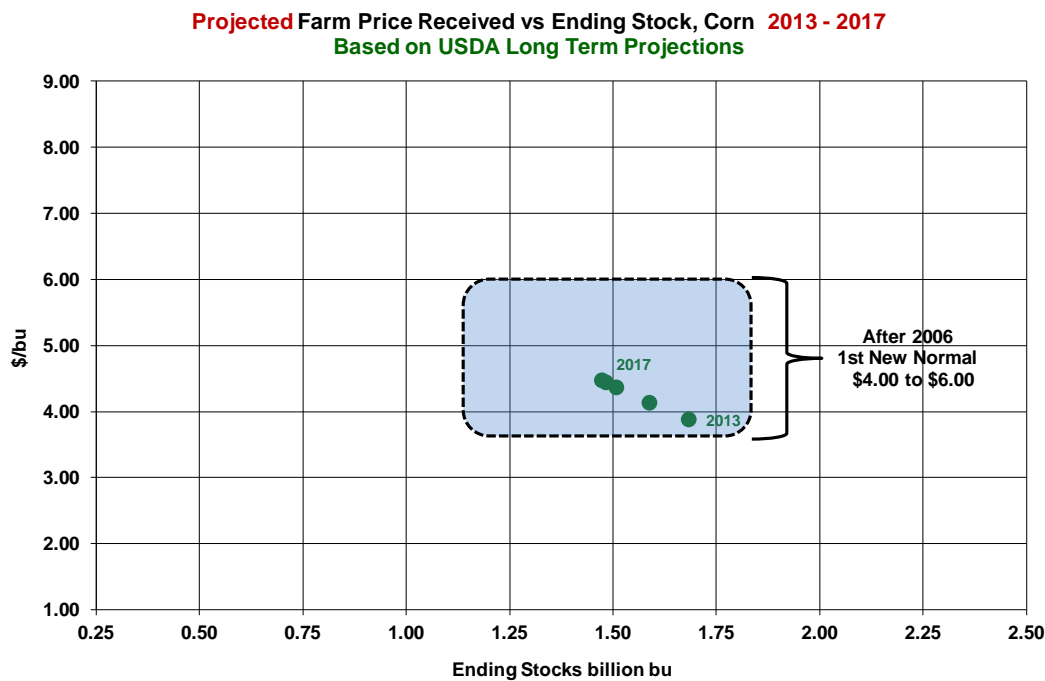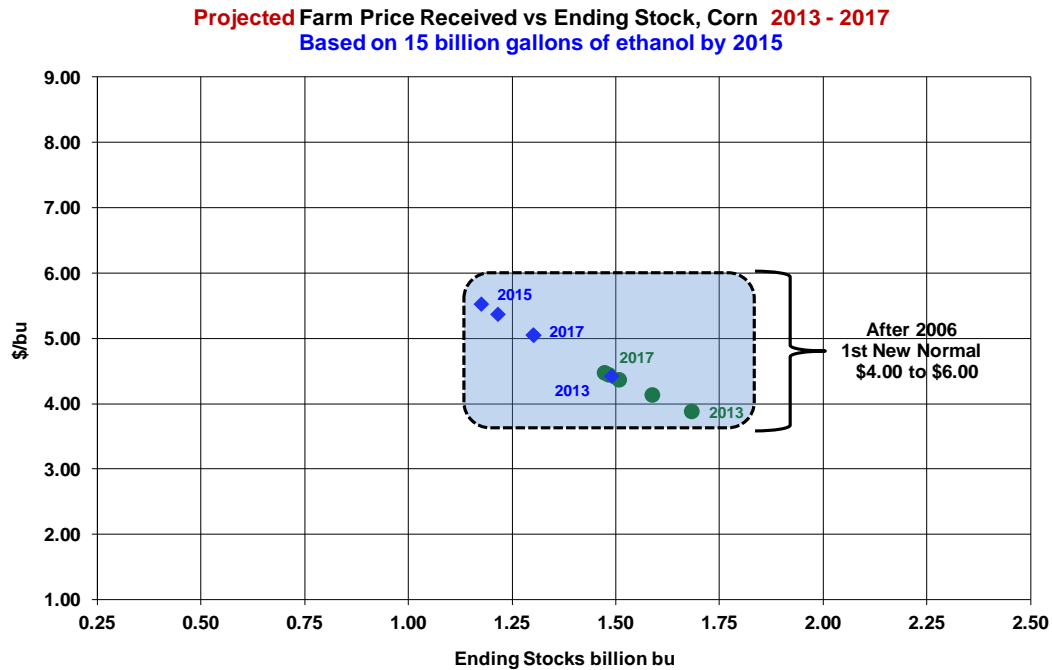
Figure 12. Scenario II - Projected Farm Prices versus Ending Stocks, 2013-17.

Scenario III. Also based on USDA's long-term projections for corn out to 2017, what if ethanol production <u>goes up to 16.5 billion gallons</u> (a 10% increase over the RFS)—needed to serve the <u>projected higher level of DDG exports at 500 million bushels</u>? Ending stocks would decline to the 0.80 to 1.40 billion bushel range. By 2015 projected corn prices would reach the <u>$6.00 to $8.00</u> range, see Figure 13, similar to price levels during the drought year of 2012.
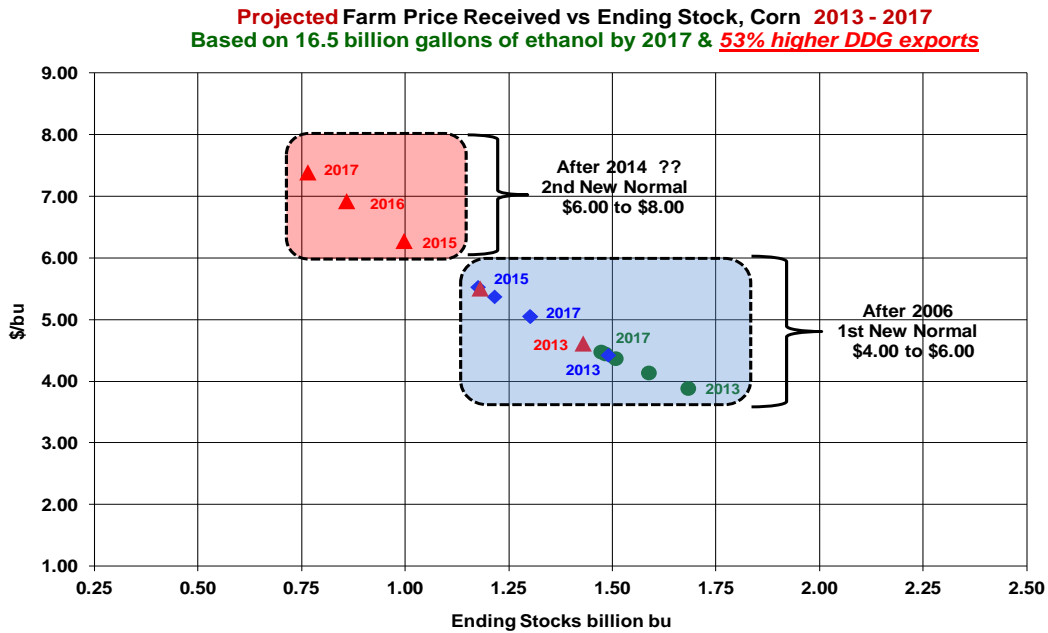

Figure 13. Scenario III - Projected Farm Prices versus Ending Stocks, 2013-17.

Conclusions for the Scenarios

It is probable that events –such as the current U.S. monetary policy of expanding the money supply, a Renewable Fuel Standard mandating 15 billion gallons of ethanol in the fuel supply, and the growing export market for distillers' grains—while individually may not have much impact, but taken collectively could result in a tipping point for the future production of ethanol and distillers' grain that would be a major increase from recent norms. The corresponding derived demand for corn, relative to the projected supply, would significantly affect the price levels for corn.

From an industry analyst's perspective, it should be noted that the scenarios do not need to be viewed as static situations. Like using radar to track an emerging weather event, in the case of the third scenario it is possible to monitor on a monthly basis the exports of DDGs to leading countries like China, Mexico and Canada, along with total exports, to see if a higher export scenario begins developing. Since the scenario is looking forward five years, if exports do increase over time, then the relative probability of the third scenario being realized increases. If exports remain at current levels over the next two, three or four years, then the probability of realizing the scenario diminishes. Concurrent tracking of the money supply, the trade-weighted index for corn, and the RFS mandate provides additional insights into the probability of a third scenario being realized. The practice of tracking makes the analysis dynamic in contributing to a strategic plan.

Implications for Management and Academia

Imagine being in the role of an industry analyst or economist employed by a large multi-billion dollar company, or as a consultant to the same. In that role the person would be responsible for presenting an external environmental analysis to senior managers and board members who have substantial knowledge about various aspects of the industry.

In addition, when presenting probable scenarios the person would be responsible for articulating the analysis in a way so recipients understand and have confidence in the results. Many of the senior managers and board members are likely to not be economists so a traditional analysis with a structured model may yield a "black box" effect and not be a credible, trusted approach. A regularly used method is the balance sheet approach, combined with graphical analysis and conditioned by an environmental scan, that explicitly shows expected cause and effect relationships. Managers and board members have a historical perspective on events and enough of an intuitive business sense that they understand and find such an approach as credible.

The objective of this article was to illustrate, by example, the kind of analysis used for strategic planning by agribusiness firms and non-governmental organizations[2].

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[2] The analysis in this article is based on actual experience. It was formally presented to an Ethanol Board of Directors for a major ethanol producing state in the U.S. and gave them a perspective they had not considered. As a result they have a strong interest in the ongoing research.

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Appendix

Table 18. U.S. corn long-term projections

Item	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Area (million acres):												
Planted acres	88.2	91.9	94.0	90.0	89.5	90.0	90.5	91.0	91.0	91.5	91.5	92.0
Harvested acres	81.4	83.9	86.8	82.8	82.3	82.8	83.3	83.8	83.8	84.3	84.3	84.8
Yield:												
Bushels/harvested acre	152.8	146.7	164.0	166.0	168.0	170.0	172.0	174.0	176.0	178.0	180.0	182.0
Supply and use (million bushels):												
Beginning stocks	1,708	1,128	843	1,623	1,683	1,588	1,508	1,473	1,483	1,453	1,468	1,468
Production	12,447	12,310	14,235	13,745	13,825	14,075	14,330	14,580	14,750	15,005	15,175	15,435
Imports	28	15	15	15	15	15	15	15	15	15	15	15
Supply	14,182	13,453	15,093	15,383	15,523	15,678	15,853	16,068	16,248	16,473	16,658	16,918
Feed & residual	4,792	4,600	5,225	5,400	5,450	5,500	5,575	5,650	5,725	5,825	5,900	6,000
Food, seed, & industrial	6,428	6,410	6,370	6,350	6,385	6,470	6,555	6,635	6,720	6,805	6,890	6,975
Ethanol and by-products	5,021	5,000	4,950	4,925	4,950	5,025	5,100	5,175	5,250	5,325	5,400	5,475
Domestic use	11,220	11,010	11,595	11,750	11,835	11,970	12,130	12,285	12,445	12,630	12,790	12,975
Exports	1,835	1,600	1,875	1,950	2,100	2,200	2,250	2,300	2,350	2,375	2,400	2,425
Total use	13,054	12,610	13,470	13,700	13,935	14,170	14,380	14,585	14,795	15,005	15,190	15,400
Ending stocks	1,128	843	1,623	1,683	1,588	1,508	1,473	1,483	1,453	1,468	1,468	1,518
Stocks/use ratio, percent	8.6	6.7	12.0	12.3	11.4	10.6	10.2	10.2	9.8	9.8	9.7	9.9
Price (dollars per bushel):												
Farm price	5.18	6.70	5.00	4.30	4.40	4.45	4.50	4.50	4.55	4.60	4.65	4.65
Variable costs of production (dollars):												
Per acre	278	327	335	333	333	336	339	345	350	356	362	368
Per bushel	1.82	2.23	2.04	2.00	1.98	1.97	1.97	1.98	1.99	2.00	2.01	2.02
Returns over variable costs (dollars per acre):												
Net returns	514	656	485	381	406	421	435	438	450	463	475	478

Note: Marketing year beginning September 1 for corn.

Group Model Building to Assess Rural Dairy Cooperative Feasibility in South-Central Mexico

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Abstract

A group model building process based on system dynamics was developed to assess the potential of a cooperative manufacturing and marketing goat cheese in a community near Xalapa. The process identified important outcomes, key variables to consider, parameter values, and relevant scenarios. This information facilitated development of a dynamic simulation model including key biological and economic factors affecting cooperative success. Model analyses indicated that the cooperative potentially could increase community incomes while controlling risk under a range of environmental and market conditions. A system dynamics-based participatory approach can help inform *ex ante* assessment of potential development and agribusiness interventions.

Keywords: farmer-led dairy cooperative, participatory group model building, system dynamics, rural development, *ex ante* assessment

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Introduction

Although economic development has increased per capita income in many parts of the world, rural areas often lag urban ones even in countries with rapid growth (Besley and Cord 2007). As an example, rural communities in Veracruz, Mexico continue to confront multiple livelihood challenges, including food insecurity, unemployment, and low and variable agricultural incomes. The creation of income-generating opportunities is required to address these challenges. One approach that has been proposed and implemented is the identification of business models that are accessible to low-income households and that in many cases also serve their needs (e.g., London and Hart 2004). Approaches of this kind often involve the participation of intended beneficiaries, long advocated by many in the development community (e.g., Chambers 1983). However, assessing the feasibility of potential of agriculture-based business models is a complex undertaking. For example, one potential strategy to earn higher incomes is value-added agricultural products. Both biological and economic uncertainties can limit the potential of this strategy, especially for smallholders (Devaux et al. 2009). Smallholders may be unable to enter or to compete in high-value markets because of scarce market information, seasonal production shortfalls, inconsistent product quality, costly market access, and poor infrastructure (Goel and Bhaskarkan 2010, Njarui et al. 2010). These conditions increase transaction costs, especially for perishable foods (Devaux et al. 2009, Hellin et al. 2009, Markelova et al. 2009). They may also preclude participation in high-value markets (Staal et al. 1997, Holloway et al. 2000).

Farmer collective action is often proposed to surmount market barriers (Markelova et al. 2009). Value-added products manufactured and marketed by farmer groups or cooperatives may improve rural livelihoods by reducing uncertainty through collective bargaining, lower transaction costs, and higher average net incomes (Nicholson et al. 1998, Holloway et al. 2000, Devaux et al. 2009). For example, improved access to formal markets through dairy cooperatives raised smallholder productivity in Ethiopia and Kenya (D'Haese et al. 2007, Francesconi and Ruben 2007). Dairy cooperatives also increased the amount of milk marketed by smallholders in India (Alderman 1987). Cooperatives frequently provide services (e.g., extension information, animal vaccination, product quality control measures) that help improve productivity and product quality, thus further increasing the attractiveness of cooperative action (Owango et al. 1998, Devendra 2001). Successful job creation in rural communities further stimulates rural economies (Goel and Bhaskarkan 2010). Collective action may also facilitate economies of scale (Burli et al. 2008, Markelova et al. 2009). However, social and logistical challenges exist for collective marketing of perishable goods (Holloway et al. 2000). It is therefore important to assess whether costs may cancel or outweigh the expected economic benefits.

Most inhabitants in the Veracruz highland community of Micoxtla work in agriculture. Most Micoxtla families struggle with seasonal food and economic insecurity (INIFAP baseline survey 2006). After meeting household needs, the principal product sales are goat's milk, young goats for meat (cabrito), and eggs. Under an integrated rural development project operated by the Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), community members identified growing demand for specialty products for the tourist trade in the nearby city of Xico (5000 residents, 5 km from Micoxtla) as a potential value-added opportunity. The

community expressed interest in exploring production of aged goat's milk cheeses to increase household incomes, which would require startup capital beyond the capacity of individual families (Staal et al. 1997, Nicholson and Stephenson 2006). Additional risks from producing and marketing premium cheeses arise from dynamic biological, economic, and social processes including weather patterns, market access, and land availability for forage production. Collective action to form a farmer-led dairy cooperative, combined with startup extension services and training by INIFAP, could help reduce these risks. Consequently, the principal objective of this project was to assist the community and INIFAP advisors to assess the *ex ante* potential of a goat's milk cheese production and marketing business structured as a community cooperative. This assessment evaluates the potential of a cooperative to increase local incomes given biological and market risks, and identifies threshold values necessary to increase the probability of cooperative success. This analysis is best viewed as a first-stage assessment that can be extended and complemented with a subsequent more detailed assessment of market demands for the cooperative's product. A complementary objective was to demonstrate the use of participatory group modeling to evaluate the feasibility of rural agribusiness options.

Methods

Participatory Group Model Building

Although *ex ante* assessment of potential agribusiness interventions is common, rarely is it undertaken using participatory systems modeling. Consequently, this assessment employs a dynamic, participatory modeling method to evaluate many biophysical and economic factors important to cooperative success. This framework assesses the expected impact on community income when a proportion of milk produced in the community is purchased and manufactured by the cooperative into aged cheese for sale to Xico restaurants. We develop a simple cooperative management structure with the primary goal of raising member net incomes via milk purchases and periodic distribution of dividends to dampen the risk of too-low family incomes. In this first-stage assessment, the focus is the biological and market contexts and their effect on the cooperative business model, rather than the internal management dynamics of the cooperative.

The analysis uses a dynamic mathematical simulation model developed through participatory group efforts. A series of group learning and model building exercises were conducted with seven participants from INIFAP, including rural development agents and researchers, and a local university student. Three of the participants comprised the INIFAP micro-watershed development team, working closely with Micoxtla smallholders on agriculture and community development initiatives. The participants had diverse disciplinary backgrounds, including agronomy, agricultural science, rural sociology, statistics, GIS, and economics, and were accustomed to working as an interdisciplinary team. However, they typically operated without an overarching framework to allow assessment of intervention outcomes. The model-building process was one component of a three-month professional development short course on systems thinking and modeling requested by INIFAP, which affected the composition of participants. Although it is more typical for group modeling processes to include direct participation by all relevant stakeholder groups, the breadth of disciplinary backgrounds and the close working relationship between team members and the community allowed for adequate representation of

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the perspectives of many relevant stakeholder groups. For example, the initial idea for a community cooperative selling goat's milk cheese arose within the community itself.

Assisted by a trained facilitator, group modeling processes (Vennix 1996, Andersen and Richardson 1997) were used to elicit key information and conceptual frameworks from participants who completed five phases of the modeling process described by Sterman (2000). The course facilitator reinforced theoretical concepts to generate information for model development and to increase confidence in modeling as a tool for future INIFAP use. Participants first defined key rural development variables in Micoxtla, emphasizing the potentials for production and marketing of value-added agricultural products through a cooperative. The group next identified the expected behaviors of key outcomes over time, developing a conceptual model using feedback loop diagramming to account for observed behaviors. Subsequently, the principal stocks (states, accumulations) and flows (rates) constituting the functional cooperative framework were identified and structurally diagrammed. This information was used to structure the simulation model, providing likely ranges of parameter values, and establishing the main expected outcomes. The participants also evaluated the initial model structure. The software used to implement the model (Vensim®) includes iconic representation and a graphical user interface, which facilitated analysis of factors and scenarios of interest, also helping to identify key assumptions and potential modifications. Previous studies indicated that participatory group model building increases stakeholder engagement and understanding of complex problems (Vennix 1996). Thus, one objective of the group learning process was consensus building and ownership of the model and of potential interventions like the cooperative.

The resulting mathematical model uses a system dynamics (SD) modeling approach, which applies systems engineering concepts to interdisciplinary social, economic, and biophysical systems to help inform with insights about real-world problems (Sterman 2000). This approach has been applied to numerous business (Sterman 2000) and environmental settings (Ford 1999). However, despite the apparent benefits from SD methods there have been few applications in the international agricultural development arena (Nicholson 2007, Nicholson et al. 2011). Mathematically, SD models are systems of differential equations solved by numerical integration (Nicholson 2007). Vensim® software provides a visual interface representing feedback structure, explicit stock-flow (state-rate) structure, and quantitative decision rules characterizing the system. Vensim® also provides numerical and graphical outputs of key variables. The SD approach embraces dynamic complexity, where long-term outcomes from interventions may differ from those in the short-term (Nicholson 2007). This method permits simulation of likely outcomes from proposed interventions to assess key behaviors over time. It also facilitates evaluation of constraints and leverage points, thus potentially enhancing the effectiveness of agribusiness interventions. *Ex ante* assessment of establishing a dairy cooperative, or rural development strategies more generally, may forewarn about potential pitfalls and expected benefits, thereby increasing the odds of success (Thornton et al. 2003). A potential limitation of this approach is that data needed for the development of simulation models are often limited. Limited data also influence other approaches to *ex ante* evaluation, which is facilitated by methods like SD that help to identify key information affecting ultimate outcomes.

Model Overview and Scenarios

The biophysical and economic simulation model depicts the aggregate goat flock owned by 25 Micoxtla families and the potential activities of a farmer-led cooperative to manufacture and market aged cheeses. The model represents current income sources from the flock (sales of milk, *cabritos*, and culled does). Feed resources comprise forage and fodder, which constrain animal productivity. Forage yield varies seasonally with precipitation, and forage nutrient allowance influences reproduction, health, and milk. Mean monthly precipitation from 1961 to 2002 determines forage productivity, thus acting as a principal proxy for associated seasonal effects of rainfall, temperature, and solar radiation on forage production. Seasonal rainfall is more variable than temperature and photoperiod in Micoxtla (Appendix 5, seasonal weather patterns). In tropical regions with long dry seasons, water availability is frequently the most important factor influencing seasonal variation in animal productivity (Van Soest 1994). Consequently, rainfall is the dominant driver of forage nutrient supply to support animal production and reproduction. A review evaluating the effects of forage quantity and quality on animal productivity in pastureland systems demonstrated that for a wide range in forage dry matter per unit area of land, quantity accounts for 60 to 90% of the variation in animal productivity (in this case, average daily gain) (Sollenberger and Vanzant 2011). Increased forage quality would be required were cooperative managers to target increased milk yield per doe, assuming forage intake is not limited by quantity and animals have genetic potential for increased productivity (Mott and Moore 1985). Such productivity increases are not necessary for the initial stages of cooperative implementation. Thus, forage quality is assumed not to change over time or with the size of the community flock. Stochastic monthly rainfall selected from a distribution with values up to 2 SD from mean monthly values do not qualitatively affect the simulated outcomes regarding cooperative feasibility, so we report the results for deterministic simulations. Long-term drought has potentially larger impacts and is evaluated in detail below.

These biological modules collectively determine milk supply, a key input for the cooperative. Milk can be fed to young goats, consumed by the household, sold raw in Xico, or sold to the cooperative. A sinusoidal function generates uniform seasonal oscillation in the average raw milk price. The cooperative manufactures and markets cheese in response to the assumed logistic growth in demand (Bass 1969), incurring costs for the raw material (milk), processing, aging (storage), and marketing. Seasonal demand variation is not included in model scenarios. Earnings above costs by the cooperative can be invested in production capacity or in dividend payments to farmer members of the cooperative. The simple cooperative business strategy as determined by the participants makes capacity investment decisions (both replacement and expansion) based on expected sales and the availability of retained earnings. Dividends are paid after investments in capacity, retaining sufficient cash to cover two months of expected costs. We assume that cooperative members are motivated by dividend payments and will agree to provide the required milk as long as dividends are paid, up to limits of local production capacity and household consumption requirements. Because establishment can be a lengthy process, and to assess the potential unintended consequences arising from dynamic complexity, a 20-yr time horizon (2013 to 2033) is used to assess future behaviors after initiating operations. A more detailed description of model modules is in Appendices 1 through 5. Model evaluation (including parameter sensitivity testing) was completed using the set of tests described for SD models (Sterman 2000), and is reported in Appendix 6.

A plethora of factors could influence the potential of the cooperative to achieve its objective of increasing community incomes. The basic approach used herein is to compare the impacts of selected factors identified by the participants in the group model building exercise on outcomes these participants indicated would be important to the community. These outcomes include month-to-month and cumulative community income (farmer, household) from caprine activities and cooperative feasibility (assessed by the ability to maintain cash holdings, to maintain production capacity, and to pay dividends to members). The scenarios with the cooperative include comparisons to a baseline, which represents the likely future outcomes in its absence. The model is also used to assess a number of factors affecting the probability of its success, including production parameters, costs, and the number of buyers for aged cheese. Some of these factors (e.g., product price and costs) can be influenced by government policy, so this analysis accounts for selected policy effects, albeit in an indirect way. We do not analyze the effects of other government policies that may influence the success of the cooperative (despite the likelihood of policy changes over a 20-year time horizon) largely due to the challenges of determining *ex ante* their nature or timing. Other scenarios permit assessment of the impact on cooperative feasibility of large short-term reductions in milk production (e.g., drought that reduces feed supplies) and cheese demand. Results are depicted graphically, as is often recommended for analyses of dynamic systems (Sterman 2000), with selected results provided in summary tables.

Results and Discussion

Baseline and Cooperative Scenarios

The baseline scenario (Figure 1, black line) assumes continuation of the Micoxtla *status quo* in the absence of a cooperative. Monthly caprine income for the community is generally below 5000 pesos ($1 USD in 2012 = 13 Mexican pesos) and subject to large seasonal variation. Oscillation in net income arises primarily from fluctuations in forage supply caused by variations in precipitation (Appendix 5, seasonal weather patterns). Results are also influenced by exogenous seasonal fluctuations in the price of raw milk, ranging from 4.5 pesos kg^{-1} during the dry season to 3.5 pesos kg^{-1} during the rainy months. Due to diminished milk production during the dry season, caprine activities are unprofitable for about two months each year (April and May). The simulated cumulative net income for the community flock during the 20-yr time horizon is about 910,000 pesos, from sales of milk, *cabrito*, and culled animals. Milk accounts for 78% of total income, followed by *cabrito* (19%) and culls (3%). This income pattern matches that observed by the INIFAP team and reported by Micoxtla producers.

Establishment of the cooperative requires an initial investment to manufacture and to market aged cheese. Initial working capital and equipment investment costs would be approximately $10,000 USD based on other small-scale dairy processing costs (Holloway et al. 2000, Nicholson and Stephenson 2006, Nicholson et al. 1998). Although this investment is clearly important, we assume that the community would be able to obtain the required funds from government sources, grants, or development agencies. This initial investment occurs in January 2015. Following initial investment, the cooperative manufactures and markets cheese in response to logistic growth in demand (Bass 1969) from 2015 to 2022. The cooperative invests in additional production capacity as permitted by retained earnings. The cooperative initiates dividend

payments to members in 2017, and payments increase to peak levels by 2022. Dividend payments in the cooperative scenario provide monthly net incomes for the community approximately three years after initial investment. This delay in realizing improvements in income may prove important to community participants in the cooperative and must be conveyed to potential members prior to startup to prevent frustration or member abandonment (Henehan 2001).
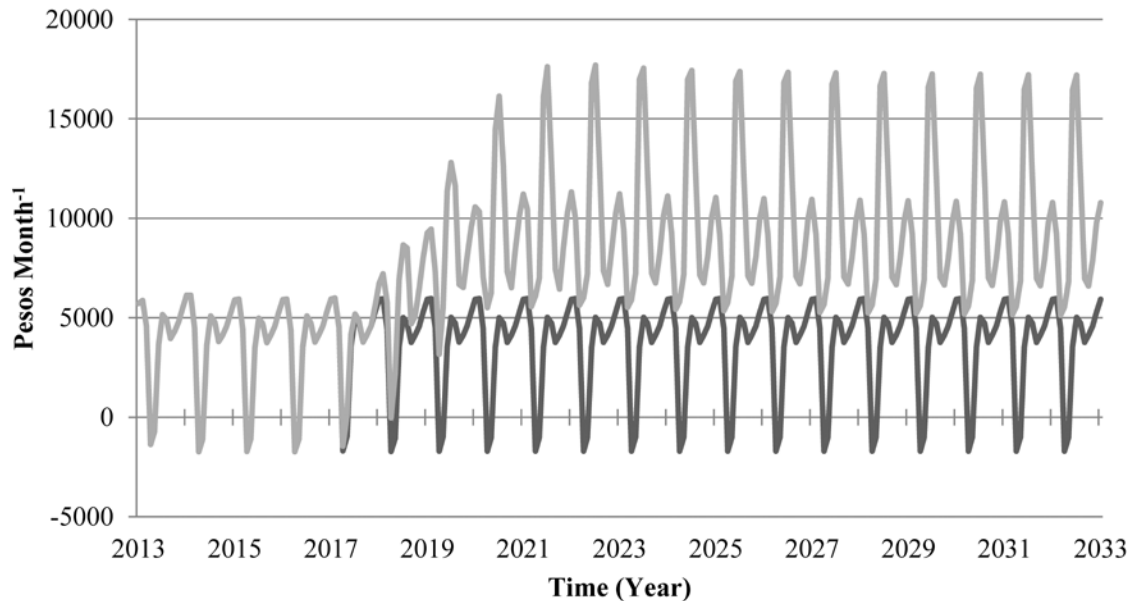

Figure 1. Monthly net cash operating income of community caprine operations for cooperative (grey line) and baseline (black line) scenarios

Cooperative operations result in greater average monthly net income for the community beginning in 2018 (Figure 1, grey line). The cooperative cash balance is positive throughout the horizon assuming an initial working capital of 30,000 pesos (Figure 2). Community incomes for the baseline and cooperative simulations differ primarily due to dividend payments by the cooperative, but also from growth in goat flock size. The cooperative also has the capacity to eliminate negative community net cash operating incomes from caprine operations during the dry season. Dividend payments would be made during periods of previous low or negative net cash operating incomes as a result of delays in cheese maturation and sales. The cumulative net income from community caprine activities is 1.936 million pesos, an increase of more than 1.0 million pesos over the baseline estimate for this 20-yr time horizon. This suggests significant potential for a cooperative to increase net incomes in the community under the assumed conditions. Importantly, the cooperative incurs losses for slightly more than three months each year (mid-May to mid-August; indicated by reduction in the retained earnings during these months, Figure 2).
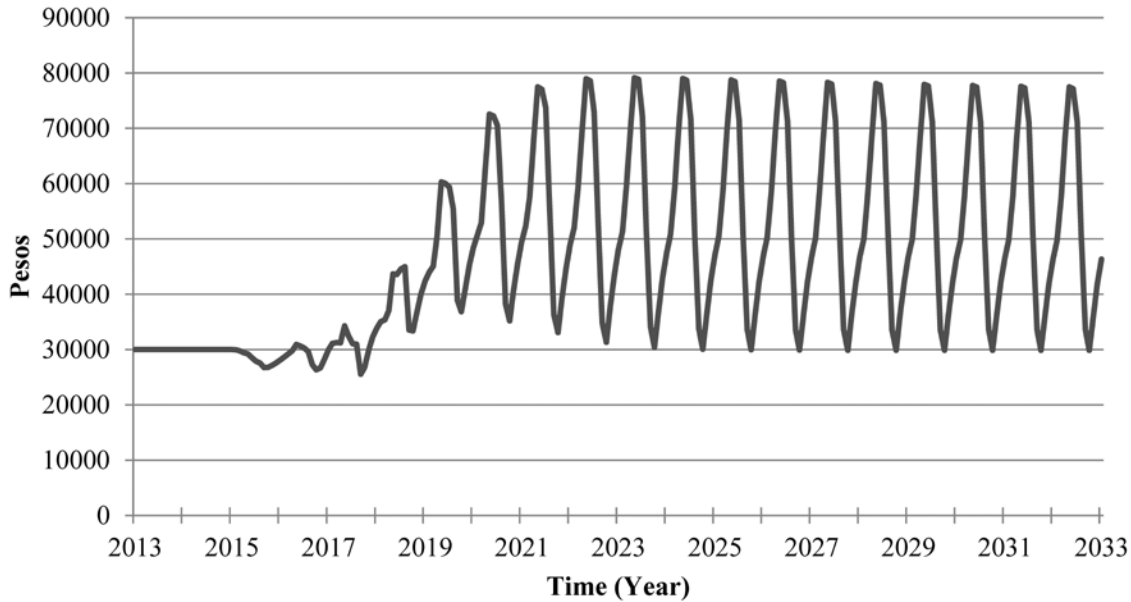
Figure 2. Cooperative cash balance for cooperative scenario

Factors Influencing Success of the Cooperative

The foregoing analysis indicates potential for the cooperative to increase Micoxtla incomes under the assumed conditions, but numerous factors may jeopardize this potential. Accordingly, we determined the threshold values that would preclude dividend payments, reduce cheese production capacity, or that would result in a negative cash balance. These threshold values are also expressed as percentage changes from assumed baseline values (Table 1). This analysis suggests cooperative feasibility over a wide range of assumed values for key factors.

Any business must develop an adequate customer base to achieve financial success. Although a thorough market evaluation was not undertaken in this first-stage assessment, a threshold analysis was developed to determine the minimum market size that would be required to allow dividend payments. In this case, the number of minimum required regular buyers is small (two, Table 1). Although this does not negate the need for a more thorough market assessment, it suggests that development of a customer base may not be the most constraining factor to successful cooperative development. In fact, the cooperative's ability to pay dividends is most sensitive to a reduction in the base price of cheese, for which a 24% reduction from the observed market value of 120 pesos kg^{-1} would be sufficient to undermine economic survival of the cooperative. For simplicity, univariate changes to values were assumed for these threshold analyses. However, multivariate analyses of these factors also suggest that the cooperative would be feasible even with multiple values assumed near the identified thresholds.

Table 1. Parameter threshold values that would prohibit dividend payments to producers, maintaining production capacity, or maintaining a positive cash balance

Factor	Threshold value	% Change from base value
Total potential buyers in Xico, number	2	-93.3
Cheese yield, kg cheese (kg milk)$^{-1}$	0.06	-40.0
Maturation time for cheese, months	10	+150.0
Production cost, pesos (kg cheese)$^{-1}$	39	+290.0
Storage cost, pesos (kg cheese * month)$^{-1}$	12	+140.0
Marketing cost, pesos (kg cheese)$^{-1}$	41	+310.0
Base cheese price, pesos (kg cheese)$^{-1}$	95	-24.0
Premium over local milk price, pesos kg^{-1}	5.2	+33.3
Initial cash holdings, pesos	5,000	-83.3

Rapid growth in demand could also threaten cooperative feasibility if the cooperative is unable to increase production quickly enough to remain a reliable supplier to the tourist market in Xico. We therefore assess the maximum annual growth rate in orders that can be filled by the cooperative over the simulated time horizon within the milk production capacity of the community goat herd and cooperative processing capacity. The cooperative could meet more than 90% of the demand during seasonal periods of high product inventory for compound annual growth rates of sales up to 11% per year beginning in 2017. Rapid demand growth causes additional variation in cooperative cash flow, but increases cumulative community net incomes. Although this analysis only considers milk supply from a single community, cooperative membership expansion to include additional smallholders in Micoxtla and nearby regions might be attractive given the benefits of cooperative participation.

Production and Demand Shocks

Because the cooperative's production and marketing environment is uncertain, it is important to determine the impact of potential shocks on community net income and cooperative feasibility. Although many such shocks could be important, this assessment illustrates selected biological and economic cases: a shock to production (drought) and demand for the product (e.g., an economic shock to the Mexican economy that reduces tourism). The timing of these shocks is important. Both shocks occur in 2017 during the growth phase and prior to the initiation of dividend payments. This is an especially vulnerable phase for the cooperative. For the production shock, we assume a two-year reduction in rainfall to 40% of normal to test the impact of an extreme production shock (the largest observed single-year reduction in rainfall during 1961 to 2002 was 63% of normal). The demand shock assumes that demand falls to 50% of its previous level for a period of two years. These shocks reduce community income and cooperative cash balance (Figure 3 and Figure 4), but do not preclude dividend payments or result in negative cash balances. Moreover, the impact of the production shock on monthly income is less for a cooperative than without it (Table 2). This finding also suggests that the cooperative may be robust in the face of unexpected biological and market developments (e.g., climate change).
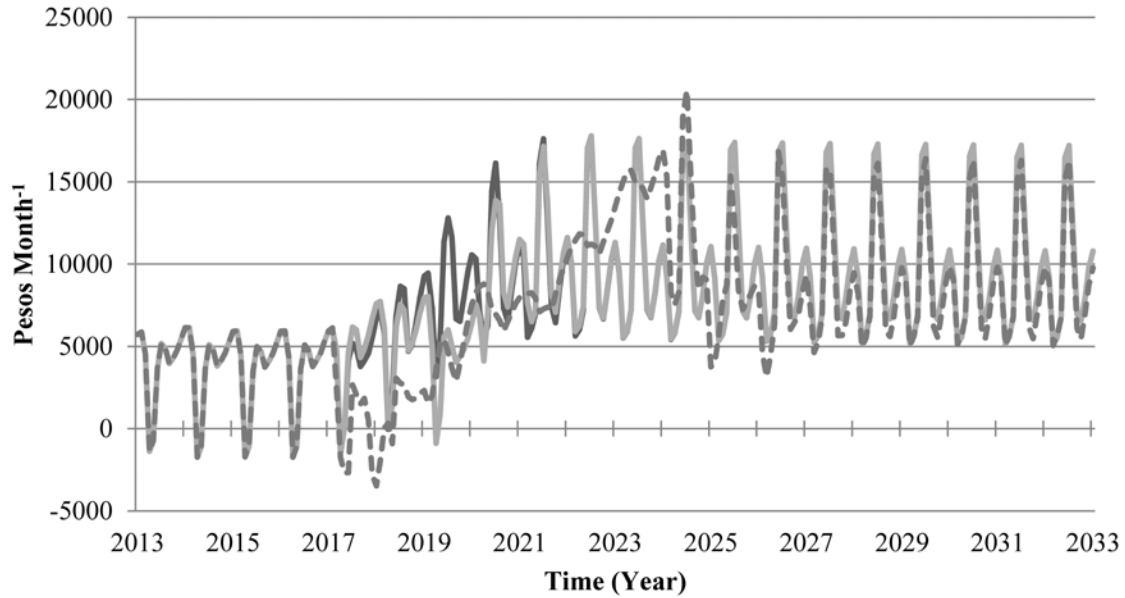
Figure 3. Monthly net cash operating income of community caprine operations for cooperative scenario (black line), the 2017 demand shock (grey line) and the 2017 production shock (dashed line)
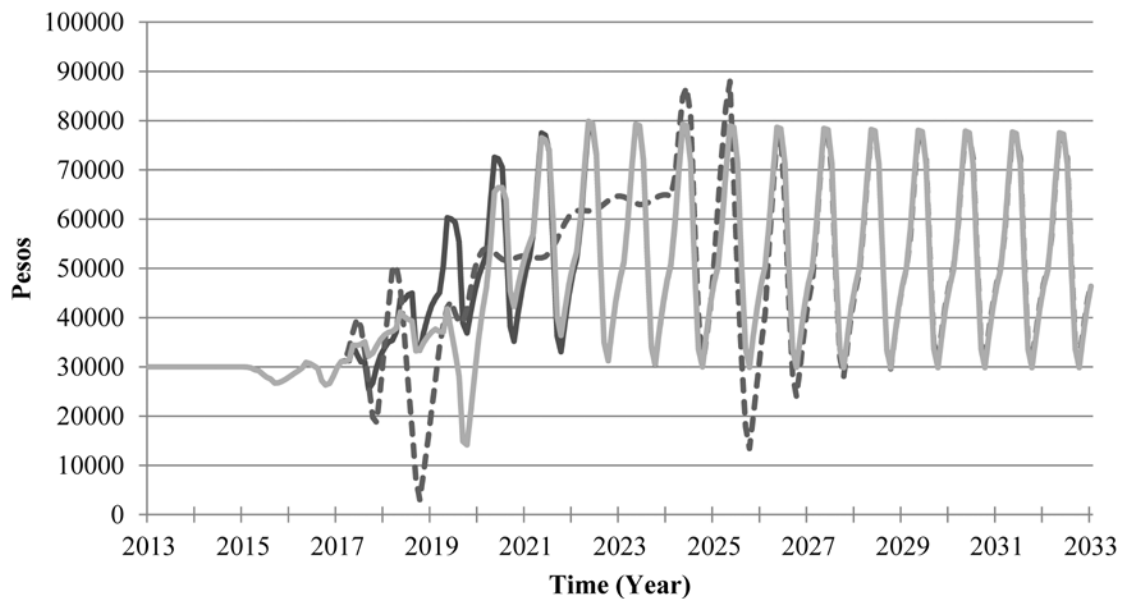

Figure 4. Cooperative cash balance for cooperative scenario (black line), the 2017 demand shock (grey line), and the 2017 production shock (dashed line)

Table 2. Key cumulative outcomes for reported simulation scenarios

Scenario	Cumulative Net Income (10^6 pesos)	% Change from Baseline	% Change from Cooperative	Cumulative Dividends (10^6 pesos)	Cooperative Average Cash Balance (pesos)	Cooperative Minimum Cash Balance (pesos)
Baseline	0.910	0	-53.0	N/A	N/A	N/A
Cooperative	1.936	+112.8	0	0.944	46,807	25,496
Demand shock	1.895	+108.3	-2.1	0.906	46,044	14,129
Production shock	1.741	+91.4	-10.1	0.943	46,325	3,004
Production shock, No cooperative	0.719	-20.9	-62.8	N/A	N/A	N/A

Conclusions

The results of this group-developed simulation model indicate that establishment of a cooperative to produce and market cheese has potential as a strategy to increase net incomes of caprine owners like those in Micoxtla. Furthermore, the cooperative appears to be resilient to variations in key biological and market parameters, and to production and demand shocks of extended duration. Short-term and moderate market demand reductions and biological shocks do not markedly alter long-term trajectories for net income or cooperative cash flow. Following recovery from shocks, the behavior of relevant financial variables is similar to behavior in the absence of shocks. Nonetheless, other factors merit consideration to assess cooperative implementation.

First, a lack of capital to invest in market feasibility studies, business plan development, and infrastructure in the startup phase may preclude effective cooperative formation (Henehan 2001). In this case, initial investment is necessary to commence operation of the cooperative, and this likely would need to be externally provided. We estimate that initial working capital and equipment investment costs would total less than $10,000 USD based on observed small-scale dairy processing costs (Holloway et al. 2000, Nicholson and Stephenson 2006). With this investment, the cooperative could return more than 900,000 pesos ($69,230 USD, undiscounted) in dividends paid to farmers from 2017 to 2033.

Second, training is required to assure timely delivery of a quality product. Cooperative managers need to be identified and trained in hygienic cheese processing, facilities repair and maintenance, and business management practices (e.g., accounting, customer relations, member management, and marketing). The training program could be organized and delivered by INIFAP or another development organization. Third, effective cooperative management and bylaws are fundamental to success (Fulton and Hueth 2009). Well-trained leaders and managers are needed to avoid risks from corruption and lack of farmer participation. An important risk is limited ability to attract a sufficient milk supply, partly due to the lag between initiating the cooperative and payment of dividends under assumed decision rules. This analysis indicates that during startup, several years may be needed for the cooperative to achieve solvency. This is a challenge because members may discontinue participation due to a lack of economic benefits during this period. If the

cooperative were to experience financial difficulties, especially during the establishment period, this could affect the future willingness of farmers to participate. This process likely could be usefully assessed with agent-based models of cooperative management (North and Macal 2007), but few agent-based analyses of agricultural cooperatives have been undertaken to date.

Longer-term structural changes in supply and demand could also affect cooperative feasibility, forcing managers to reassess the cooperative business model and opportunities for participant expansion. On the supply side, cooperative members may identify other more remunerative activities with their existing resources over the long time horizon analyzed. For the cooperative to be successful in the long term, it must also determine the most appropriate strategic responses to changes in market demand, including both the volume demanded and the types and variety of products. Finally, although the cooperative can increase community incomes even for a relatively small market (two buyers, see above discussion), a detailed study of market demand for aged cheese would be required to identify specific buyers and the volume and seasonal patterns of sales. During group model building activities, INIFAP participants identified market information as a major limitation and a priority activity before cooperative establishment. Although these represent significant challenges, traditional market assessment methods and additional group model building efforts can be used to assess these factors and to suggest potential strategies.

On the other hand, this modeling analysis does not fully represent other potential financial or social benefits from cooperatives for Micoxtla or other communities like it. Farmers hold more collective bargaining power as a unit in the market place than as individuals (Nicholson et al. 1998, Holloway et al. 2000, Devaux et al. 2009). A dairy cooperative may also reduce transaction costs for its constituency (Staal et al. 1997, Holloway et al. 2000). Although the current model does not differentiate transaction costs for fluid milk sales in Xico and the cooperative, this may be another motivation for cooperative membership. Production of additional value-added products in rural communities like Micoxtla could further mitigate the risks associated with agricultural livelihoods. A similar approach to the one adopted in this paper could be applied to assess these products or to assess other options for agribusiness development interventions.

Group model building based on SD methods has the potential to improve the efficacy of international agribusiness development initiatives. The participatory activity was important for four principal reasons. First, the group identified community priorities and opportunities. For example, the community strongly believed that any value-added activities should be undertaken as a community (cooperative) effort rather than by a small number of entrepreneurs, and this was reflected in a key assumption of the modeling effort. The group also identified the potential for the specific product, goat's milk cheese, based on their experience with marketing opportunities in Xico. Second, the interdisciplinary group of participants contributed to the development of the specific structure of the modules, but also engaged in vigorous discussions about how much detail was required to adequately capture the (qualitatively) observed behaviors. Thus, they identified potential areas for model simplification that were reflected in the model structure described above. Third, inclusion of the participants in model building has been shown in previous studies (Vennix 1996, Andersen and Richardson 1997) to enhance group learning, consensus building, and confidence in the expected outcomes of potential interventions. Although this study does not include a more formal evaluation of these outcomes, course

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evaluations indicated that these outcomes occurred. Changes in the structure of INIFAP programs, including a reduction in resources for the micro-watershed team's activities, occurred since the time of the study. This probably prevented implementation of a cooperative in Micoxtla subsequent to the participatory group model building effort. Finally, in contrast to typical group model building undertakings (Vennix 1996, Andersen and Richardson 1997), INIFAP participants benefitted from instruction in systems thinking and system dynamics modeling. Consequently, participants acquired skills necessary to use the model and to potentially modify it or develop their own tools for *ex ante* assessment of agribusiness interventions. The present application, undertaken with a leading research and development institution in Mexico, demonstrates the contributions of these methods to research and development programming. The net benefit could yield better understanding about the pathways of proposed interventions, their benefits and pitfalls, and better informed investments by donors.

Acknowledgments

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Appendix 1. Core Model Structure and Module Overviews

The model comprises eight linked modules that are described below: 1) community goat flock, 2) forage resources, 3) milk allocation, 4) dairy cooperative management and decisions, 5) cooperative productive capacity, 6) cooperative aged cheese manufacture, 7) market for aged cheese, and 8) net income expectations and decisions for goat producers. Module descriptions are complemented by key model equations (Appendix 2), model parameter values (Appendix 3), lookup tables (Appendix 4), seasonal weather patterns (Appendix 5), and model evaluation (Appendix 6).

Community Goat Flock

The goat flock module tracks the size and composition of the aggregate community flock (Figure A1). The stock-flow structure consists of a doe aging chain divided into three stocks: *cabritas* (young does)*,* weaned *cabritas*, and adult does. An additional stock of *cabritos* (young bucks) contributes to the goat production stock-flow structure, but is not included in the doe aging chain because *cabritos* are either sold or consumed locally. Primary management decision rules associated with the goat flock include reinvestment in adult does (animal purchases) and variation in the adult doe culling rate.
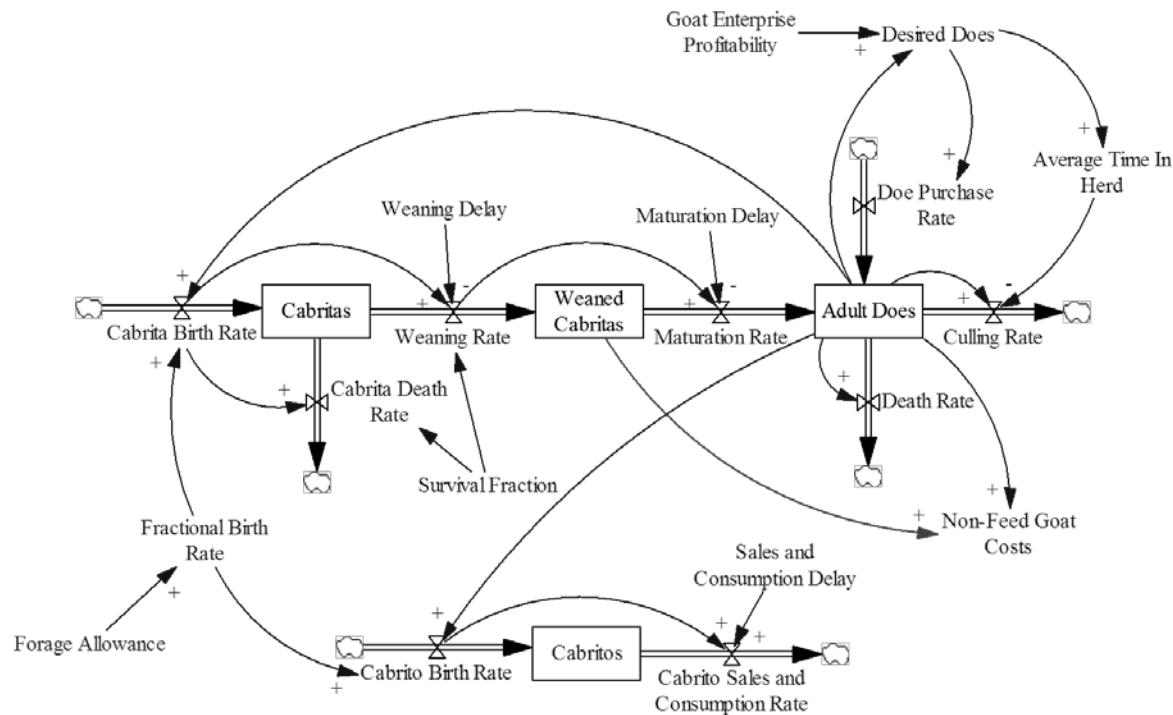

Figure A1. Simplified goat flock stock-flow structure consisting of four stocks to represent flock management

The fractional birth rate (Appendix 2, Table A1, Eq. 1) varies based on fulfillment of required forage needs (effect of forage allowance) through a reference multiplicative formulation[1]. The rate is uniformly distributed so that 50% of goat kids are males and 50% are females. The *cabritas* stock is affected by one inflow (*cabrita* birth rate) and two outflows (death and weaning rates). The weaning rate, an intermediate flow between the *cabritas* and weaned *cabritas* stocks, is a third-order delay of the *cabrita* birth rate and depends on the constant average weaning age. The weaned *cabritas* stock contains only one outflow, a high-order (eighth) delay in the weaning rate. The combined weaning and maturation delays form a higher-order delay distribution around the total average delay time for doe maturation. *Cabritas* must reach their first parturition to complete maturation to adulthood, which is depicted by entry into the stock of adult does. The age at first parturition is just over two years. We assume that all adult does produce milk.

The stock of adult does contains an additional inflow, purchased animals, and two first-order outflows, the rates of culling and mortality. We assume that Micoxtla producers make decisions about flock composition based on enterprise profitability. The culling rate (Appendix 2, Table A1, Eq. 4) changes with average time in the flock, a variable that is a function of the ratio of desired adult does to actual does (Appendix 4, Table A3). When desired adult does exceed actual adults, producers purchase does (Appendix 2, Table A1, Eq. 5) and decrease the culling rate (Appendix 2, Table A1, Eq. 3, 4). The desired adult does variable (Appendix 2, Table A1, Eq. 2) is defined by a reference multiplicative formulation that adjusts based on the actual number of adult does and expected net income of the goat operation (Appendix 4, Table A3). Does are purchased when sufficient cash is available and the desired number exceeds the actual count of adults. The desired does and doe purchase formulations are adapted from the production capacity formulation in Sterman (2000).

The fractional mortality rate determines the adult doe mortality rate as a function of several parameters so that the model initializes in dynamic equilibrium. The fractional rate also varies according to the effect of forage allowance (forage dry matter per animal unit) via a reference multiplicative formulation (Appendix 4, Table A3). We assume all culls can be sold at a fixed price and all animals in the stock of adults (adult does and weaned *cabritas*) incur monthly non-feed costs. Therefore, sales of culled animals and monthly non-feed costs affect the monthly net cash operating income of community caprine operations.

The fractional birth rate inflow and goat sales and consumption outflow affect the *cabritos* stock. The outflow is a third-order delay of the inflow. We assume that all *cabritos* are either sold or used for household consumption, and all that are not consumed are sold. The number of animals sold and the constant *cabrito* price determine *cabrito* sales revenues. Animals in the stocks of *cabritos* and *cabritas* consume milk. Adult males are not modeled explicitly because most Micoxtla producers do not maintain breeding bucks. The few producers that own breeding bucks lend them to other producers. Non-buck owners sometimes pay low breeding fees that are ignored and excluded from the model boundary.

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[1] Reference multiplicative effect is a common system dynamics formulation that multiplies a variable's reference value by a nonlinear effect that is dependent on an additional variable or variables. The nonlinear effect is often normalized to return the reference value under initial default conditions. The effect uses a lookup function (see Appendix 4, Table A3 for all model lookup functions).

Forage Resources

The forage resources module (Figure A2) generates a nonlinear physical capacity constraint to the size of the goat flock. An important variable linking it to the community goat flock module is fractional forage needs satisfied (Appendix 2, Table A1, Eq. 7), which is derived from forage mass per caput (Appendix 2, Table A1, Eq. 6). The ratio of forage mass per caput to reference forage mass per caput defines the fraction of forage needs that are met (Appendix 2, Table A1, Eq. 6 and 7). This fractional forage condition (effect of forage allowance) nonlinearly affects the birth rate, adult goat mortality, milk production, and desired forage resources via their respective reference multiplicative effect formulations in other modules (Appendix 4, Table A3). This forage resources formulation assumes forage quality does not change over time or with the size of the community flock. Management decisions in this module include fertilizer applications to forage crops and land area in forage production. Both generate production costs in the form of fertilizer costs (Appendix 2, Table A1, Eq. 14) and land costs (Appendix 2, Table A1, Eq. 15). Labor costs (Appendix 2, Table A1, Eq. 16) are a function of forage produced. The sum of labor, land, and fertilizer costs determines forage production costs (Appendix 2, Table A1, Eq. 17).
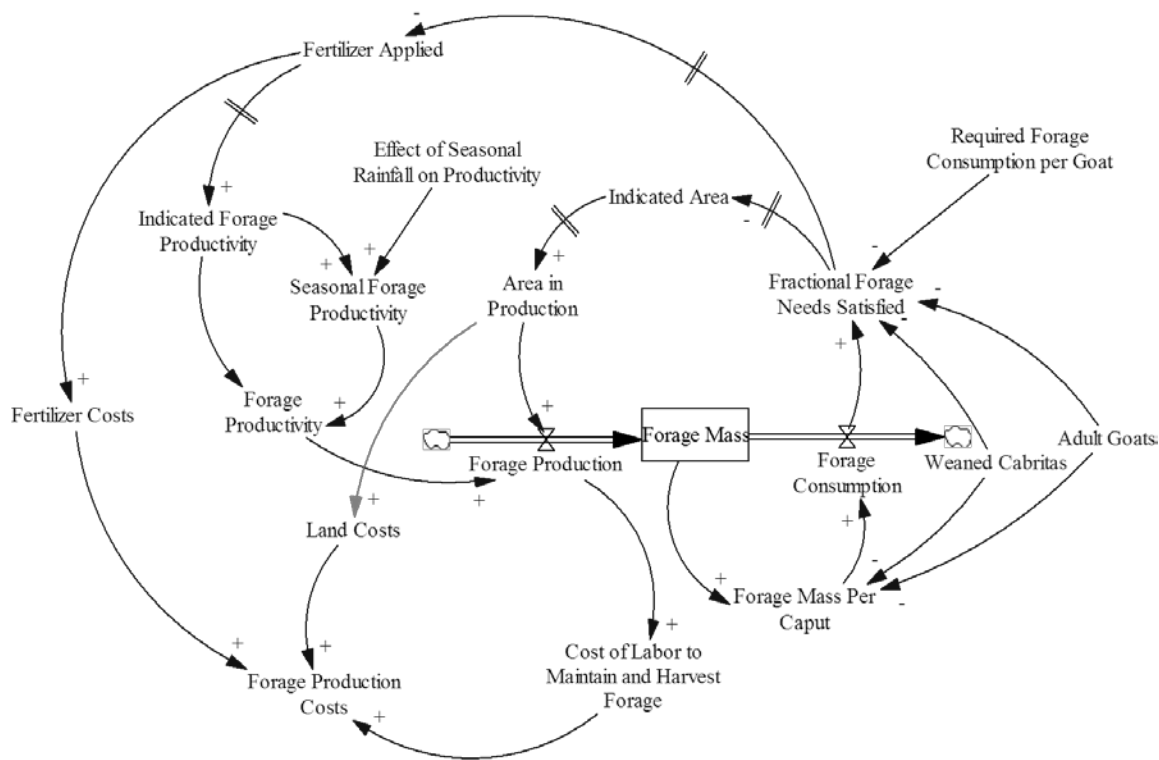

Figure A2. Simplified forage stock-flow structure consists of multiple balancing feedback loops that regulate forage production and consumption

The forage resources component of the model consists of one stock, forage mass, with its production inflow and consumption outflow. We assume that farmers desire to increase forage production through productivity increases and land area expansion when forage resources are

perceived to be insufficient. Both land productivity and land in production are anchored on their reference values in reference multiplicative formulations (Appendix 4, Table A3). Indicated land area changes via a reference multiplicative formulation so that more land is desired when forage resources are perceived to be inadequate (Appendix 2, Table A1, Eq. 8). Furthermore, producers increase fertilizer applications (Appendix 2, Table A1, Eq. 9) when forage productivity is inadequate in an attempt to meet flock needs. INIFAP worked with Micoxtla farmers to improve crop productivity by applying fertilizer. The inclusion of this policy in the model assumes that producers recognize the potential for increased returns with productivity gains from fertilizer applications, and that they have the capacity to purchase fertilizer or apply manure. The indicated forage productivity variable (Appendix 2, Table A1, Eq. 10) calculates productivity changes from fertilizer applications via a first-order delay formulation with a three-month delay time.

Indicated forage productivity or seasonal forage productivity (Appendix 2, Table A1, Eq. 12) determines actual forage productivity (Appendix 2, Table A1, Eq. 11). Seasonal land productivity changes with the pattern of rainfall though the effect of seasonal rainfall on productivity (Appendix 2, Table A1, Eq. 13). Average yearly rainfall patterns (Appendix 5, Table A4) from the climatology station in Teocelo, Veracruz from 1961 to 2002 provide a proxy for seasonal variation in forage productivity (INIFAP 2006). The ratio of average individual monthly rainfall to overall average monthly rainfall affects forage productivity in a multiplicative formulation (Appendix 2, Table A1, Eq. 12).

Forage consumption (Appendix 2, Table A1, Eq. 19) depends on the number of adult goats (adult does and weaned *cabritas*) and the amount of forage consumed per goat. The quantity consumed per goat changes through a reference multiplicative formulation depending on the ratio of forage mass per caput to reference forage mass per caput (Appendix 4, Table A3).

Milk Allocation

The milk allocation module (Figure A3) tracks fluid milk for *cabrito* and *cabrita* consumption, for household consumption, and for sales income. Stocks of adult does, *cabritos*, and *cabritas* link it to the goat flock module. The effect of forage allowance also affects milk output and links the milk allocation module to the forage resources module.
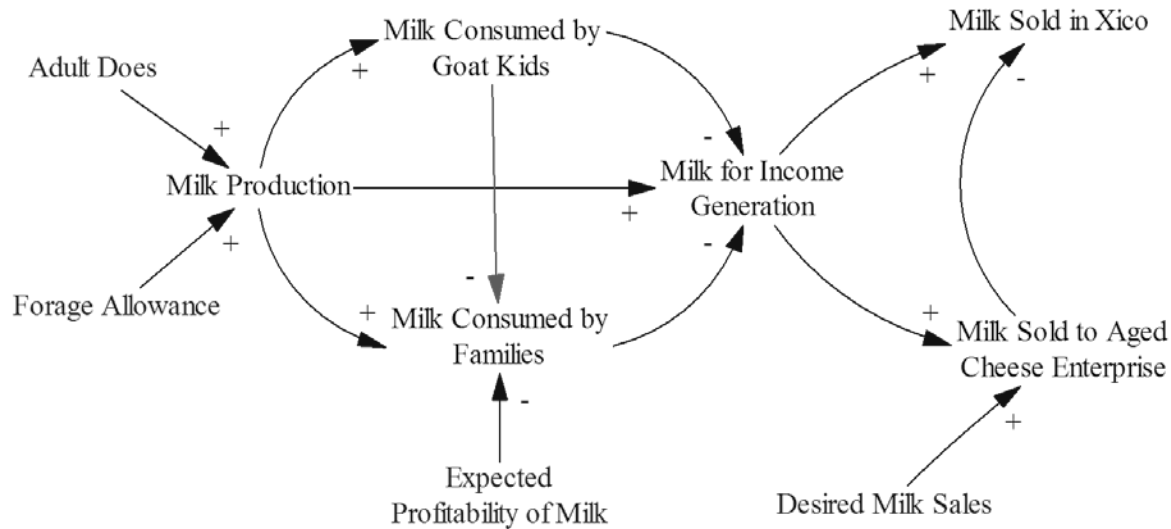
Figure A3. Simplified structure for milk allocation consisting of fluid milk consumption by goat kids and the families raising them, with surplus milk allocated for income generation and sold in Xico or to the aged cheese cooperative

Reference multiplicative formulations define the nonlinear relationships in variables for the amount of milk consumed by the household and daily milk yield per doe (Appendix 4, Table A3). Milk for household consumption decreases when milk sales income surpasses the reference value. Milk for *cabrito* and *cabrita* consumption varies with the number of young goats. Producers do not restrict milk consumed by kids. Thus, a constant daily amount per kid is assumed. Milk production also varies based on forage allowance and total adult does.

Milk remaining after consumption by kids and by the household is sold (Appendix 2, Table A1, Eq. 20). The model begins with all milk available for income generation activities being sold in Xico. An initial investment to establish productive capacity is required for milk to be allocated to produce aged cheese. This initial investment occurs in January 2015, two years after the simulation start time. We assume that producers will first fill cheese cooperative demand before selling excess milk in Xico (Appendix 2, Table A1, Eq. 21 and 22). Transaction costs are not considered for farmers.

Dairy Cooperative Management and Decisions

The dairy cooperative module (Figure A4) depicts cooperative management decisions and impacts on cooperative cash balance, and is independent of animal production and milk sales. The structure tracks the cooperative income statement, which is the difference between premium cheese sales revenue and the sum of raw milk costs (at the local market price under baseline conditions) and cheese production, storage, and marketing costs. Cooperative income and expenses depend on cheese manufactured. Labor and management are included in production and marketing costs. Thus, the overall measure of financial performance for the cooperative is net income.
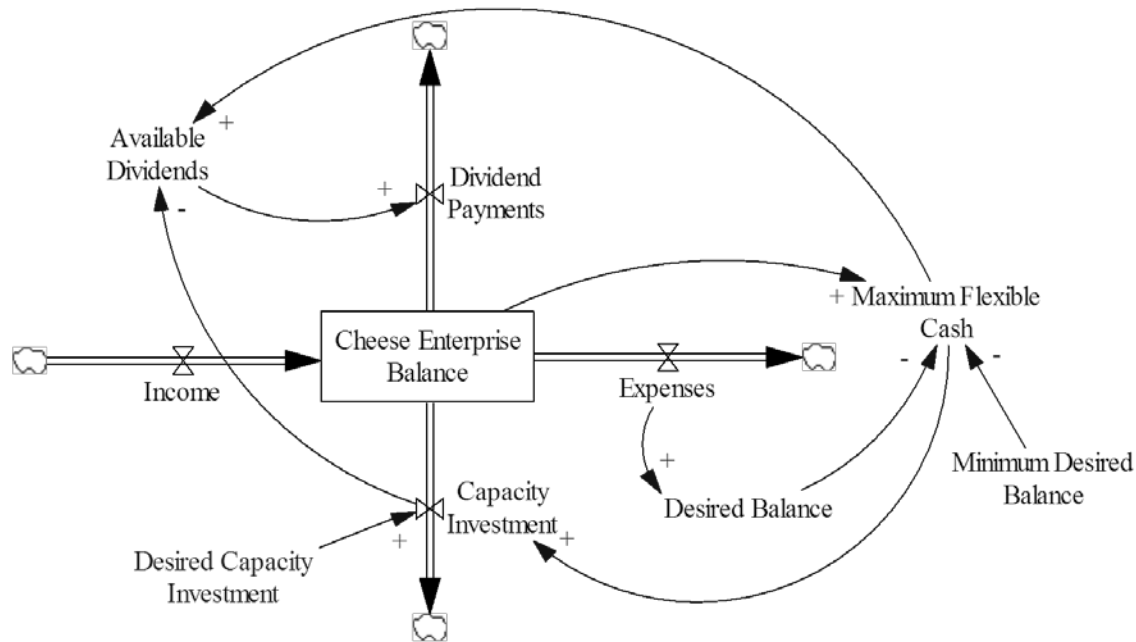
Figure A4. Simplified single stock structure for cheese cooperative decisions and cash balance, consisting of income minus expenses and accounting for dividend payments and capacity investments given assumed cooperative management policies

The cash flow statement forms the core structure of the module. It accumulates cash from net income, which can be dynamically allocated to invest in productive capacity. As is the case with some farmer-led cooperatives (Goel and Bhaskarkan 2010), we assume that the objective of the cooperative is to maximize economic returns to farmers who sell raw milk to the cooperative. Consequently, after desired capacity investments are fulfilled (also accounting for depreciated assets), surplus is paid to participating farmers as dividends or as a combination of dividends and higher milk prices. The capacity investment and dividend payments outflows are important to the performance of the cooperative. A maximum flexible cash decision rule (Appendix 2, Table A1, Eq. 35) assumes that a management objective is to maintain sufficient cash on hand to cover expected expenses for future months to prevent economic crises due to seasonal market uncertainties. It selects the minimum value between the difference between the cheese enterprise balance and the minimum desired balance, and the cheese enterprise balance and the desired balance. Costs and cost coverage time determine the desired balance (Appendix 2, Table A1, Eq. 36). Thus, the cooperative invests in capacity (Appendix 2, Table A1, Eq. 37) when there is a desired investment in capacity (Appendix 2, Table A1, Eq. 31) from the cheese cooperative productive capacity structure (Figure A5) and sufficient flexible cash on hand to make the investment.

We assume that the cooperative will always fulfill desired capacity investments before paying dividends to farmers. If excess flexible cash is available after fulfilling desired capacity investments, dividend payments can be made (Appendix 2, Table A1, Eq. 38 and 39). This is important primarily in the initial stages of the simulation as the cooperative expands capacity to meet consumer demand. Rather than pay quarterly, six-month, or annual dividends, the cooperative pays dividends on a continual basis after becoming solvent.

Cooperative Productive Capacity

The productive capacity module (Figure A5) represents maximum cooperative capacity to produce aged cheese. Thus, productive capacity serves as a proxy for cooperative physical assets. The cooperative initializes operations by making a small exogenous investment in productive capacity at the same time that aged cheese market development commences (2015). Following the initial investment, the capacity expansion structure (Appendix 2, Table A1, Eq. 30) acquires capacity endogenously when there is a desired capacity investment (Appendix 2, Table A1, Eq. 31) and sufficient flexible cash. Desired capacity investments respond to expected demand for aged cheese via the capacity deficit variable (Appendix 2, Table A1, Eq. 32). Capacity also depreciates over time through a first-order delay in the outflow from the capacity stock. Capacity utilization (Appendix 2, Table A1, Eq. 33) is a function of the ratio of expected orders to actual capacity in a reference multiplicative formulation (Appendix 4, Table A3). We assume that the cooperative will lower capacity utilization by decreasing milk purchases when cheese demand is low. Capacity utilization determines desired milk purchases (Appendix 2, Table A1, Eq. 34). Productive capacity depreciates over time and requires occasional reinvestment to maintain desired capacity.
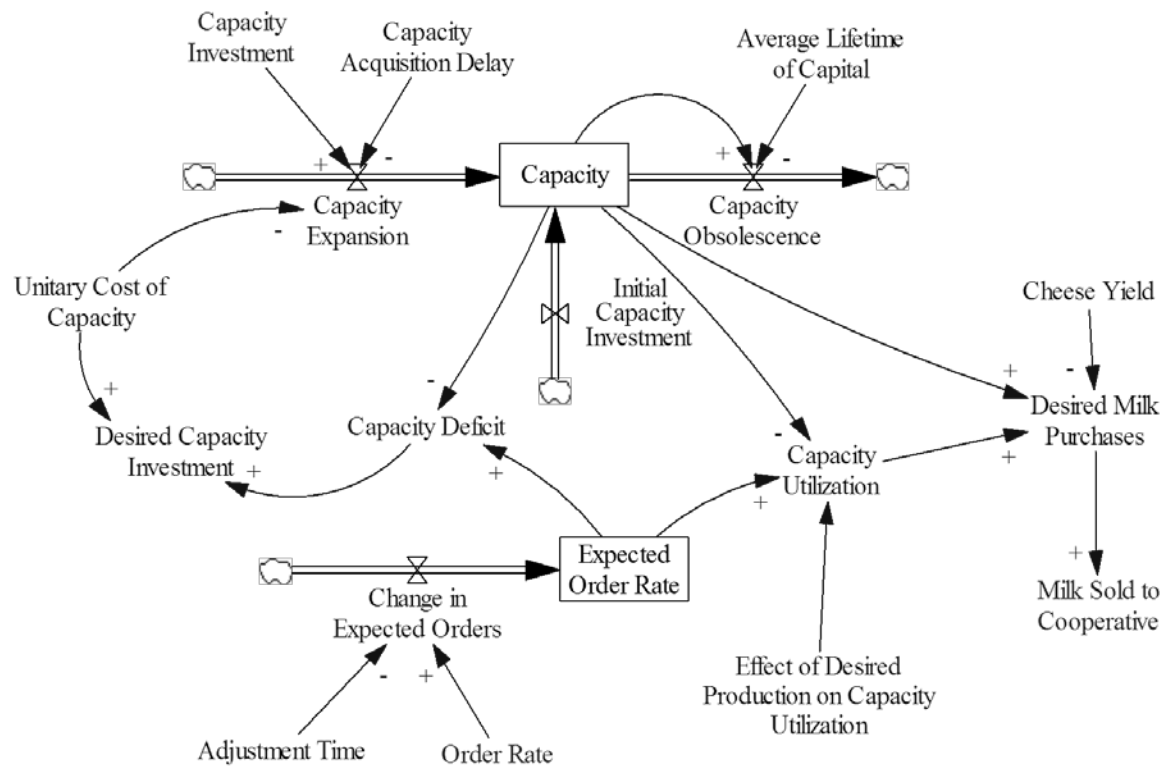

Figure A5. Productive capacity and utilization structure for the cheese cooperative

Cooperative Aged Cheese Manufacture

Purchased milk flows into the two-stock cheese manufacturing process (Figure A6) once the cooperative acquires productive capacity. Cheese yield from the processing of fluid milk

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(Appendix 2, Table A1, Eq. 23) determines cheese production. This production rate transfers product into the aging cheese stock. The maturation delay affects the intermediate flow (maturation rate, Appendix 2, Table A1, Eq. 24) between the aging cheese stock and the inventory stock. It is a fixed delay of the cheese production rate. After maturation, product is transferred to the aged cheese inventory stock. It exits this stock through the order fulfillment rate (Appendix 2, Table A1, Eq. 25), which is a variation of the Fuzzy MIN function suggested by Sterman (2000). Consumer demand and available inventory determine orders filled. Order fulfillment represents cheese sales to consumers and is the sole source of income for the cooperative.

The quantity of cheese being produced, stored, and sold determines production costs, storage costs, and marketing costs, respectively. The unit cheese production costs (Appendix 2, Table A1, Eq. 26) decrease over time as members of the cooperative acquire cheese making experience. Another major cost for the cooperative is the raw milk input, which the cooperative buys from producers. Aged cheese price affects cheese revenues.
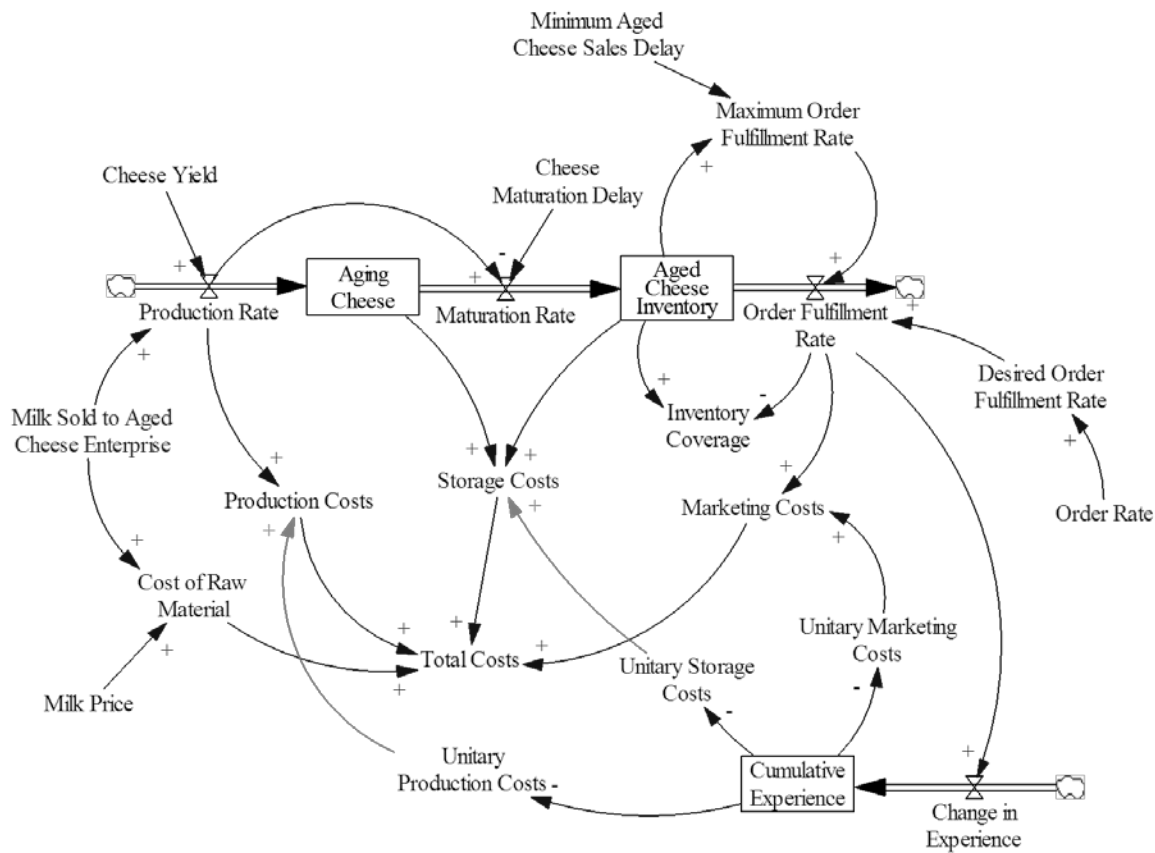

Figure A6. Simplified stock-flow structure of cooperative aged cheese production consisting of a two-stock aging chain

Market for Aged Cheese

The market for premium cheese module (Figure A7) represents the market in the larger nearby community of Xico, where buyers are hotels and restaurants serving the growing tourism industry. The market demand structure creates logistic growth in the number of actual buyers (e.g., restaurants, hotels, and private households). This directly affects product demand, desired cooperative productive capacity, and capacity utilization. The structure is adapted from the Bass Diffusion Model (Bass 1969), which is commonly used to estimate new product sales during the product growth phase (Sterman 2000).

The population of potential buyers (Appendix 2, Table A1, Eq. 27) is determined by the population of total buyers, the current number of actual buyers, and the fraction of the population willing to adopt the product. The fraction willing to adopt limits the number of potential buyers, which prevents the entire population from becoming potential buyers unless the price of aged cheese is extremely low. The adoption rate (Appendix 2, Table A1, Eq. 28) is the sole inflow into the actual buyers stock. It is the sum of adoption from interaction and adoption from word of mouth. Adoption from word of mouth (Appendix 2, Table A1, Eq. 29) depends on the interaction between actual buyers and potential buyers. The buyer interaction rate constrains adoption from word of mouth. The total population variable includes test structure to evaluate the effect of changes in market size on cooperative feasibility.

With the exception of unit costs and cheese price, the structure functions exogenously to the rest of the model to determine market demand. Limiting factors for market growth include the potential buyer population size, effectiveness of commercialization, and the buyer interaction rate.
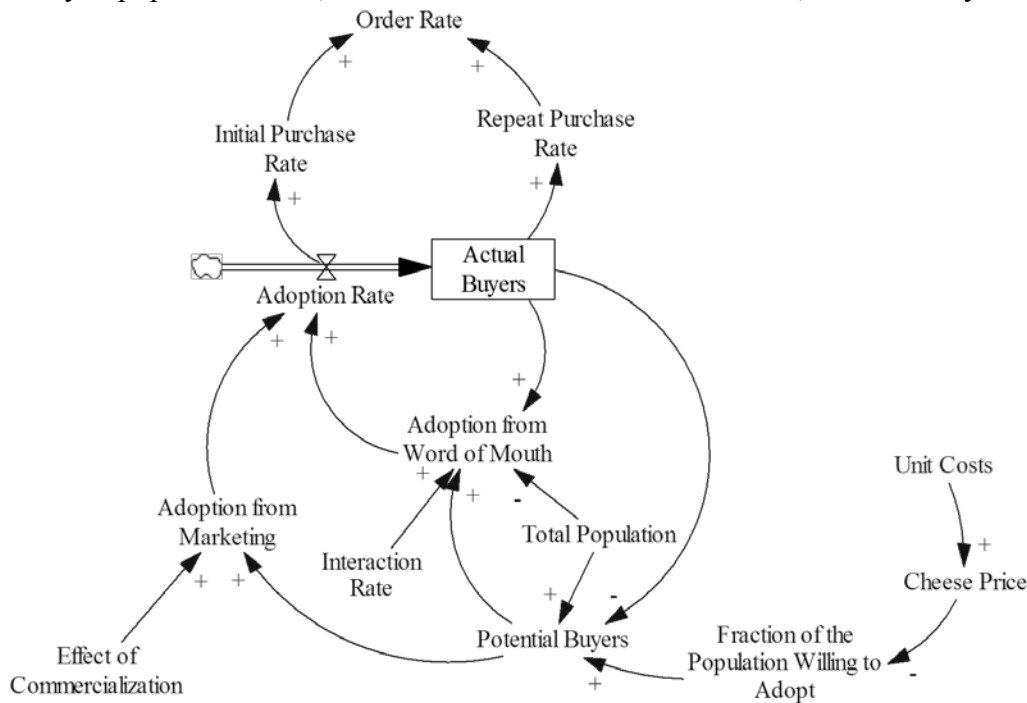

Figure A7. Simplified aged cheese market structure adapted from a typical two-stock market growth structure (Sterman 2000) to interface with unit costs and the price of aged cheese.

Net Income Expectations and Decisions for Goat Producers

The net income expectations and decisions module depicts monthly net cash operating income derived from young buck sales, culled goat sales, milk production, and dividend receipts. These variables represent farmer expectations (Appendix 2, Table A1, Eq. 40) about net incomes of goat production and milk production. Consequently, these variables influence producer decisions related to reinvestment of net cash operating income in different goat enterprises (e.g., goat purchases), the culling rate, and household milk consumption. Deducting forage production costs from the aforementioned sources of income derives the caprine income statement. The monthly net operating income from community caprine activities (Appendix 2, Table A1, Eq. 43) is derived from the income statement, and is considered the most relevant decision variable for smallholder farmers.

The profitability expectations module also contains oscillations in seasonal milk price. These prices can fluctuate up to 50% between the dry season and rainy season based on the quality, supply, and demand for milk (Holmann 2001; Njarui et al. 2010). An exogenous sinusoidal function generates milk price oscillation between 4.5 pesos kg^{-1} during the dry season and 3.5 pesos kg^{-1} during the rainy season.

Other important indicators of goat enterprise performance include returns to labor (Appendix 2, Table A1, Eq. 41) and income over feed costs (Appendix 2, Table A1, Eq. 42). Although the endogenous structure ignores these variables, they are likely important to producer decision making. Family labor contributions are assumed gratis. Forage production costs also affect the monthly profitability of community caprine operations in this module.

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Appendix 2. Key Model Equations

Table A1. Model Equations (by module)

Eq. #	Equation	Units
	Community Goat Flock	
1	Fractional birth rate = (kids per parturition / birthing interval) * effect of forage availability on fractional birth rate(fraction of forage needs met)	month^{-1}
2	Desired does = adult does * effect of profitability on desired does (ZIDZ^2((expected profitability-reference profitability), reference profitability))	does
3	Average time in flock = MAX^3 (base average time in flock * effect of ratio of desired adult does to adult does on average time in flock (ZIDZ(desired adult does, adult does)), minimum time in flock)	month
4	Culling rate = adult does/average time in flock	doe month^{-1}
5	Doe purchase rate = MAX ((MIN (purchases permitted based on available cash, (desired adult does – adult does) / desired adult does adjustment time)), 0)	doe month^{-1}
	Forage Resources	
6	Forage mass per caput = ZIDZ(forage mass, adult goats + weaned *cabritas*)	kg DM goat^{-1}
7	Fractional forage needs satisfied = forage mass per caput / reference forage mass per caput	dmnl^4
8	Indicated land area = base amount of land in production per family * effect of perceived required forage needs met on desired area (smooth fractional forage needs satisfied)	hectares household^{-1}
9	Fertilizer applied = reference fertilizer application * effect of perceived required forage needs met on fertilizer application(smooth fractional forage needs satisfied)	kg hectare^{-1} month^{-1}
10	Indicated forage productivity = SMOOTH (base forage productivity * effect of fertilizer on productivity(fertilizer applied / reference fertilizer application), fertilizer effect on forage productivity adjustment time)	kg DM hectare^{-1} month^{-1}
11	Forage productivity = indicated forage productivity * (1 - seasonal rainfall switch) + seasonal productivity * seasonal rainfall switch	kg DM hectare^{-1} month^{-1}
12	Seasonal forage productivity = indicated forage productivity * effect of seasonal rainfall on forage productivity	kg DM hectare^{-1} month^{-1}
13	Effect of seasonal rainfall on productivity = (average monthly rainfall / overall average monthly rainfall) * indicated forage productivity	dmnl
14	Fertilizer costs = fertilizer applied * area in production * unit cost of fertilizer	pesos month^{-1}
15	Land costs = area in production * fixed monthly cost per hectare	pesos month^{-1}
16	Cost of labor to maintain and harvest forage = forage production * labor required to maintain and harvest forage * monthly rate for hired labor	pesos month^{-1}
17	Forage production costs = cost of labor to maintain and harvest forage + land costs + fertilizer costs	pesos month^{-1}
18	Cost to produce one kg forage DM = forage production costs / forage production	pesos (kg DM)$^{-1}$
19	Forage consumption = (adult goats + weaned *cabritas*) * base forage consumption per goat * (effect of forage allowance on consumption (ZIDZ(forage mass per caput, reference forage mass per caput)))	kg DM month^{-1}

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[2] ZIDZ means "zero if divided by zero". When the denominator is zero, the function returns a value of zero instead of producing a floating point error due to division by zero (Ventana Systems, Inc. 2008). (e.g., ZIDZ(10,0) = 0)
[3] The MAX function returns the higher of two possible values (Ventana Systems, Inc. 2008). (e.g., MAX (4,7) = 7)
[4] Dimensionless

Eq. #	Equation	Units
	Milk Allocation	
20	Milk for income generation = MAX((milk production-milk consumed by kids- milk consumed by families) , 0)	kg day^{-1}
21	Milk sold to aged cheese enterprise = MIN(milk production for income generation, desired milk purchases)	kg month^{-1}
22	Milk sold in Xico = milk production for income generation – milk sold to aged cheese enterprise	kg month^{-1}
	Cooperative Aged Cheese Manufacture	
23	Production rate = cheese yield * milk sold to aged cheese cooperative	kg cheese month^{-1}
24	Maturation rate = DELAY FIXED(production rate, cheese maturation delay, production rate)	kg cheese month^{-1}
25	Order fulfillment rate = desired order fulfillment rate * order fulfillment table(ZIDZ(maximum order fulfillment rate, desired order fulfillment rate))	kg cheese month^{-1}
26	Unit costs = base unit costs *(cumulative experience / initial experience)$_{\text{strength of learning curve}}$	pesos (kg cheese)$^{-1}$
	Market for Aged Cheese	
27	Potential buyers = MAX(Fraction of the population willing to adopt * total buyer population – actual buyers, 0)	Buyers
28	Adoption rate = adoption from interaction + adoption from marketing	buyers month^{-1}
29	Adoption from word of mouth = ZIDZ((buyer interaction rate*proportion of adopters*actual buyers*potential buyers),total population)	buyers month^{-1}
	Cooperative Productive Capacity	
30	Capacity expansion = DELAY FIXED(capacity investment / unitary cost of capacity, capacity acquisition delay, 0)	kg cheese (month*month)$^{-1}$
31	Desired capacity investment = capacity deficit * unitary cost of capacity	pesos
32	Capacity deficit = MAX(0, expected order rate - capacity)	kg cheese month^{-1}
33	Capacity utilization = effect of desired production on capacity utilization (ZIDZ(expected order rate, capacity))	dmnl
34	Desired milk purchases = (capacity/cheese yield) * capacity utilization	kg month^{-1}
	Dairy Cooperative Management and Decisions	
35	Maximum flexible cash = MAX(0, MIN(cheese enterprise balance – minimum desired balance, cheese enterprise balance – desired balance))	pesos
36	Desired balance = costs * cost coverage time	pesos
37	Capacity investment = MIN(desired capacity investment / cheese enterprise balance adjustment time, MAX(0, maximum flexible cash / expense time))	pesos month^{-1}
38	Available dividends = MAX(0, (maximum flexible cash – expense time * capacity investment)/dividend expense time)	pesos month^{-1}
39	Dividend payments = available dividends * dividend activation switch	pesos month^{-1}
	Net Income Expectations and Decisions for Goat Producers	
40	Expected profitability = SMOOTH3(monthly profitability, smooth adjustment time)	pesos month^{-1}
41	Returns to labor = (monthly profitability of community caprine activities / number of families) / monthly hours worked per family	pesos hour^{-1}
42	Income over feed costs = milk sales income + culled goat sales income + *cabrito* sales income + dividend income – forage production costs	pesos month^{-1}
43	Monthly net cash operating income = monthly net income from milk and milk products + monthly net income from *cabrito* and culls – monthly forage production costs	pesos month^{-1}

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References

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Appendix 3. Model Parameter Values

Table A2. Parameter Summary Table (by module)

Parameter Name	Default Value	Units	Source and Comments
Control			
Time Step	0.0625	month	
Initial Time	0	month	
SavePer	1	month	
Initial Year	2013	year	Timebase
Years Per Month	0.0833	year month^{-1}	Timebase
Final Time	240	month	
Cooperative Productive Capacity			
Initial Cheese Cooperative Capacity	0	kg cheese month^{-1}	
Unit Cost of Capacity	50	(pesos*month) (kg cheese)$^{-1}$	
Capacity Utilization Switch	1	dmnl	1=on, 0=off
Initial Exogenous Capacity Investment	20	kg cheese (month*month)$^{-1}$	
Expected Orders Adjustment Time	1	month	
Initial Expected Order Rate	0	kg cheese month^{-1}	
Capacity Acquisition Time	1	month	
Average Capital Lifetime	240	month	
Cooperative Aged Cheese Manufacture			
Base Unit Storage Cost	5	pesos (kg cheese*month)$^{-1}$	
Base Unit Commercialization Cost	10	pesos (kg cheese)$^{-1}$	
Base Unit Production Cost	10	pesos (kg cheese)$^{-1}$	
Initial Experience	500	kg cheese	
Learning Curve	(0.02915)	dmnl	Equivalent to a 5% cheese making cost decrease each time experience doubles (Sterman 2000).
Endogenous Milk Price Switch	0	dmnl	1=on, 0=off
Initial Orders	0	kg cheese	
Aged Cheese Price Subsidy	0	dmnl	
Percentage Above Xico Milk Price Paid by Cooperative	0	dmnl	
Initial Proportion of Milk Destined for Aged Cheese Production	0	dmnl	
Cheese Yield	0.1	kg cheese (kg milk)$^{-1}$	

Parameter Name	Default Value	Units	Source and Comments
Cooperative Aged Cheese Manufacture-*Continued*			
Minimum Delay in Aged Cheese Sales	0.25	month	
Average Delay in Aged Cheese Maturation	4	month	
Average Delay in Aged Cheese Sales	0.5	month	
Perceived Cooperative Cash Balance Adjustment Time	1	month	
Aged Cheese Price Subsidy Start Time	70	month	
Dairy Cooperative Management and Decisions			
Minimum Desired Cash Balance	30,000	Pesos	
Dividend Switch	1	dmnl	1=on, 0=off
Initial Cooperative Investment	0	pesos month^{-1}	
Initial Cumulative Profitability of Aged Cheese Enterprise	0	pesos	
Capacity Investment Adjustment Time	1	month	
Expected Dividends Adjustment Time	3	month	
Expected Aged Cheese Profitability Adjustment Time	1	month	
Dividend Start Time	0	Month	
Cost Coverage Time	2	month	The desired amount of time to cover costs with cash on hand.
Capacity Expenditure Delay	1	month	
Dividend Expenditure Delay	4	month	
Initial Cooperative Cash Balance	30,000	pesos	
Forage			
Base Area in Production per Family	2	ha household^{-1}	INIFAP
Fixed Monthly Land Costs	10	pesos (ha*month)$^{-1}$	
Unit Fertilizer Costs	5	pesos kg^{-1}	Cristóbal Carballo, 5-8 pesos kg^{-1} for typical NPK mix
Reference Fertilizer Application	10	kg (ha*month)$^{-1}$	
Required Forage Consumption per Goat	60	kg DM (goat*month)$^{-1}$	INIFAP estimate
Seasonal Rainfall Switch	1	dmnl	1=on, 0=off

Parameter Name	Default Value	Units	Source and Comments
Forage-*Continued*			
Normal Monthly Rainfall Switch	1	dmnl	1=on, 0=off This switch allows historical monthly rainfall data (INIFAP 2006) to proportionately affect forage productivity. It can be switched off to remove seasonality or to turn on seasonal data-based drought patterns.
Drought Switches	0	dmnl	A series of data-driven drought patterns (INIFAP 2006) can be activated in lieu of the normal monthly rainfall switch.
Monthly Labor Used Per Family	120	hours (family*month)$^{-1}$	INIFAP – Approximately 4 hours caprine labor are invested / family / day.
Required Labor for Maintenance and Harvest of Unit Forage Produced	0.001	(laborer*month) kg DM^{-1}	Amount of labor required in months to harvest 1 kg forage. 1 laborer can harvest 1000 kg forage/month.
Months of Consumption	1	month	Used to calculate value of initial forage mass stock
Monthly Payment for Hired Labor	50	pesos (laborer*month)$^{-1}$	This monthly salary is quite low because most families do it themselves (INIFAP)
Number of Families	25	households	INIFAP
Average Monthly Precipitation	174.537	mm	INIFAP (2006)
Average Monthly Forage Productivity	250	kg DM (ha*month)$^{-1}$	INIFAP estimate, low productivity, value highly uncertain
Fertilizer Effect on Forage Productivity Adjustment Time	3	month	
Production Area Adjustment Time	6	month	
Smooth Fraction Forage Requirements Met Adjustment Time	2	month	
Community Goat Flock			
Base Average Time in Flock	84	month	INIFAP
Non-Feed Costs Per Goat	5	pesos (goat*month)$^{-1}$	INIFAP
Litter Size	2	dmnl	INIFAP

Parameter Name	Default Value	Units	Source and Comments
Community Goat Flock-*Continued*			
Average Age for *Cabrito* Sales and Consumption	1	month	INIFAP
Fraction *Cabrita* Deaths	0.05	dmnl	INIFAP
Kidding Interval	12	month	INIFAP
Goat Purchase Adjustment Parameter	1	month	
Percentage *Cabritas*	0.5	dmnl	
Culled Goat Price	300	pesos goat^{-1}	INIFAP
Cabrito Price	300	pesos goat^{-1}	INIFAP
Proportion Initial Does that are Adults	0.60	dmnl	
Proportion *Cabritos* Sold	0.90	dmnl	INIFAP
Desired Adult Goats Adjustment Time	6	month	
Minimum Residence time in Weaned *Cabritas* Stock	1	month	
Minimum Residence Time in Flock	1	month	
Average Weaning Time	3.5	month	INIFAP
Average Delay in Doe Maturation from Weaning to Adults	21	month	INIFAP
Purchased Goat Price	1,000	pesos goat^{-1}	INIFAP
Market for Aged Cheese			
Start of Commercialization	0	month	
Initial Actual Buyers	0	buyers	
Initial Purchases per Buyer	5	kg cheese buyer^{-1}	INIFAP
Average Consumption per Buyer	10	kg cheese (buyer*month)$^{-1}$	INIFAP
Demand Shock	0	kg cheese month^{-1}	
Demand Shock Duration	0	month	
Demand Shock Time	0	month	
Commercialization Effectiveness	0.005	month^{-1}	
Expansion to Other Markets	0	buyers month^{-1}	
Initial Population of Total Potential Buyers in Xico	30	buyers	INIFAP
Initial Aged Cheese Price	120	pesos (kg cheese)$^{-1}$	INIFAP
Price Shock	0	pesos (kg cheese)$^{-1}$	
Price Shock Duration	0	month	
Price Shock Time	0	month	
Buyer Proportion that Adopts Aged Cheese	0.5	dmnl	
Buyer Interaction Rate	0.25	month^{-1}	
Market Expansion Time	120	month	
Milk Allocation			
Daily *Cabrito* Milk Consumption	1	kg (*cabrito**day)$^{-1}$	INIFAP
Reference Household Milk Consumption	1	kg (household*day)$^{-1}$	INIFAP
Average Days per Month	30.42	days month^{-1}	Conversion factor

Parameter Name	Default Value	Units	Source and Comments
Milk Allocation-*Continued*			
Cooperative Switch	0	dmnl	1=on, 0=off
Reference Daily Milk Production per Goat	1.5	kg (goat*day)$^{-1}$	INIFAP, (Nagel et al. 2006)
Cooperative Start Time	24	month	The cooperative begins marketing and processing operations in 2015.
Net Income Expectations and Decisions for Goat Producers			
Amplitude	0.5	pesos kg^{-1}	INIFAP, amplitude of milk price oscillations in Xico market
Base Milk Price in Xico	4	pesos kg^{-1}	INIFAP
Milk and Traditional Cheese Production Costs	2	pesos kg^{-1}	INIFAP estimate
Seasonal Milk Price Switch	1	dmnl	1=on, 0=off
High Milk Price Month	3.3	month	Coincides with low milk productivity seasons.
Milk Price Shock	0	pesos kg^{-1}	
Milk Price Shock Duration	12	month	
Milk Price Shock Time	120	month	
Cosine Parameter	2	dmnl	
Period	12	month	
Pi	3.14159	dmnl	
Initial Cumulative Profitability of Goat Operations	0	pesos	
Initial Cumulative Profitability of Goats and *Cabritos*	0	pesos	
Initial Cumulative Profitability of Milk	0	pesos	
Expected Forage Costs Adjustment Time	3	month	
Smooth Monthly Profitability of Milk Adjustment Time	3	month	
Smooth Monthly Profitability of Goats and *Cabritos* Adjustment Time	10	month	

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Appendix 4. Lookup Tables

Table A3. Lookup or Table Functions

Table Name	Function Values[5]	Units
Order Fulfillment Table	(0,0), (0.25,0.25), (0.5,0.5), (0.715596,0.688596), (0.972477,0.842105), (1.24159,0.934211), (1.46177,0.973684), (1.67584,0.982456), (2,1)	dmnl
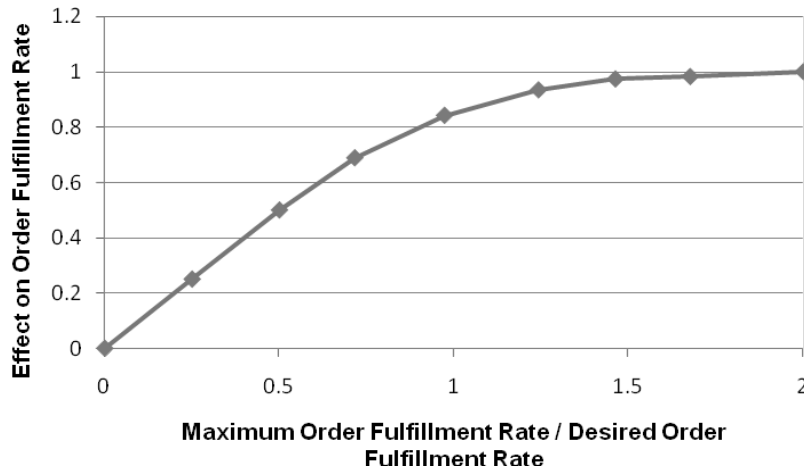
Effect of Perceived Required Forage Needs Met on Desired Terrain in Production	(-0.0675229,1.24211), (0.0572477,1.19474), (0.244404,1.12632), (0.577737,1.06842), (1,1), (1.23547,0.982456), (1.57847,0.973684), (1.97382,0.963158), (2.33211,0.963158)	dmnl

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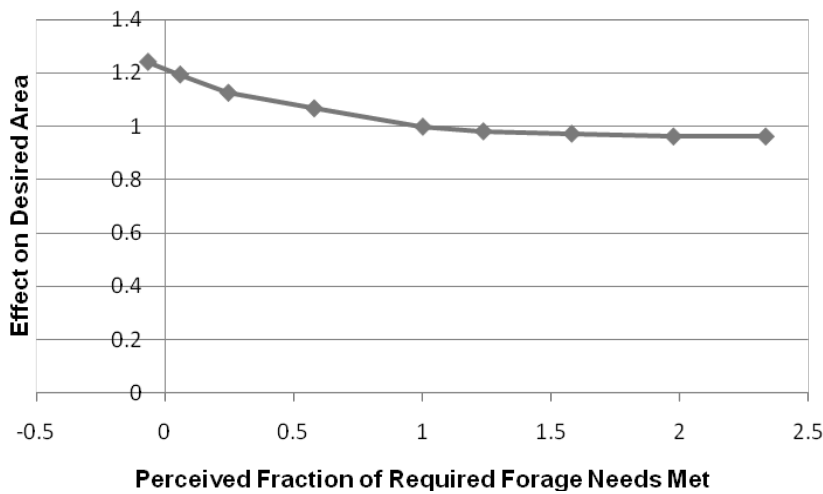
[5] Lookup function values are (X, Y) pairs.

Table Name	Function Values[5]	Units
Effect of Forage Allowance on Animal Forage Consumption	(0,0), (0.100917,0.252193), (0.284404,0.498904), (0.550459,0.740132), (0.733945,0.860746), (1,1), (1.31193,1.08004), (1.48624,1.1239), (2,1.19518), (2.5,1.23), (3,1.25), (5,1.25), (6.97248,1.25439)	Dmnl
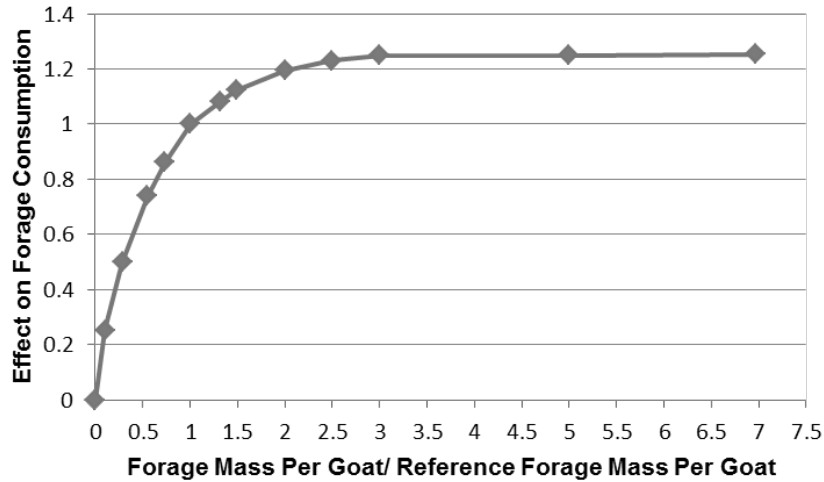
Effect of Desired Cheese Production / Production Capacity on Capacity Utilization	(0,0), (0.110092,0.298246), (0.238532,0.587719), (0.366972,0.754386), (0.599388,0.894737), (1,1), (2,1.1), (3,1.15)	dmnl
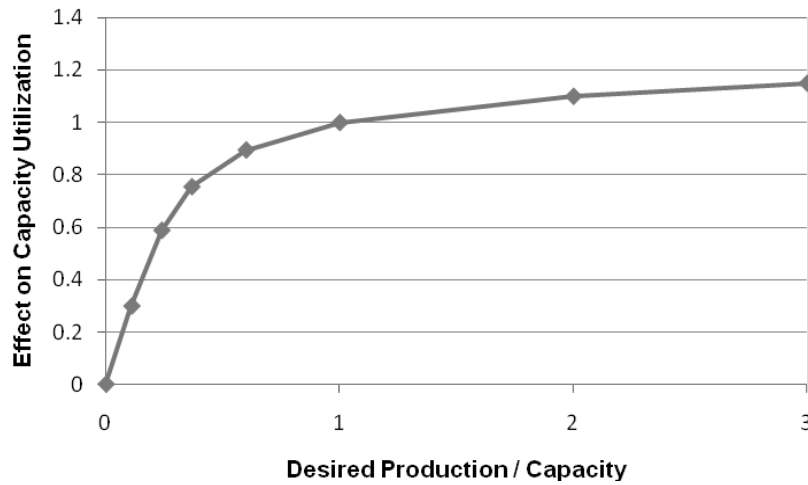
Table Name	Function Values[5]	Units
Effect of Perceived Required Forage Needs Met on Fertilizer Applications	(0,1.5), (0.415902,1.46842), (0.568807,1.38947), (0.752294,1.28421), (0.88685,1.14211), (1,1), (1.5,1), (2,1)	dmnl
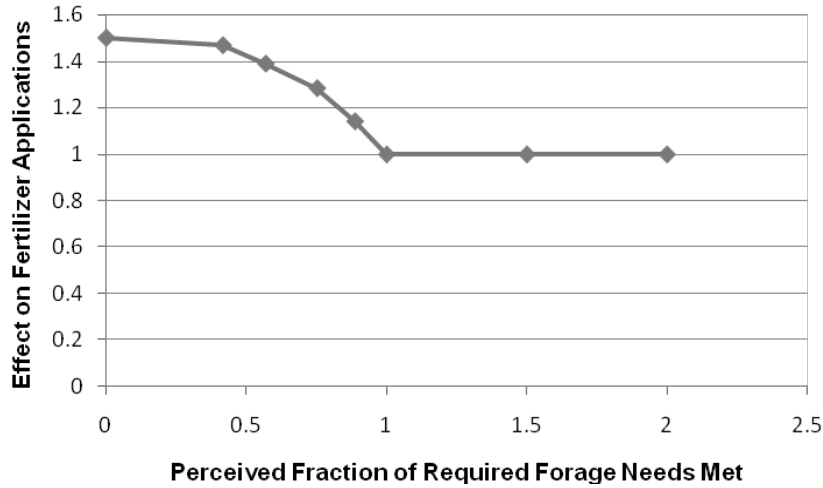
Effect of Fertilizer on Productivity	(0,0.25),(0.5,0.65),(1,1),(1.5,1.25), (2,1.4),(3,1.6),(4,1.75)	dmnl

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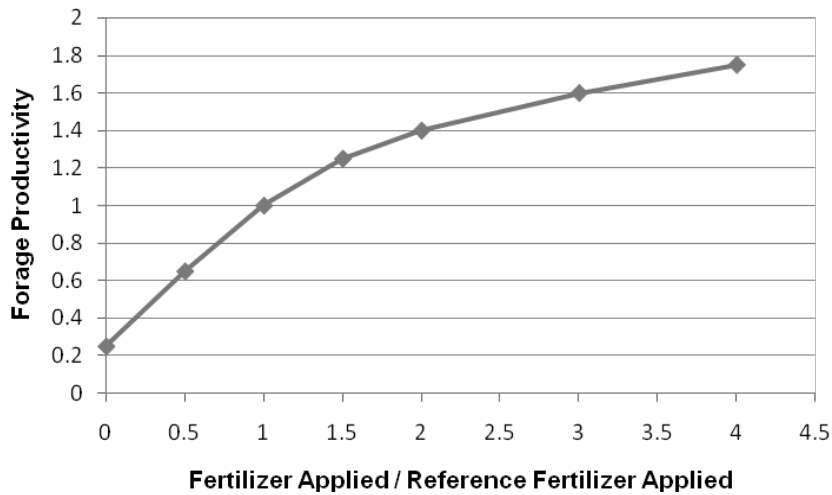
Table Name	Function Values[5]	Units
Effect of Forage Allowance on Adult Doe Fractional Death Rate	(0,10),(0.0611621,2.85088),(0.183486,1.84211),(0.550459,1.27193),(1,1),(1.40673,0.701754),(1.98777, 0.350877),(4,0.1)	dmnl
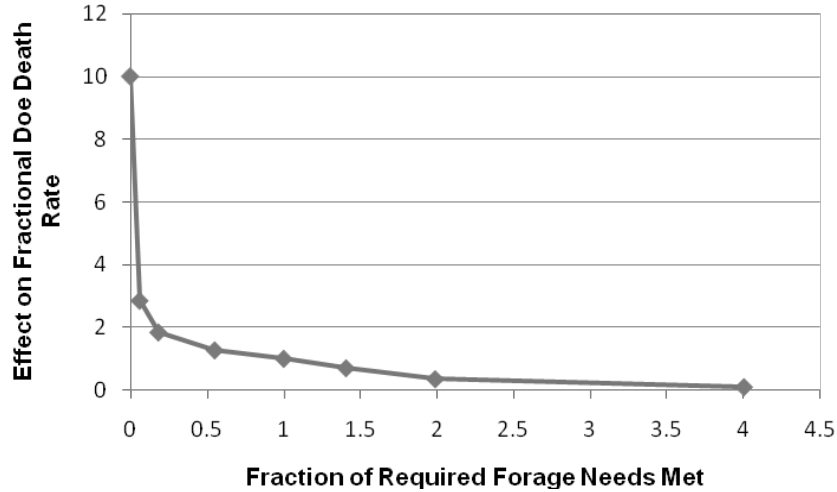
| Effect of Forage Allowance on Fractional Birth Rate | (0,0), (0.324159,0), (0.501529,0), (0.556575,0.245614), (0.685015,0.54386), (0.831804,0.833333), (1,1), (1.43119,1.14035), (2,1.25) | dmnl |
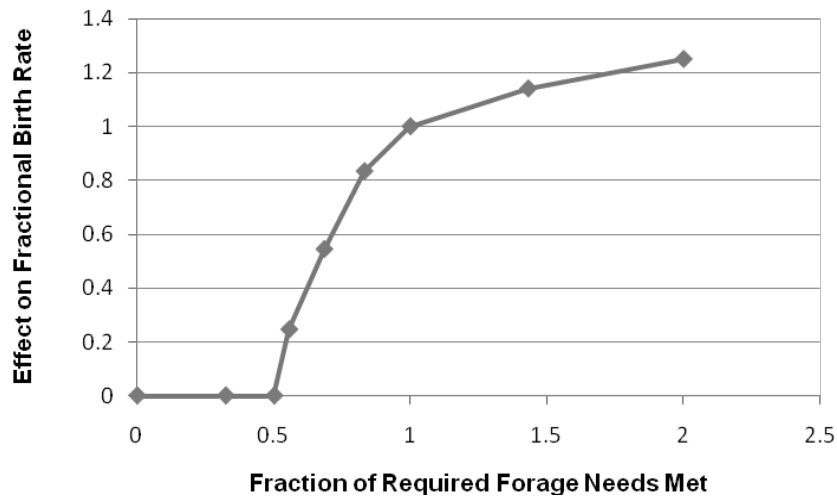
Table Name	Function Values[5]	Units
Effect of Desired Adult Animals/Adult Animals on Average Time in Flock	(0,0), (0.232416,0.570175), (0.525994,0.885965), (0.807339,0.973684), (1,1), (1.19266,1.03509), (1.46177,1.12281), (1.68196,1.35088), (1.88379,1.6578 9), (2,2)	dmnl
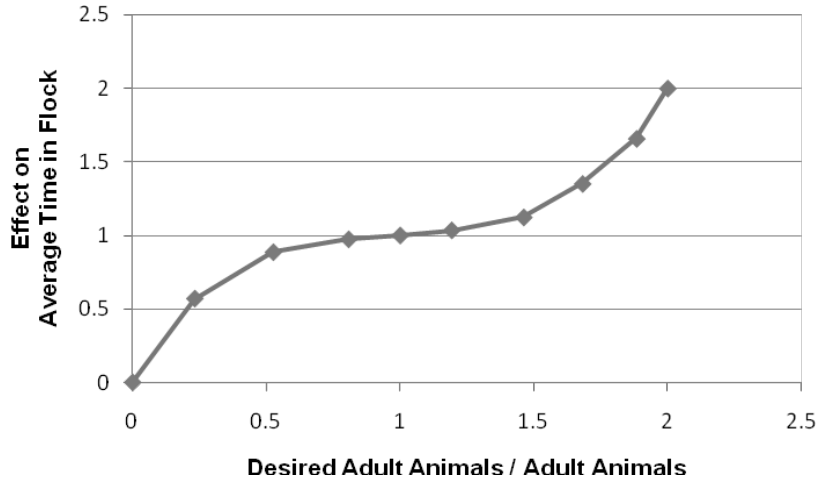
Effect of Expected Net Income on Desired Adult Goats	(-3,0), (-2.62997,0.412281), (-2,0.75), (-1.60245,0.877193), (-1,0.95), (0,1), (0.98471,1.05263), (2.48318,1.20175), (3.97554,1.49123)	dmnl
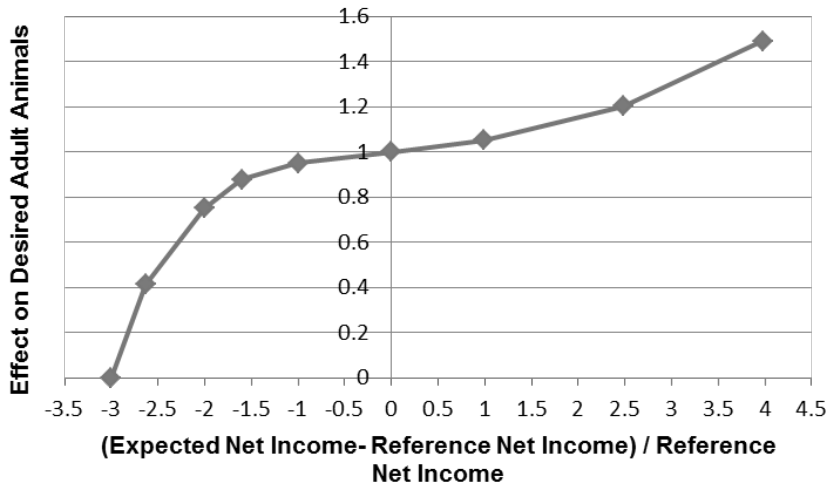
Table Name	Function Values[5]	Units
Effect of Aged Cheese Costs on Aged Cheese Price	(0,0), (1,1), (2,2)	dmnl
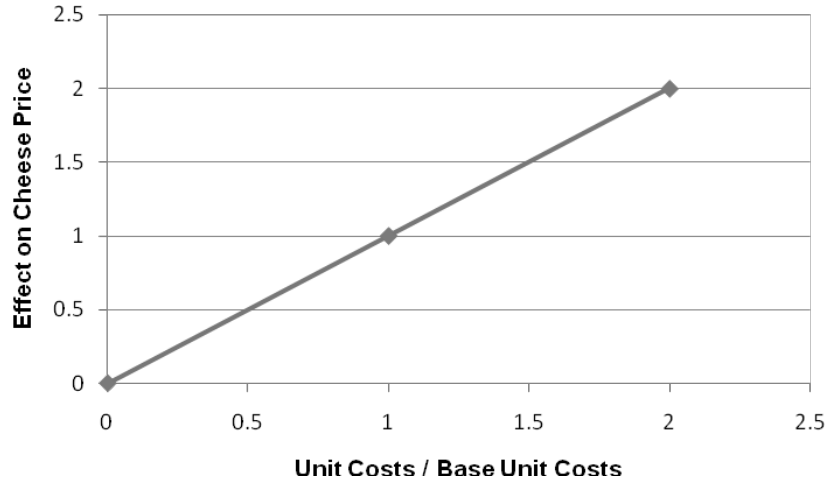
Table Name	Function Values[5]	Units
Effect of Forage Allowance on Milk Production	(0,0), (0.6,0), (0.611621,0.412281), (0.691131,0.719298), (0.831804,0.894737), (1,1), (2,1.5)	dmnl
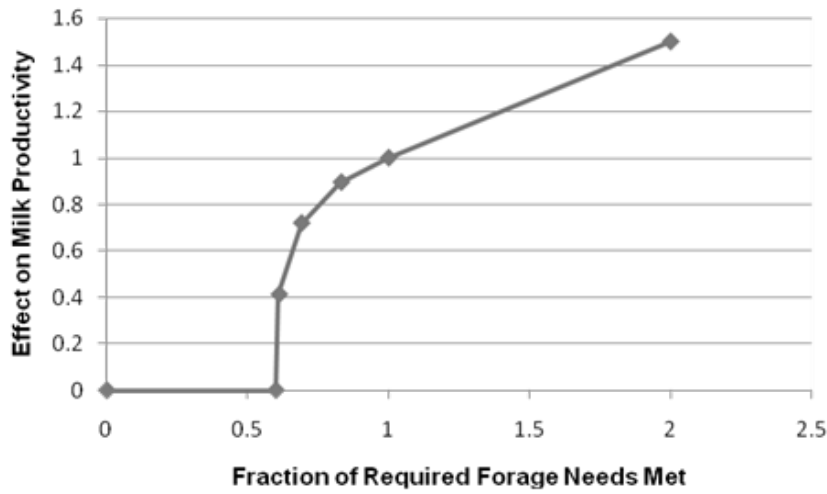
Table Name	Function Values[5]	Units
Effect of Expected Net Income of Milk on Household Milk Consumption	(-1,1),(0,1),(3,0),(10,0)	dmnl
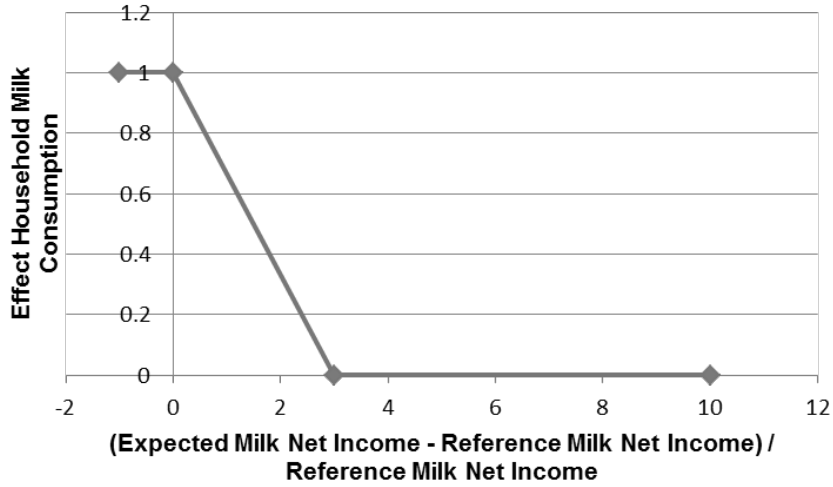
Appendix 5. Seasonal Weather Patterns from 1961 to 2002

Table A4. Recorded Mean Monthly Weather Data at Teocelo, Veracruz Weather Station (INIFAP 2006)

Month	Precipitation (mm)		Maximum Daily Temperature		Minimum Daily Temperature		Daily Photoperiod
	Mean (mm)	CV (%)	Mean (ºC)	CV (%)	Mean (ºC)	CV (%)	Mean (hr)
January	58.66	77.3	21.34	10.9	11.36	13.2	11.0
February	56.10	64.9	22.45	10.7	12.10	11.7	11.4
March	79.66	120.4	25.08	7.7	13.83	9.1	11.9
April	78.24	61.5	27.37	6.8	15.58	6.0	12.5
May	146.56	63.4	28.14	7.1	16.63	6.3	12.9
June	351.69	41.1	27.28	6.9	16.69	5.7	13.2
July	297.20	40.7	26.59	5.5	15.76	4.3	13.1
August	283.46	46.8	26.70	4.9	15.79	3.9	12.7
September	376.96	34.4	26.07	5.0	15.99	4.3	12.2
October	193.91	46.9	24.85	6.1	14.91	5.3	11.6
November	104.51	67.9	23.63	8.1	13.62	10.0	11.1
December	67.51	49.5	21.73	7.9	12.27	9.7	10.8
Annual	**2094.45**	14.9	25.11	4.3	14.55	3.7	12.0

Appendix 6. Model Evaluation

Model evaluation was completed using the model testing procedure outlined by Sterman (2000). The model was tested with and without seasonal rainfall patterns imposed. Therefore, some sensitivity results may not reflect the same results that would be achieved when seasonal rainfall patterns are present.

Boundary Adequacy

The model boundary is adequate and consistent with the purpose of the model. Most key components of the model are endogenous. The exclusion of forage quality from the model is one notable exception. Furthermore, seasonality is simulated as an exogenous input from available rainfall data. It directly affects forage production. The time horizon of 20 years is adequate to assess both the short-term and long-term implications of value-added goat cheese production by the cooperative. However, the time horizon can be lengthened as a test input to assess even longer-term impacts of value-added goat's milk production and shocks.

Structure Assessment

The model does not violate basic physical laws. The model structure does not include forage quality. A seasonal forage production proxy is based on rainfall data to test variability in forage production. Partial goats are possible in the model. This permits more continuous behavior in lieu of modeling the biological processes as static events.

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Dimensional Consistency

The model is dimensionally consistent without the use of parameters that have no real world meaning.

Parameter Sensitivity Testing

Group model building sessions with INIFAP determined most parameter estimates. These estimates were derived from participants' expert knowledge of the system, which included the perspectives of many relevant stakeholder groups. Additional sources included unpublished documents from the INIFAP – Sitio Experimental Teocelo micro-watershed development project, personal correspondence with the INIFAP micro-watershed development team outside of group model building sessions, and other reports (e.g., Instituto Nacional de Ecología 2002). Parameter values are close to actual real world values and have real world meaning. However, a varying degree of uncertainty exists for parameters such as delays, adjustment times, and those associated with the production of aged cheese by a dairy cooperative and with the aged cheese market. Thus, sensitivity testing was completed for all parameters.

We undertook parameter sensitivity testing to evaluate the probability that operation of the cooperative would be economically infeasible (i.e., that it would fail financially or producer incomes would fall below historical levels). Sensitivity tests were completed for all model parameters using Latin Hypercube sampling with 100 simulations. Policy-sensitive parameters included cheese yield, cheese price, milk production, milk and cheese production costs, milk consumption levels, fluid milk price, and values affecting flock composition. Combined with production and market shocks, the limited number of policy-sensitive parameters suggests that the basic cooperative concept is potentially financially feasible and likely to increase Micoxtla family net incomes.

Extreme Conditions

Numerous extreme conditions tests were conducted, and model performance was realistic at extreme values. For example, when the number of families was set to zero, the model became completely static and no production occurred. The model also performed adequately when the number of families was set at an unreasonably high number.

Time Step Assessment

The current time step of 0.0625 month is adequate. The time step should be one-fourth to one-tenth as large as the smallest time constant in the model (Sterman 2000). The smallest time constant in the model is 0.25 month. The time step was halved several times to evaluate behavioral changes. Model behavior was relatively unaffected except for slight variation due to added integration error with the smaller time step. Larger time steps were also tested, but behavior changed more substantially when the value was above 0.0625 until uncharacteristic model behavior and a floating point error occurred with a time step interval of one.

Behavior Reproduction

The model endogenously approximates the hypothesized behavior of the system under normal and extreme conditions. It reproduces the assumed reference mode behavior given current model structure. No behavioral comparisons are made to actual data.

Surprise Behavior

A sensitivity test of the kids per parturition parameter revealed the most notable surprise behavior. The parameter was tested between one and two kids per parturition. Intuitively, fewer kids per parturition would decrease flock size over time. However, it produced further flock growth over time. The smaller count of young goats in the flock consumed less milk, which left more milk available for income generation. As a result, community goat producers achieved slight increases in net income with fewer young goat births, and increased the adult goat purchase rate and decreased the culling rate to augment the size of the goat flock over time.

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Exploring the Factors Influencing Consumers' Choice of Retail Store When Purchasing Fresh Meat in Malaysia

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Abstract

This research explores the preferred place for Malaysian consumers to purchase fresh meat. From four focus group discussions, participants indicated that their decision to purchase fresh meat from either a modern retail outlet or the traditional market was influenced by five key variables: perceptions of freshness, Halal assurance, a good relationship with retailers, a competitive price and a pleasant environment for shoppers. Results were subsequently validated in a quantitative survey of 250 respondents in the Klang Valley. Despite the increasing number of supermarkets and hypermarkets, not only are the traditional markets able to coexist with modern retail formats, but they remain the preferred place for respondents to purchase fresh meat.

Keywords: fresh meat, retail, supermarkets, traditional markets, Malaysia

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Introduction

Globalization of the food retail system has impacted on the distribution and marketing of fresh food. For most developing countries, including Malaysia, traditional retail formats are being replaced by supermarkets and hypermarkets (Goldman et al. 1999).

In many parts of Western Europe and North America, modern retail outlets now dominate the food retail market (Chen et al. 2005). An increasing number of modern retail outlets is also being observed in Latin America and Asia (Reardon et al. 2005), where increasing population and rising personal disposable income is resulting in significant shifts in the food demand. According to Reardon et al. (2003), supermarkets are perceived to be the place where more wealthy consumers choose to shop. However, modern retail formats struggle to maintain their position in the market for those consumers who do not have sufficient income. Irrespective, in the six leading Latin American countries, modern retail formats now account for 45-75% of sales. In Asia, ACNielsen (2003) reports that the supermarkets average share of overall food retail sales (excluding fresh food) is 33% for Indonesia, Malaysia and Thailand, and 63% for the Republic of Korea, Taiwan and the Philippines.

In Malaysia, the structure of food retailing has changed dramatically over the last few decades. In previous years, the only retail formats were the traditional markets, grocery stores or mini-markets. Consumers purchased almost everything there including fresh fruit and vegetables, meat, chicken and fish, and other household supplies like dry food, bread, detergents, stationery and toys.

However, since the 1990's, the food retail industry in Malaysia has experienced tremendous growth. Modern retail outlets such as supermarkets and hypermarkets now dominate the retail food trade (Shamsudin and Selamat 2005). With new retail outlets emerging, consumers are reviewing where they will do the majority of their grocery shopping. In 1995, for example, the number of supermarket shoppers increased 1.5 times, while hypermarket shoppers have more than doubled (Eight Malaysia Plan 2001 – 2005). As reported by Abdullah et al. (2011), the average number of supermarkets and hypermarkets in Malaysia increased 2.1% and 26.8% respectively, from 2003 to 2008.

In parallel with the development of the food retail industry, the behavior of consumers in Malaysia has also changed. Malaysian consumers are experiencing dramatic changes in their lifestyle, which impacts on the way they purchase their food. These factors include:

    (1) an increase in personal disposable income. This has increased the ownership of both refrigerators and microwave ovens, which has changed the purchasing habits of consumers (Shamsudin and Selamat 2005). For instance, in the past, perishable goods were bought from traditional markets on a day-to-day basis. Owning a refrigerator allows consumers to shop less often as now they have the capacity to store perishable products for 1 to 2 weeks;

    (2) the need for convenience. With more women entering the work force, time is scarce and therefore the demand for convenience is high. Convenience means more than just a one-stop store for working women. According to Geuens et al. (2003), supermarkets and hypermarkets provide convenience for shoppers in terms of providing facilities

such as ample car space, proximity to other shops, extended trading hours and the width and depth of the product range;

(3) a greater awareness of food safety and food quality issues. Becker et al. (2000) suggested that the place of purchase provides an important and trusted source of information for consumers on the safety of the meat they intend to purchase. Consumers often assume that fresh food being offered in a clean and tidy supermarket is safer to eat than the product available from an unclean and disorganised market (Berdegue et al. 2005). More consumers are purchasing more fresh meat from modern retail outlets because they believe that it is safer; and (4) changes in diet. Malaysians are eating more healthy food. Shaharudin et al. (2010) confirmed that the purchase of organic meat has increased in Malaysia as consumers have become more concerned with the use of antibiotics, vaccines and growth promotants in poultry and cattle production. However, the availability of food that has been organically produced is a problem faced by many consumers in Malaysia. As mentioned by Shamsudin and Selamat (2005), organic food is mainly sold in modern retail outlets and is rarely found in traditional markets.

The emergence of modern retail outlets has impacted on both the traditional food retail environment and consumer behaviour in Malaysia. How consumers have responded to this complex situation is the main focus of this paper. As very little research has been undertaken to explore the food shopping behaviour of Malaysian consumers, this research project sought to identify which factors were most influential in the consumers' choice of retail outlet when purchasing fresh meat and to explore why consumers continue to shop at traditional markets when they have the opportunity to purchase from modern retail outlets.

Retail Formats in Malaysia

Food distribution channels in Malaysia can be divided into two broad categories: the old and the new. Different channels cater for different segments of the Malaysian population. The old format consists of traditional markets and grocery stores (mini-markets). The traditional market, which comprises wet markets, fresh markets, night markets and farmer's markets, are popular among consumers when purchasing fresh food. The traditional market has been defined as a market with little central control or organization, that lacks refrigeration, and does not process fresh foods into branded goods for sale (Trappey and Lai 1997). Goldman et al. (1999) described a typical wet market as an agglomeration of small vendors, where each vendor specialized in one fresh food line (meat, fish, fruit or vegetable) or in a sub line (fruit and vegetables). Traditional retailers complement each other as they offer a full assortment.

In Malaysia, supermarkets began to emerge in the early 1960's. The Weld Supermarket was the first modern supermarket to be opened in Kuala Lumpur in 1963, and was initially built to cater for expatriates who were working and living in the city. During the 1970's, modern supermarkets started to expand with the entry of several foreign ventures into Malaysia. By 1984, Zainal Abidin (1989) [cited in Roslin and Melewar (2008)] was describing the 'supermarket war' in Malaysia.

The new emerging retail formats are supermarkets, hypermarkets and convenience stores. According to Perrigot and Cliquet (2006), the basic concept of a hypermarket is described as 'everything under the same roof'. Perrigot and Cliquet (2006) then further elaborate the concept of a hypermarket as: (1) having a large floor space to hold the widest assortment of products and providing a large parking lot for shoppers; (2) implementing a discount pricing policy, and (3) self-service techniques based on effective merchandising and sales promotion. Cheeseman and Wilkinson (1995) described supermarkets as self-service stores, which offer one stop shopping, value for money and hold a large product selection in pleasant surroundings. Trappey and Lai (1997) add that most supermarkets have facilities to process fresh foods and use a wide range of refrigerated facilities to hold chilled and frozen product. Although supermarkets' merchandise assortment is described as limited, their retail strategies resemble the hypermarkets (Roslin and Melewar 2008). Their strategies to attract consumers include focusing on the merchandise width and depth while maintaining a low price. Convenience stores represent around 11% of retail sales and are located in major urban centers and along highways to capture those consumers who prefer convenience (Pricewaterhouse Coopers 2006). These stores offer a greater variety of products, longer hours of operation and lower prices compared to the traditional grocery stores.

In Malaysia, modern retail formats are mainly located in the major urban centers (Shamsudin and Selamat 2005). Most hypermarkets are located in the states where the population density is higher and more affluent – Selangor, Kuala Lumpur and Penang. In 2003, there were 240 supermarkets and 30 hypermarkets in Malaysia (Euromonitor International 2010). Five years later, the number of supermarkets in Malaysia had increased to 265 and the number of hypermarkets had increased to 90 (Table 1).

Table 1. Number of modern retail outlets in Malaysia

	2003	2004	2005	2006	2007	2008
Supermarkets	240	242	245	255	260	265
Hypermarkets	30	40	50	60	80	90

Source. Adapted from Euromonitor International (2010)

Foreign-owned retailers dominate the retail sector in Malaysia. In 2005, 83% of hypermarkets in Malaysia were foreign-owned (Malaysia 2006). Among the foreign-owned retailers are Giant (Hong Kong), Jaya Jusco (Japan), Carrefour (France), Tesco (UK) and Makro (Holland). Local retail chains include The Store, Parkson, Mydin, Bintang and Econsave.

More recently, modern retail outlets have started to spread into small towns in rural areas. In Malaysia, Tey et al. (2008a) indicated that the second wave of modern retail development has seen hypermarkets open in Banting, Nilai and other mid-sized towns in Malaysia.

Although modern retail formats are dominating the food retail sector, supermarkets and hypermarkets generally concentrate on processed, dry and packaged foods, rather than fresh food items. The move towards fresh food lines is generally slow. ACNielsen (2003) report that between 80% to 90% of Asian shoppers still use traditional markets regularly. According to Goldman et al. (1999), supermarkets in other Asian countries like China, Indonesia, Japan, Singapore and Taiwan, are unable to dominate fresh food lines due to serious problems in handling the fresh food category. In the traditional markets, retailers are able to fulfill

consumer's specific requirements such as requesting a specific size, quantity and quality. In terms of meat items, Malaysian consumers want it 'live and warm'. This situation cannot be experienced in modern retail outlets where most meat items are frozen or chilled.

Despite the dominance of modern food retailers in the West, traditional retail formats are still important in Malaysia, for they continue to capture a high percent of the groceries purchased (57%), compared to only 31% for supermarkets and hypermarkets (Idris 2002). Consequently, both retail outlets are expected to coexist for some time to come.

Methodology

In the absence of any empirical literature, given that the research problems identified were new to Malaysia, the study was undertaken using two different approaches. In the first exploratory stage, focus group interviews were considered to be the most appropriate means of data collection. According to Sim (1998, p. 346), a focus group is defined as a group interview – centered on a specific topic (focus) and facilitated and coordinated by a moderator – which seeks to generate primarily qualitative data by capitalizing on the interaction that occurs within a group setting. Kruger and Casey (2000) claimed that focus groups are seen as a method to better understand how people feel or think about an issue, product or service. Through a guided discussion, participants within a focus group discussion are allowed to interact with each other in a way that uncovers a range of insights on the topic of conversation (Szwarc 2005). Focus group interviews have been widely used in exploratory research and are a popular technique to gain a preliminary understanding of consumer preferences (Verbeke and Viaene 2000).

For the focus group discussions, participants were selected using convenience sampling. Convenience sampling is defined as a non-probability sampling technique that attempts to obtain a sample of convenient elements (Malhotra et al. 2008, 272). Malhotra et al. (2008) confirms that convenience samples are suitable for focus group interviews, pre-testing questionnaires or for the conduct of pilot studies.

Initially, the sample was drawn from the social network of the researcher (colleagues, friends, neighbors and relatives). After participating in the discussions, respondents were then asked to identify other potential participants who might be interested in joining the next group discussion.

For this study, a total of four focus group interviews were conducted between October and November 2007 in Kuala Lumpur. All focus group interviews were held in a seminar room which was equipped with recording facilities. Even although the focus group interviews were held in a seminar room, the researcher ensured that the discussions were conducted informally and in a relaxed manner to encourage spontaneous comments from the participants. Each focus group discussion followed an interview guide which consisted of a check list of questions on several sub-topics. The interview guide contained mostly open-ended or unstructured questions. This allowed participants to answer in their own words and to discuss a variety of related issues. The interviews were conducted by a moderator who facilitated the group discussions.

Participants for the focus group discussions were the primary food shoppers for the household. A total of 45 participants joined the discussions; 9 in Focus Group 1 (FG1), 15 in both FG2 and

FG3, and 6 in FG4. As highlighted by Rabiee (2004), the participants of a focus group discussion cannot be considered to be representative of a specific population, therefore, the findings arising from the discussions cannot be utilized in any statistical way nor can any inferences be made about the population from which they were drawn.

The findings from this first phase of the study were considered to be both preliminary and necessary, for in the absence of any substantial body of literature, it was necessary to identify the key determinants of choice before proceeding to a quantitative procedure.

The second stage utilized the survey method, which required the development of a structured questionnaire. Tull and Hawkins (1990) confirm that the survey method can provide data on attitudes, feelings, beliefs, past and intended behaviors, knowledge and personal characteristics. Furthermore, the survey method is the most common method of primary data collection in marketing research. It is simple to administer and can provide reliable data where responses are limited to the stated alternatives (Malhotra et al. 2008).

In this study, the central location personal interview method, based on selected shopping malls and traditional markets, was considered to provide the most appropriate means of data collection. According to Hair (2008), the shopping mall intercept method is relatively inexpensive and very convenient because the researcher does not need to spend much time or effort in securing a person's willingness to participate in the interview because both are already at a common location. Potential respondents are intercepted and interviewed as they arrive or as they are about to leave the shopping precinct.

In this study, the Klang Valley was chosen as the research area for a number of reasons: (a) geographically, the Klang Valley lies between Selangor state and the Federal Territory which includes large cities like Kuala Lumpur (the national capital of Malaysia), Putrajaya, Shah Alam and Klang; (b) the availability of both modern retail outlets and traditional markets; (c) it is a region with holds a good mixture of potential respondents with different levels of education, income distribution and ethnicity, which are anticipated to have some impact on the purchase and consumption of fresh meat; and (d) due to limited budget and time constraints, data were collected by focusing in one geographic area only.

The questionnaire was divided into three sections. Section One gathered information regarding the store choice behavior of the respondents and their perceptions of the quality of fresh meat purchased from either a modern retail outlet or a traditional market. Section Two was organized to investigate consumers purchasing behavior for fresh chicken and/or the purchase of fresh beef.

The target meats for this research were highly influenced by the religion, ethnicity and the cultural background of the Malaysian population. It was reported that 61% are Muslim, 20% are Buddhist, 9% are Christian, 6% are Hindu and 4% are others (The World Factbook 2009). Chicken was chosen due to the high consumption among Malaysian consumers and the acceptability by most religions (Paraguas 2006). According to the FAO, the consumption per capita of poultry was 33.8 kg (Tey et al. 2008b). Beef was the other target meat for this research. Beef consumption (5.8 kg) among Malaysians is higher than mutton (0.5 kg) (Paraguas 2006;

Tey et al. 2008b). As the majority of Malaysians are Muslim and the consumption of pork is forbidden, pork was not selected for this research.

The importance of socio-demographic factors as determinants for the purchase of fresh meat were presented in Section Three. Bonne and Verbeke (2006) and Krystallis and Arvanitoyannis (2006) demonstrated that correlations existed between socio-demographic characteristics such as income, education level, gender, family size and the presence of children in the household and the quality of the fresh meat purchased by consumers.

The collection of socio-demographic variables also enables the sample to be compared with data from the Malaysian Department of Statistics and other research studies. In this study, the majority of respondents were female (86%), which was somewhat higher than that collected by Nooh et al. (2007)(63%) and Ahmad and Juhdi (2008)(64%). Nevertheless, women continue to do the majority of the household shopping in Malaysia.

More than half of the respondents were aged between 26 to 44 years old. Haque and Khatibi (2005), Ghazali et al. (2006) and Wan Omar et al. (2008) also recruited a large number of participants from the younger generation. However, the small number of elderly respondents was no cause for alarm as data available from the Malaysian Department of Statistics (2009) indicated that 64% of the Malaysian population was in the age group of 15 to 64 years old. In this study, 98% of the respondents who participated in the survey fell within this range.

The fieldwork was carried out from December 2008 until February 2009 at a number of traditional markets and modern retail outlets around the Klang Valley region. In all, 260 respondents were interviewed.

The data was analyzed using univariate data analysis (descriptive analysis and cross-tabulations) and multivariate data analysis (cluster analysis) using SPSS v.17.

Cluster analysis was undertaken to identify potential groups of consumers who preferred to purchase their fresh meat from either a modern retail outlet, traditional markets or from both retail outlets. Having no knowledge as to how many groups might be present in the data set, the researcher employed hierarchical cluster analysis in the first instance (Hair et al. 1998). Using a simple measure of homogeneity - the average distance of all observations within the clusters - hierarchical cluster analysis suggested 2-5 cluster solutions. In the second step, the k-means clustering algorithm was employed, testing each of the potential cluster solutions.

According to Hair et al. (1998), the selection of the final cluster solution is a subjective matter and requires substantial judgment by the researcher. From a marketing perspective, Kotler and Armstrong (2006) identify four criteria which impact on the final cluster solution:

(1) measurability. This refers to the effective size and purchasing power of the cluster. Clustering should be undertaken using variables that are known to impact or to influence the likelihood of purchase;

(2) accessibility. This involves the degree to which a segment can be effectively reached and served. In this instance, accessibility relates to the ability of a retailer to direct its marketing activities at a specific segment;

(3) substantiality. The segment should have a sufficient number of consumers so that it is profitable for the firm; and

(4) actionable. This criterion describes the degree to which a retailer can develop effective marketing programs which are able to attract, serve, satisfy and build relationships with customers.

On these criteria, the results indicated that a two cluster solution was optimal.

As the respondents who participated in this study were drawn only from the Klang Valley, their behavior is unlikely to be representative of the whole of Malaysia, especially for those residents of East Malaysia (Sabah or Sarawak) and those who reside in rural areas.

Results and Discussion

Store Choice

In general, participants from each focus group purchased chicken and beef from both modern retail outlets and traditional markets. However, the majority of respondents preferred to buy chicken and beef from traditional markets. When participants were asked why they selected traditional markets over modern retail outlets, freshness and the guarantee of Halal were mentioned by all four groups. Nevertheless, there were a small number of participants who chose to buy fresh meat occasionally from modern retail outlets.

The quantitative findings supported the findings from the focus group studies, for 173 respondents (66%) purchased the majority of their fresh meat from traditional retail market outlets (Table 2).

Table 2. Principal place of purchase for fresh meat

Modern retail outlets	N	%
Hypermarket	52	20.0
Supermarket	35	13.5
Traditional markets		
Wet market/fresh market	95	36.5
Night market	31	11.9
Farmers market	17	6.5
Grocery store	17	6.5
Wholesale market	13	5.0
Total	260	100.0

Respondents were then presented with a group of statements which sought to measure the relationship between the respondents' perceptions of food quality and their preferred place to purchase fresh meat. The questions required respondents to either agree or disagree with each statement on a six point Likert scale, where 1 was "I disagree a lot" and 6 was "I agree a lot". To group respondents according to their preferred choice of retail store when purchasing fresh meat,

a two-stage cluster analysis was applied (Hair et al. 1998). On this occasion, after an extensive subjective review of the alternatives, a two cluster solution was considered to be optimal, where Cluster 1 described "modern retail shoppers" and Cluster 2 described the "traditional market shoppers." Differences between the clusters on each of the clustering variables were identified using the independent samples t-test (Table 3).

Table 3. Respondents level of agreement/disagreement with each statement according to cluster

	Cluster 1		Cluster 2		P
	Mean	**SD**	**Mean**	**SD**	
The quality of the fresh meat available is better in supermarkets	4.82	0.90	3.62	1.26	0.000
Supermarkets operate everyday while traditional markets operate only on certain days of the week	5.02	1.28	4.27	1.53	0.000
Consumers can bargain on price in wet markets	4.55	1.36	5.29	1.02	0.000
Its more convenient to shop in supermarkets because I can buy all my groceries at the same time	5.59	0.64	4.95	1.07	0.000
I often meet my friends when I shop at traditional markets	2.84	1.25	3.79	1.45	0.000
Supermarkets offer a wider range of fresh food	5.33	0.83	4.19	1.28	0.000
At traditional markets, the vendors remember my name	3.34	1.56	4.24	1.44	0.000
I cannot buy the other household items I need if I shop at traditional markets	4.77	1.27	3.91	1.44	0.000
I go to supermarkets because of the shopping points I get	3.91	1.58	3.47	1.44	0.027
The children feel comfortable when I shop at supermarkets	5.17	0.95	4.44	1.29	0.000
Traditional markets seldom have a good or clean environment	4.96	1.14	4.07	1.12	0.000
Supermarkets offer better customer service than the traditional markets	4.96	0.93	4.26	1.21	0.000
I can return easily goods if I'm not satisfied when I buy them from traditional markets	3.74	1.33	4.23	1.22	0.004
I buy my other household goods from supermarkets but I buy my chicken and beef supplies from traditional markets	3.19	1.29	5.30	0.99	0.000
Traditional markets offer better quality meat at a much cheaper price	3.54	1.18	5.01	1.067	0.000
I can return easily goods that I'm not satisfied with after purchasing it from supermarkets	4.33	1.36	3.85	1.45	0.011
Fresh meat is displayed better in supermarkets	5.19	0.86	4.64	1.02	0.000
Chicken and beef are fresher in traditional markets	4.14	1.19	5.51	0.79	0.000
I prefer to buy my fresh meat from the same vendor in the traditional markets	3.96	1.25	5.36	0.84	0.000
Products in the supermarkets is clearly priced	5.48	0.65	5.23	0.89	0.014
Retailers in the traditional market are more knowledgeable about the products they sell	4.22	1.25	5.23	0.91	0.000

Note. where 1 is "I disagree a lot" and 6 is "I agree a lot"

"Modern retail shoppers" had a higher mean score on convenience and enjoyed shopping at modern retail outlets because the store offered a greater variety of fresh food and the fresh meat was displayed better. This group was less concerned about building any long term or enduring relationship with the vendor and they generally disliked the idea of going to a traditional market merely to purchase fresh meat.

"Traditional market shoppers" believed that the meat was both fresher and cheaper in the traditional market. They were more loyal as they purchased fresh meat from the same vendors and were prepared to go out of their way to purchase fresh meat from traditional markets, even although they often purchased other household products from supermarkets. They also enjoyed the opportunity to bargain on price.

To verify the findings, a cross-tabulation was used to investigate any relationship between the clusters that had been identified and the preferred place of purchase. Respondents belonging to Cluster 1 purchased the majority of their fresh meat from hypermarkets (79%) and supermarkets (75%)(Table 4).

Table 4. Place of purchase by cluster

	Cluster 1		Cluster 2		Total
	n	**%**	**n**	**%**	
Modern retail outlet:					
Supermarket	24	75.0	8	25.0	32
Hypermarket	38	79.2	10	20.8	48
Traditional market:					
Wet market/Fresh market	16	18.6	70	81.4	86
Farmers market	2	13.3	13	86.7	15
Night market	3	10.3	26	89.7	29
Wholesale market	5	38.5	8	61.5	13
Grocery store	6	35.3	11	64.7	17
Total	94		146		240

Note. [Pearson chi-square = 79.16, df = 6, p = 0.000]

Conversely, those respondents from Cluster 2 were more likely to buy a greater proportion of their fresh meat from the night market (90%), farmers market (87%) and the wet market/fresh market (81%).

Although socio-demographic variables have been widely used for the purpose of segmenting and profiling consumers, as the data is relatively easy to collect, measure and analyses, much of the literature has demonstrated that the socio-demographic variables are ineffective in segmenting consumers. In classifying shoppers, Boedeker and Marjanen (1993) found that socio-demographic characteristics provided a very narrow perspective of consumer behavior. According to Romano and Stefani (2006), using only demographic variables provided a very poor classification due to the weak correlation between the socio-demographic variables and the purchase decision. In this research, variables such as gender, age, marital status, highest level of education attained, race and income were found not to be significantly different between the clusters.

Factors Attracting Consumers to Purchase Fresh Meat from Modern Retail Outlets and Traditional Markets

A number of factors were mentioned during the focus group interviews which were then integrated under similar themes. A total of five themes were identified as the major factors which most influenced the consumers' decision to purchase fresh meat from a modern retail outlet or a traditional market (Table 5). The factors are not ranked according to importance as the purpose of the preliminary study was to identify the variables that were most often used by Malaysian consumers in their decision to purchase fresh meat from a retail store.

Further confirmation was achieved when a cross-tabulation was used to differentiate the variables which best described the quality of the meat purchased according to those who opted to buy from modern retail outlets and those who preferred to purchase fresh meat from the traditional markets (Table 6).

Table 5. Factors attracting consumers to purchase fresh meat from modern retail outlets and traditional markets

Factors attracting consumers	Modern retail outlets	Traditional markets
Freshness	√	√
Halal guaranteed		√
Good relationship with retailers		√
Competitive price	√	√
Good environment	√	

√ : represent responses mentioned from focus group discussions

Table 6. Variables respondents consider to differentiate the quality of fresh meat by cluster

	Cluster 1 (94)		Cluster 2 (146)	
	N	**%**	**N**	**%**
Freshness	67	71.3	140	95.9
Good environment	50	53.2	39	26.7
Halal guaranteed	24	25.5	44	30.1
Competitive price	22	23.4	15	10.3
Good relationship with retailers	3	3.2	34	23.3

Freshness

Freshness was often cited as one of the most influential variables impacting on the consumers' decision to purchase fresh meat (Verbeke and Viaene 2000). In the qualitative findings, freshness was a factor which attracted consumers to shop at both outlets. The quantitative and qualitative findings were very much similar where respondents who purchased fresh meat from both retail outlets cited freshness as that variable which was best able to differentiate the quality of the meat offered by traditional markets (96%) and modern retail outlets (71%). The findings of this study are similar to earlier research which indicated that consumers consider freshness alongside factors such as the reputation of the place of purchase (Hsu and Chang 2002). However, freshness was perceived differently according to the place of purchase.

According to Kennedy et al. (2004), in order to judge freshness, product appearance, which comprises color and the physical form of the meat, is utilized. How the product looks is important to judge the freshness of the meat, especially when meat has been packaged in retail outlets (Warriss 2000). At the time of purchase, consumers rely entirely on visual cues. For instance, in determining the freshness of beef, the meat was expected to have a bright red color. One participant from a focus group commented:

> *"Color indicates the freshness of the beef. Red implies that the beef is still new and the cow has just been slaughtered."*

In Malaysia, consumers prefer shopping at traditional markets for fresh meat. They emphasised the freshness of meat in traditional markets, given that fresh meat products were slaughtered early in the morning and delivered directly to retailers in various locations. Goldman and Hino (2005) described the freshness of the meat available from the traditional markets as "warm" (just recently being killed) and not chilled or frozen. The situation in traditional markets in Malaysia is similar to Taiwan, where fresh meat is displayed on counters or hung on hooks (Hsu and Chang 2002). Consumers are given an opportunity to touch the meat to determine its freshness.

The main reason why consumers seek freshness when purchasing meat is associated with food preparation. If the products purchased are not fresh, the meal will not be tasty or healthy. A participant from Focus Group 4 commented:

> *"Freshness will affect the taste of your food. If the beef is fresh, you can taste the 'sweetness' of the beef in your cooking."*

This finding corresponds to other studies by Zinkhan et al. (1999) and Goldman and Hino (2005). It is important to purchase fresh food to maintain good health and enjoy the taste of food. Therefore, fresh food like beef, fish and poultry are purchased at traditional markets, for this is where the requirements for freshness can best be met (Zinkhan et al. 1999).

Modern retail outlets have the advantage of offering fresh meat in refrigerated display units. Fresh meat in modern retail outlets is pre-cut and pre-packaged in sanitised conditions, then chilled and displayed on temperature controlled shelves (Hsu and Chang 2002). Younger participants from FG2 occasionally purchased beef and chicken from supermarkets as they were attracted to the clean, chilled and nicely packed meat. Umberger et al. (2003) added that the freshness of the meat purchased from supermarkets was determined by the label attached to the product. According to Bonne and Verbeke (2006), the label can provide information such as the slaughter date, the date the meat was processed and the origin of the meat. Furthermore, supermarkets and hypermarkets have the advantage of good retail procurement logistics, technology and inventory management (Reardon et al. 2003). In contrast, the food safety issue in traditional markets is questionable as the majority of retailers do not have the proper storage space, refrigeration or the knowledge to prevent fresh meat from becoming contaminated.

Halal Guaranteed

When participants were asked what they look for in their decision to purchase chicken and beef, the majority of respondents in all four groups indicated the importance of Halal. This finding was similar to Shafie and Othman (2006) who reported that 89% of consumers highlighted the importance of Halal in their decision to purchase meat. Halal and the relationship between butchers and customers is closely related. According to one participant:

> *"The question of Halal and where I buy my meat supplies from is important to me and my family. This is why I buy from the same butcher at the same fresh market every time I want to buy beef. I am confident on the source – where the seller gets the beef from."*

Similar findings were presented by Bonne and Verbeke (2006), who identified the role of religion in the consumption of fresh meat. For fresh meat to be guaranteed Halal, it was closely related to the method of slaughter and the presence of a Halal certificate or label. In the absence of any legitimate third party certification, trusting their preferred butcher at the point-of-purchase provided the desired assurances. Trust is highly associated with the place of purchase for meat products, as most Muslims prefer to purchase fresh meat from an Islamic butcher who operates in a traditional market. Consumers place much value on being served by butchers of the same ethnic race and religion in the traditional market (Goldman and Hino 2005; Bonne and Verbeke 2006).

However, there was little difference between the respondents' perceptions that the fresh meat was guaranteed Halal when purchased from different outlets. Whereas some 25% of the respondents who shopped from modern retail outlets believed that the meat was Halal, 30% of the respondents who purchased meat from the traditional markets believed that the meat was Halal.

Respondents who purchased their fresh meat from supermarkets and hypermarkets believed that the meat was Halal from the Halal certificate or label attached to the package. Fresh meat that is guaranteed Halal carries a Halal food certificate and label. Halal food certification refers to an examination of the processes undertaken in the preparation, slaughtering, cleaning, processing, handling, disinfecting, storing, transporting and the management of the food product (Wan Omar et al. 2008). In Malaysia, the Department of Islamic Development Malaysia (JAKIM) is the main organization which provides Halal certification and is the main source of information for consumers regarding the Halal status. Most of the local fresh meat available from modern retailers carries the Halal logo produced by JAKIM, while imported meat carries their own Halal logo. The Halal logo attached to pre-packs of chicken and beef may provide a significant advantage compared to vendors from traditional markets that do not have Halal certification.

However, this factor alone does not encourage consumers to buy fresh meat from modern retail outlets. Consumers, especially the elderly, are less likely to buy meat from supermarkets or hypermarkets because they lack confidence (Bonne and Verbeke 2006). The majority of elderly participants still prefer to buy meat from their preferred butcher. One participant commented that:

> *"I will try my very best to avoid buying imported beef as I am not confident with the Halal status of the meat. I wonder why imported beef does not carry Halal-JAKIM labels?"*

Another respondent added:

> *"I still have doubt with the Halal system in our country. This is why I do not buy my fresh meat from supermarkets. I only buy my chicken and beef supplies from Muslim butchers."*

The credibility of the information and the personalised service provided by traditional vendors was found to outweigh the institutionalised quality system for Halal certified fresh meat in supermarkets. The assurance of an Halal logo has only managed to capture younger consumers rather than the majority of consumers. Younger shoppers are more confident with the Halal logo displayed on the packages of chicken and beef sold in modern retail outlets. Furthermore, they are strongly in favour of the Halal label and the slaughtering method for the reason of convenience shopping (Bonne and Verbeke 2006).

Good Relationship with Retailers

Initially, the preliminary research findings suggested that a good relationship with retailers was a factor attracting consumers to purchase fresh meat from traditional markets. The survey results verified the preliminary research findings, suggesting that a good relationship between vendors and customers in the traditional market (23%) was an important motive compared to those shoppers who purchased meat in a modern retail outlet (3%). Traditional markets constituted a place not only to purchase perishable goods, but also provided a place for meeting acquaintances. Relationships are built not only between vendors and customers, but also between buyers. For example, buyers exchange information about the quality of products or which stalls offer the best bargains. Traditional markets are perceived as a place to foster social relationships (Zinkhan et al. 1999).

Personal relationships built between retailers and consumers developed trust for both groups. Zinkhan et al. (1999) stated that the respondents who often visit the street market in Sao Paulo know each other by name and often engage in social conversation. Goldman and Hino (2005) reported a similar result as Arab Israelis prefer to buy fresh meat from a known and trusted source. This ensures customer loyalty as consumers continue to purchase from the same retailer. In this study, several participants from the focus group discussions made similar statements about the importance of developing a good relationship with retailers:

> *"I only buy chicken at Muslim butchers because of trust and the good relationship I have with butcher that I have been visiting for many years. The opportunity to interact with the butcher is seen not only as a mean to guarantee that the meat is safe to eat and slaughtered according to the Islamic way, but may help building relationships between retailers and consumers."*

> *"I recognize very well the vendor. This is why I buy my beef supplies from her."*

Abu (2004) agrees with the importance of personal interaction between vendors and customers which eventually develops customer loyalty. Customers are more loyal to a store which offers

warm and friendly service. The personalized services offered by the butcher such as cleaning the chicken or cutting the meat according to the consumers' preferences, encourage loyalty. Vendors in traditional markets often give feedback to customers who are looking for quality products. Factors such as the ability the truthfully answer customers' questions, giving regular customers individual attention and vendors' knowledge of their product attracts customers to shop from a particular retail outlet (Dabholkar et al. 1996). Suryadarma et al. (2010) revealed that 40% of traditional retailers cited politeness as the main attribute of their business success. In addition, more consumer-friendly services such as giving priority to frequent customers, giving discounts, being honest, providing home delivery services and the availability to pay in installments were employed as strategies by traditional retailers in Indonesia to become more competitive in the retail food market. The social environment in traditional markets provides a leisurely experience for consumers which cannot be experienced when shopping at supermarkets and hypermarkets. Furthermore, there are no channels for immediate feedback for customers who shop from modern retail outlets.

According to Verbeke and Vackier (2004), meat is considered to be a high involvement product in the food product category, which requires consumers to access enough information about the product to evaluate the product attributes carefully before purchase. To reduce the perceived risk in purchasing fresh meat from a retail outlet, a long-term personal relationship with the butcher is a common approach. Yeung and Yee (2003) demonstrated how personal information from experts (butchers) reduced the perceived risk associated with the purchase of meat. Irish consumers were found to be more confident when they purchased fresh beef from their preferred butcher as the meat was fresher, of higher quality and the service provided by butchers was better than supermarkets, which led to a reduction in the level of perceived risk (McCarthy and Henson 2005). Vendors were perceived as experts, where consumers relied on them to provide safe and high quality products (Figuie et al. 2006).

Competitive Price

From the focus group discussions, competitive price was mentioned as a reason for consumers to buy their fresh meat from both outlets. Similarly, the quantitative findings revealed that there was little difference in consumer perceptions as to which retail outlet: modern retail outlets (23%) or the traditional market (10%) offered the lowest price. Past research reveals that the price of food is much lower in supermarkets (Aylott and Mitchell 1999; Chung and Meyers 1999). However, in order to compete with modern retail stores, traditional market vendors must not only maintain the quality of their fresh food, but ensure their prices are competitive (Faiguenbaum et al. 2002). In both studies, differences in the price of fresh meat between retail stores were not investigated.

Generally speaking, retail outlets which offer good quality products at a lower price will attract more consumers. According to Trappey and Lai (1997), offering lower prices is an important reason for consumers to shop at supermarkets. The fact that the price in traditional markets is higher motivates consumers to buy goods from hypermarkets or supermarkets (Farhangmehr et al. 2000). Modern retail outlets are capable of offering more competitive prices for the products they stock as they have the economies of scale in procurement. Furthermore, competition between the major chains is forcing prices down. In Malaysia, modern retailers such as Giant,

Tesco and Carrefour are engaged in a price war to entice consumers to purchase from their stores. Carrefour has cut prices for about 1,200 products and Giant is reported to have sacrificed profits in order to maintain their low-price leader position in the country (Arshad et al. 2006). While price wars may be advantageous for consumers, it does put pressure on local retailers to provide a similar price.

However, prices of fresh meat in the traditional market are not always cheaper than modern retail outlets (Farhangmehr et al. 2000; Hsu and Chang 2002). Hsu and Chang (2002) recorded the unit prices of various meat cuts from both retail outlets in Taiwan. Based on the data collected, several fresh meat products in traditional markets were sold at a higher price compared to supermarkets. For example, retailers in the traditional markets in Taiwan sold a whole chicken for $5.80/kg compared to $2.90/kg from supermarkets. In contrast, Block and Kouba (2006) found that fresh meat was at least 10% cheaper at corner stores in Chicago than supermarkets.

Nevertheless, shoppers who shop in the traditional markets enjoy competitive prices, for they are allowed to bargain, whereas the price in modern retail outlets is fixed. The majority of participants from the focus group discussions (66%) mentioned that they felt satisfied with their purchases from traditional markets after gaining the product through negotiation with vendors. As a result of having a good relationship with vendors, shoppers were able to bargain on price. This cannot be experienced when shopping from modern retail outlets.

Zinkhan et al. (1999) explained how bargaining is a cultural value which occurs in most markets in Brazil. Maruyama and Trung (2007) described bargaining as the 'art of shopping' and found that in Vietnam, consumers who wanted to bargain were more likely to shop in traditional outlets (traditional bazaars and mom and pop stores). Lui (2008) found that consumers who prefer to shop at wet markets in Hong Kong mentioned that through bargaining, they managed to: (1) pay less than the actual price of the product (paying only $10 if the goods cost $11), and (2) received additional products at no cost upon purchasing. Traditional retailers demonstrated that bargaining had symbolic value in reinforcing the tie between consumers and the retailer. This cultural tradition differentiates consumers' purchasing experience in the traditional markets from other modern retail outlets.

Maruyama and Trung (2007) suggest that shoppers who do most of their shopping from supermarkets do not consider bargaining to be useful. For them, obtaining products at a much cheaper price is less important in their decision to purchase. When shopping at a modern retail store, they search for superior products which are safer and better quality.

Although price is one of the key factors that influences consumers in their decision to purchase fresh meat from either a modern retail outlet or a traditional market, respondents in the main survey expressed their dissatisfaction over the rising price of the fresh meat that was available from both retail stores. In Malaysia, fresh chicken was found to be more affordable compared to the price for fresh beef. Not surprisingly, consumers' dissatisfaction over the increasing price of chicken has been more frequently reported in the media, compared to their dissatisfaction over the price of beef (Yatim et al. 2010; Zolkiply 2010).

Good Environment

Store environment and layout may influence the consumer's choice of retail store (Baker 1990). The concept of store image is the way consumers 'see' the store in their minds (Farhangmehr et al. 2000). According to Yalch and Spangenberg (1990), the right use of color, lighting, sound and furnishing may stimulate perceptual and emotional responses within consumers, which eventually affects their behaviour. Devlin et al. (2003) found that a store environment which caters for children, makes food shopping an uncomplicated task with clear signage and product labels, and was clean and tidy, was preferred by shoppers. Espinoza et al. (2004) further state that a good store atmosphere and pleasant surroundings may increase the consumers' willingness to buy.

The participants from all focus groups who purchased their fresh meat from supermarkets or hypermarkets mentioned that the pleasant store atmosphere was an influential factor in their store choice decision. The quantitative findings concur with the preliminary research findings, where 53% of respondents highlighted the cleanliness of the store as a motive to purchase fresh meat from modern retail outlets. Only 27% of respondents considered traditional markets to have a good environment.

Modern retail outlets do offer a good environment for shoppers. These modern retail outlets are described as clean and comfortable; the store is air-conditioned; it's easier to buy goods with the trolley provided; and modern retail formats are a suitable place to shop and to bring the children. Although the prices of some items may be relatively higher than traditional markets, consumers still shop at modern retail outlets due to comfort and good parking facilities (Abu 2004). The good environment provided by most modern retail outlets is also used as a marketing tool to attract more customers.

Respondents from the main survey considered the cleanliness of the store to be indicative of the quality of meat. Jabbar and Admassu (2009) revealed how cleanliness was measured by the hygiene of staff/butchers and premises. Their study demonstrated that consumers believed better quality meat was sold from shops that were cleaner, where staff wore clean clothes and used clean equipment to process the meat. Cleanliness of the equipment, washing the meat using clean water and the adoption of hygienic practices by butchers was perceived to improve the microbiological quality of meat (Rao and Ramesh 1988). Consumers in Ethiopia preferred to purchase their fresh meat in supermarkets compared to traditional butchers because of the different level of cleanliness between the retail outlets (Jabbar and Admassu 2009).

Most participants from the focus group discussions described traditional markets as crowded, hot and stuffy. This was not dissimilar to how consumers in Hong Kong described traditional markets: dirty, slippery, crowded, smelly, unorganized, poorly ventilated and noisy (Goldman et al. 1999). According to Hsu and Chang (2002), the floor in most traditional markets in Taiwan is wet and dirty. Furthermore, fresh meat products may be easily contaminated as the butchers do not wash their hands between handling fresh meat and doing other tasks. In Indonesia, many consumers complain about the dirty condition of wet markets and are often robbed by pickpockets (Muharam 2001). Cleanliness was seen as presenting a significant barrier for the traditional retail outlets to compete with modern retailers.

However, Suryadarma et al. (2010) revealed how cleanliness was seen to be one of the least important variables for traditional retailers to attract more shoppers. This is because, despite portraying traditional markets as having a poor environment, the traditional markets continue to offer goods and services which attract loyal customers. Similarly, Trappey and Lai (1997) indicate that a poor environment had little impact on shoppers. The traditional markets offered a more convenient location, a greater variety of products and superior product quality which far outweighed the inferior shopping atmosphere. The strong bond between vendors and their customers also explains why consumers continue to shop at traditional markets.

Conclusions

The results of the preliminary study provide a basis for identifying those factors which most influence consumers in their choice of retail store when purchasing fresh meat. Results from the main survey then confirmed and demonstrated that most Malaysians in the Klang Valley prefer to purchase their fresh meat from traditional markets. Even though modern retail outlets are expanding, purchasing fresh meat from traditional markets is still the preferred place of purchase in Malaysia. Some literature claims that traditional markets will soon be displaced, losing their customers to modern retailers who offer higher quality and safe products, one-stop shopping and a more pleasant environment for shoppers (Trappey and Lai 1997; Goldman et al. 1999; Reardon et al. 2003). The findings of this study demonstrate that consumers have not abandoned traditional markets when purchasing fresh meat, due to several pull factors such as having a good relationship with retailers, the meat is perceived to be of better quality (fresh) and Halal guaranteed, and the ability to bargain on price. Even though traditional markets do not provide a pleasant environment, they do create an environment in which interpersonal relationships thrive and the community is brought closer together. Shoppers visit traditional markets not only to buy goods, but also to visit friends and acquaintances.

On the other hand, supermarkets and hypermarkets have the advantage of offering a pleasant environment in which to shop for their patrons. For traditional retailers, it may be difficult for them to be competitive in providing such pleasant surroundings for their customers.

Retailers from both markets can capitalize on the store choice attributes which influence consumers' purchasing behavior. For instance, Malaysians have emphasized the importance of cleanliness when shopping for fresh meat. If traditional retailers are to respond to these issues, intervention from the government and local authorities will be needed. Among the activities that need to be carried out to improve the cleanliness of the traditional markets are: (1) the construction of new markets; (2) ensuring that there are concrete floors, running water, appropriate sewage and waste disposal; (3) making it compulsory for vendors to attend training courses related to proper food handling and food safety before granting a license; (4) conducting regular and compulsory health testing for vendors, and (5) conducting regular inspections in terms of compliance to health and sanitation.

As issues involving Halal and the preference to purchase meat from a trusted vendor were important for Malaysians when purchasing fresh meat from a retail store, modern retailers must emphasize the importance of offering fresh meat that is guaranteed Halal. While most fresh meat in supermarkets and hypermarkets are labeled with a Halal logo, it is still insufficient for

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consumers to believe that the meat was slaughtered appropriately and according to Islamic rulings. Thus, modern retailers should provide personal assurances through monitoring the supply chain or establishing dedicated supply chains to ensure that the supply of fresh meat to supermarkets and hypermarkets are genuinely Halal.

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A Comparative Analysis of Strategic Planning Practices in Michigan Agribusiness Firms: 1992 vs. 2012

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Abstract

Over the past 20 years, U.S. agribusinesses have been subject to a number of significant structural changes. Given that the strategic management literature emphasizes an organization's fit with its environment as an important determinant of performance, this study examines how strategic planning practices have changed over time. Data for this study was collected from Michigan agribusinesses at two time periods, 1992 and 2012. A comparative analysis indicates that Michigan agribusinesses have become larger, more diverse, and have increased their adoption of strategic planning activities. Furthermore, these practices were found to be positively correlated with performance.

Keywords: strategic planning, management practices, firm performance, agribusiness, comparative analysis.

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Introduction

U.S. agribusinesses face a competitive environment that is often characterized as more uncertain, with more complex relationships and fiercer competition than just 20 years ago (Ross and Westgren 2009, Ross et al. 2013). Boehlje (1999) and Boehlje et al. (2011) identify several specific changes that have transformed the agribusiness and economic environment during this period. For one, Boehlje (1999) illustrates how tightly aligned value chains, rather than a single firm or economic agent, have become the focal point for successful business activities and transactions. There has also been a change in the type of products produced by the agribusiness sector. As Boehlje (1999) illustrates, the sector now focuses on the "biological manufacturing" of products with specific attributes that are tailored to end-user preferences in contrast to the production processing of commodity products. Both these changes in the industrial organization of agriculture production favor the establishment of higher concentration levels in each of the different industry segments, which deeply influence the way agribusiness organizations behave and interact.

More recently, Boehlje et al. (2011) also describe how "formerly distinct value chains are becoming increasingly interlinked and interdependent". As a result of this convergence firms that did not traditionally interact with each other are now becoming partners and/or new competitors. Examples of this convergence can be seen by the demand for agricultural products from companies in the food, energy, and/or industrial sectors of the economy. Similarly, agribusiness firms are often present in more than one input market, and are developing portfolios of synergistic products and services that support an active cross-selling strategy in an attempt to develop a competitive advantage (Freedonia Group 2012). Some of the results of the industry changes described above as well as other changes in the general business environment in which U.S. agribusiness firms operate are reflected in Table 1.

Table 1: Comparison of Competitive Environment for U.S. Agribusinesses in 1992 vs. 2012.

	1992	**2012**
Commodity Price Index (2005=100)	54.93	187.19
Corn ($/bu)	2.30	6.73
Soybeans ($/bu)	5.61	13.9
Milk ($/cwt)	9.71	16.7
Use of Production Contracts (Hogs)	3%	>66% (2004)
% of Crop GM-seed		
Corn	0%	88%
Soybean	0%	93%
Ag Land Values MI ($/ac)	1,106	3,850
GDP ($ Billion)	8.28	53.19 (2011)
Agriculture Contribution	2%	1%
Interest Rates (LIBOR)	4.248%	0.862%
S&P 500	435.71	1379.85
U.S. Unemployment Rate (Michigan)	7.5% (8.9%)	8.9% (9.3%)

While the environment described above may well provide agribusiness firms with abundant opportunities for entrepreneurial behavior (Ross and Westgren 2009), it is also true that increased uncertainty and complexity is likely to have placed considerable strain on agribusiness strategic planning activities. Increased frequency of market shifts and/or production shocks make forecasts quickly obsolete and the greater magnitude and diversity of business relationships make "back-of-the-envelope" planning inadequate. As such, we might expect agribusiness firms to change their strategic planning practices.

In this paper, we explore how the strategic planning practices employed by U.S. agribusiness firms have changed over time. Specifically, we conduct a comparative analysis with data collected from two surveys conducted with Michigan agribusinesses in 1992 and 2012[1] to identify changes in the following areas:

- What planning practices do agribusinesses use in order to make strategic decisions?
- What effect do strategic planning practices have on firm performance?
- What expectations do agribusiness firms have for performance and strategic management activities in the future?

The paper is organized as follows. In the next section, we highlight relevant strategic planning literature with a particular focus on the strategic planning in agribusiness firms and the effect of strategic planning on performance. This is followed by a description of the data and the comparative analysis methodology used in this study. The results of the analysis are then presented and discussed. It is expected that both agribusiness managers and industry scholars will benefit from this study. This study will provide agribusiness managers with key benchmarking data, insights about the future intentions and expectations of other agribusiness, as well as a general understanding of the payoff of various strategic planning activities. For agribusiness scholars, this study represents one of the few attempts to understand how the strategic planning activities of U.S. agribusinesses have changed over time.

Theoretical Background

The concept of strategy and the need for strategic planning was first introduced into the management literature in the mid 20th century (Ansoff 1965; Chandler 1962; Mintzberg et al. 1998; Selznick 1957). Scholarship in this area has focused on understanding the underlying motivations and processes that are used to organize and construct the system of activities that are observed in firms. Furthermore, research in this area has been interested in *which* activities allow firms to create value and outperform other firms over the long-term (i.e. sustainable value creation).

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[1] Both the 1992 and 2012 surveys were conducted in collaboration with the Michigan Agribusiness Association (MABA).

The Strategic Planning Process in the U.S. Agribusiness Industry

The strategic management process is typically comprised on two fundamental components: a strategic analysis and strategy formulation. Using tools and concepts such as SWOT analysis (Learned et al. 1969), five forces model (Porter 1979) and/or value chain analysis (Porter 1985), a strategic analysis is used to provide an assessment of a firm's current performance, its underlying resources and capabilities and of its business environment (Morgan 2007). This assessment is consistent with two of the dominant theories in the strategic management literature: the resource-based view of the firm and contingency theory. The resource-based view of the firm postulates that firms with resources and capabilities that are valuable, rare, costly to imitate will gain a sustainable competitive advantage in the marketplace and outperform rival firms (Barney 1991; Barney 2007; Wernerfelt 1984). Alternatively, contingency theory emphasizes that firm performance is a result of the effectiveness of a firm's *fit* or alignment with its business environment or situation (Donaldson 2001, Morgan 2007). An in-depth understanding of both the internal and external drivers of firm performance is seen as essential for developing a successful strategic plan.

This study, however, focuses primary on the planning or formulation phase of the strategic management process. Porter (1996) argues that a strategy is a system of activities that work together in a reinforcing way to achieve superior performance. What activities, therefore, are important for formulating a successful strategy? Eden and Ackerman, in their 1998 book *Making Strategy*, start by defining the concept of *emergent strategizing*, which is the term they use for the general patterns that emerge from organizations and, whether they realize it or not, represents their strategic direction. This concept is important because it states that even firms that do not perform any formal activities of strategic planning have some general strategically driven direction. These authors present a framework for strategy making as a JOURNEY: **JO**int **U**nderstanding (of all the stakeholders about the strategic direction), **R**eflecting (about the firm's distinctive competencies and how well they support the strategy and aspirations), and **NE**gotiating strateg**Y** (in order to reach an agreement about the aspirations so that they are feasible but still inspirational, monitor the implementation and agree on a draft of strategic intent and direction). Whether or not firms use this planning model, this view of involving all stakeholders and considering the firm's and the surrounding characteristics before establishing the strategy for the firm is an important consideration for the process.

Regarding the relationship between strategic planning and performance, several studies have found a positive relationship between performance and the firm's planning activities (Thune and House 1970, Rhyne, 1987). However, a meta-analysis of this relationship conducted by Boyd (1991) found only mixed results with some studies reporting either no effect or small negative effects between strategic planning activities and performance.

To determine whether a relationship between strategic planning and performance exists in the agribusiness context is of significant importance, as the planning activities, and the strategy implementation that follows, usually signify incurring high non-operational costs. Studying the California processing tomato industry, Baker and Leidecker (2001) found support of this positive relationship in their sample and time period. Their research showed that the use of strategic planning tools had a strong relationship with the firm's ROA. In particular, three specific tools

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including the use of a mission statement, long-term goals and ongoing evaluation were found to have a strong relationship with profitability. To our knowledge, however, few studies have examined the role of strategic planning over time.

Methodology

The data for this study was collected from a survey of firm-level management practices and performance of Michigan agribusiness firms. In particular, firms were sampled from the membership of the Michigan Agribusiness Association (MABA), which represents approximately 95% of the Michigan agribusiness firms (J. Byrum, personal communication, July 2012). Firms are sampled from Michigan agribusiness industry for two reasons. First, this industry is characterized by a wide diversity of firms, dealing in different products ranging from inputs like seed, fertilizer and agro-chemicals, to farm machinery and petroleum products; and services, ranging from chemical application to marketing services, like commodity warehousing and trading or hedging mechanisms. Second, Peterson (1995) conducted a survey of the same population in 1992. The availability of data on the strategic planning practices of agribusiness firms 20 years ago offers us a unique opportunity to explore how agribusiness firms have changed over time both with respect to demographic characteristics and their strategic planning behavior.

As mentioned above, the data for this study was collected at two different time periods, 1992 and 2012. To maintain the comparability of the two datasets, these surveys focus solely on Michigan-based agribusiness firms and where possible, the integrity of survey items was maintained across survey waves.[2] It is important to note that the number of agribusiness firms in the MABA membership drops considerably from 362 firms in 1992 to 80 in 2012. This is a significant finding in itself and provides support to the significant amount of consolidation that has occurred in the U.S. agribusiness sector over the past 20 years (Boehlje 1999, Boehlje 2011).

Data Collection Procedures

The 1992 survey was sent by mail to the owner/manager of 362 agribusiness firms in the MABA membership database and generated 212 responses (i.e. 58.5% response rate) (Peterson 1995). The data from this survey provides a baseline of firm and industry characteristics as well as an inventory of management practices and expectations by which to compare the current state of the industry. In particular, this survey allows for us to describe how the agribusinesses have changed over time in terms of strategic planning and with respect to demographic characteristics and firm performance.

The initial 1992 survey was followed up, 20 years later, by a similar survey of Michigan agribusiness firms conducted during the summer of 2012. The 2012 survey was conducted as a web survey to a target population of 80 owner/managers of current agribusiness firms in the

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[2] In the few cases were items are not identical, a notation has been made in the manuscript to indicate potential non-comparability issues.

MABA membership[3]. To encourage participation, a letter of support from the executive director of the MABA accompanied the link to the web survey. A reminder notice was sent to the MABA membership after two weeks and the survey was open for a total of four weeks. In total, 60 responses were collected from the 2012 survey, representing a 75% response rate[4].

Survey Analysis

This paper provides a descriptive comparison of Michigan agribusiness firms, management practices and performance across the 1992 and 2012 time periods.   For this purpose, the analysis of the survey data from both the 1992 and 2012 surveys were divided into two components. The first component of the data analysis provides a descriptive analysis of agribusiness firm demographics, strategic planning practices and performance measures collected in the two time periods. Statistical analyses such as t-tests and chi-square tests are used to determine significant differences between firms in the two time periods.   Furthermore, a cluster analysis was conducted to identify groups of firms with similar levels of strategic behavior in terms of planning activities used.

The second component of the analysis examines the relationships between strategic planning practices and performance outcomes. For this purpose, correlations are calculated between performance related variables and various management practices at respective time periods[5]. In each case, *pretax profits* and *satisfaction with performance* are used as measures of firm performance. Furthermore, due to the low number of usable observations, hypothesis testing was conducted using a chi-square test of the independence between two variables. The following two performance relationships are examined.

R1: The level of strategic planning used by the firm is positively correlated with performance. Firms located in the higher planning clusters were expected to show higher levels of performance as they should be able to create competitive advantage over other players in the market by incorporating strategic management practices in their business. These expectations were supported by the findings of previous studies like the ones performed by Baker and Leidecker (2001) or Andersen (2000), where positive correlations between strategic planning activities and performance were found.

R2: Demographic characteristics of the firm are correlated with performance. The idea that firms could be subject to certain requirements in terms of minimum efficiency scale could justify

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[3] The degree to which firms overlap in the 1992 and 2012 surveys is unknown as respondents were not asked to identify themselves or their organizations in order to protect the confidentiality and anonymity of surveys responses.
[4] However, not all firms answered all questions. Where appropriate the number of responses for each question is indicated.
[5] As is the case with all survey research that utilizes a single source for both dependent and independent variables, common method variance is a potential issue. Unfortunately, given the type of firms involved in the data collection, utilizing a single respondent (i.e. owner/manager) as the source of data was unavoidable. We attempt to mitigate this potential issue by using various *ex ante* and *ex post* methods as suggested by Chang et al. (2010) and Podsakoff et al. (2003). First, we use different scale endpoints for various survey items Salesto reduce method bias caused by commonalities of endpoints (Podsakoff et al. 2003). We also conduct a Harman's single factor test, which indicates that less than 50% (0.18) of the variance of survey items can be explained by a common factor.

a positive relationship between demographic variables, like sales or total assets, and performance. Nevertheless there could be the need for a lower capital-labor ratio. This could justify a negative correlation between the number of employees and performance, or even a positive relationship between debt-to-asset ratio and performance. Testing for the existence of these relationships between demographic characteristics of the firm and performance can help shed light into these questions.

Survey Results

In this section, we provide a detailed analysis of the data collected in the 1992 and 2012 surveys. Comparisons are made between the two datasets to highlight how Michigan agribusiness firms have changed over the 20-year time period in terms of demographics information, strategic planning practices, performance and future expectations for performance and management activities. The results also illustrate the relationship between strategic planning activities and firm performance.

Respondents' Level of Satisfaction with Firm Performance

Surveys respondents were asked to indicate their level of satisfaction with the firm's performance on a scale of 1 (very dissatisfied) to 7 (very satisfied). These results are illustrated in Figure 1. As shown, the results reveal an industry with high levels of satisfaction with a clear increase in satisfaction levels in all categories from 20 years ago. Special attention should be paid to the level of satisfaction with profit margins. In 1992, agribusiness firms were moderately satisfied (=3.4) with their performance, while in 2012, the average level of satisfaction had climbed to 4.6 of the 7-point scale. Furthermore, our results indicate that the aggregate level of satisfaction across all performance variables is statistical different between 1992 and 2012 at the 1% significance level (see Table 2). This finding is consistent with the levels of profitability reported below.
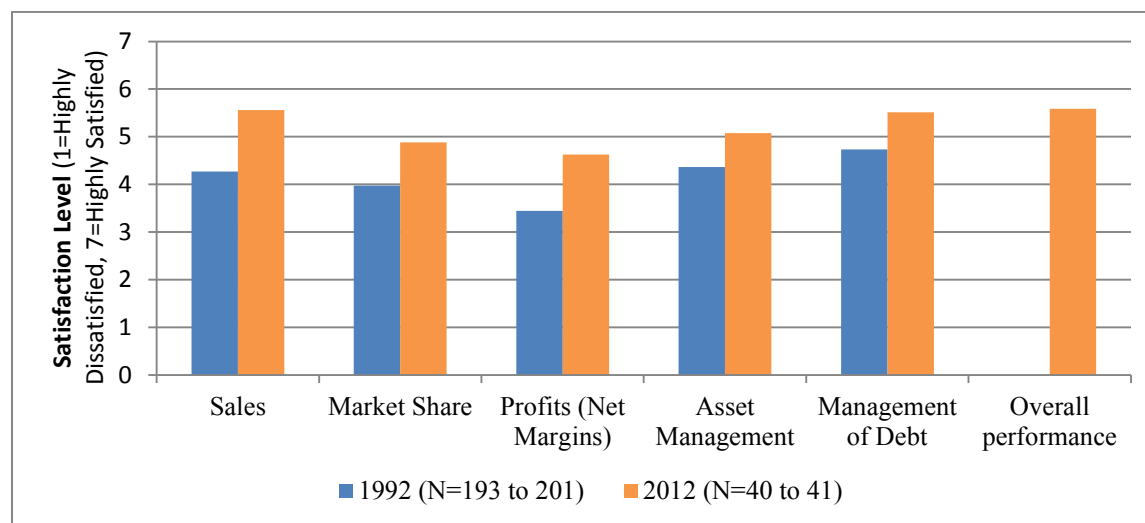

Figure 1. Average Level of Satisfaction with Firm Performance in 1992 and 2012.

Both surveys also included a question about the respondent's satisfaction with various business activities within the agribusiness firm. These results are illustrated in Figure 2. As above, a clear increase in satisfaction level is evident when comparing the 1992 and 2012 survey results. On average, seven of the nine operations received a score of above 5 on the 7-point scale in 2012. Furthermore, our results indicate that the aggregate level of satisfaction across all business activities is statistically different between 1992 and 2012 at the 1% significance level (see Table 2). Together the Figures 1 and 2 illustrate an industry that is more satisfied with its own performance and abilities today than it was twenty years ago.
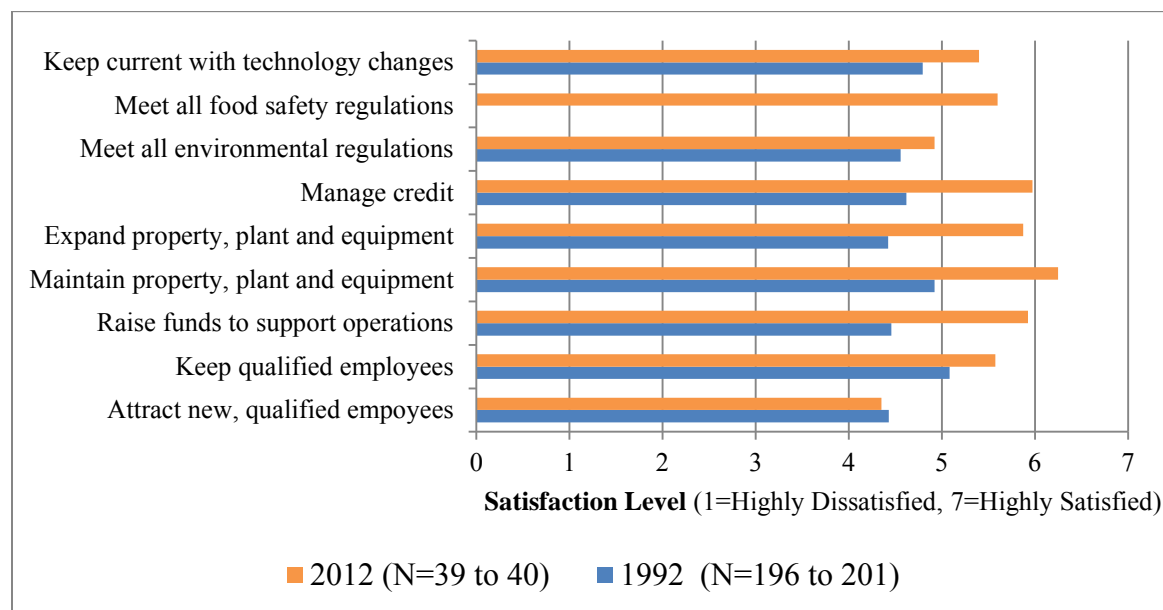

Figure 2. Average Level of Satisfaction with Firm's Ability to Perform Various Business Activities, 1992 vs. 2012.

Table 2. Average Level of Satisfaction with Performance and Ability to Conduct Business Activities, 1992 vs 2012.

Variable	Mean 1992 2012	p-value
Satisfaction with performance	4.13 5.17	**0.00*****
Satisfaction with business operations	4.64 5.56	**0.00*****

Note. ***= significant at 1% significance level.

Demographic and Performance Characteristics of Michigan Agribusiness Firms

In addition to satisfaction levels, survey respondents were also asked to report actual performance levels for the agribusiness firm as well as other demographic data. The results of this analysis are presented in the following figures.
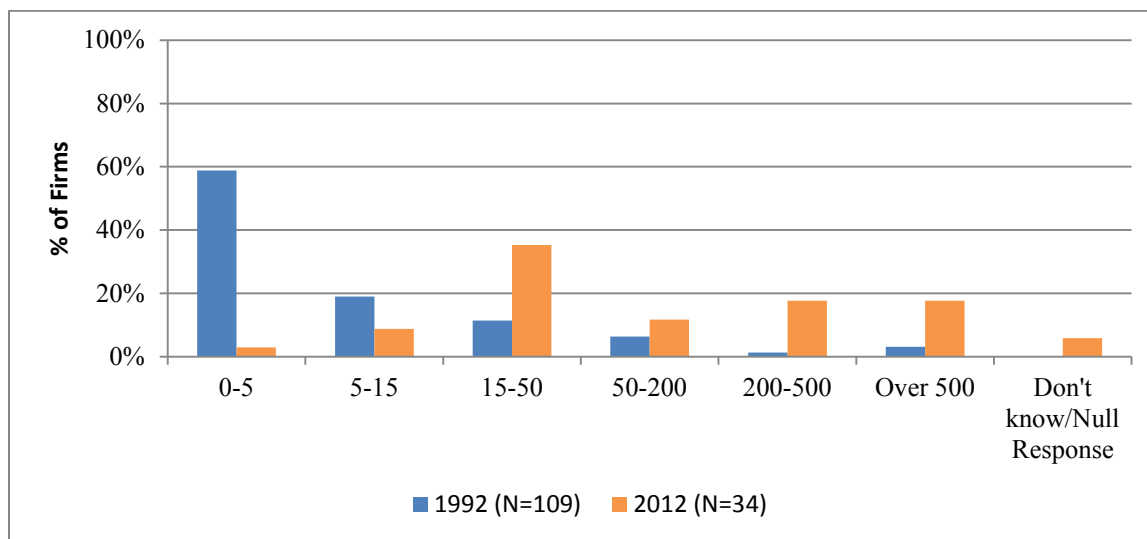
Figure 3. Average Sales (in Millions $, Nominal Value) for Previous 3-Year Period, 1992 vs. 2012.

Note. According to the Bureau of Labor Statistics ,100 USD (1992) = 164 USD (2012).
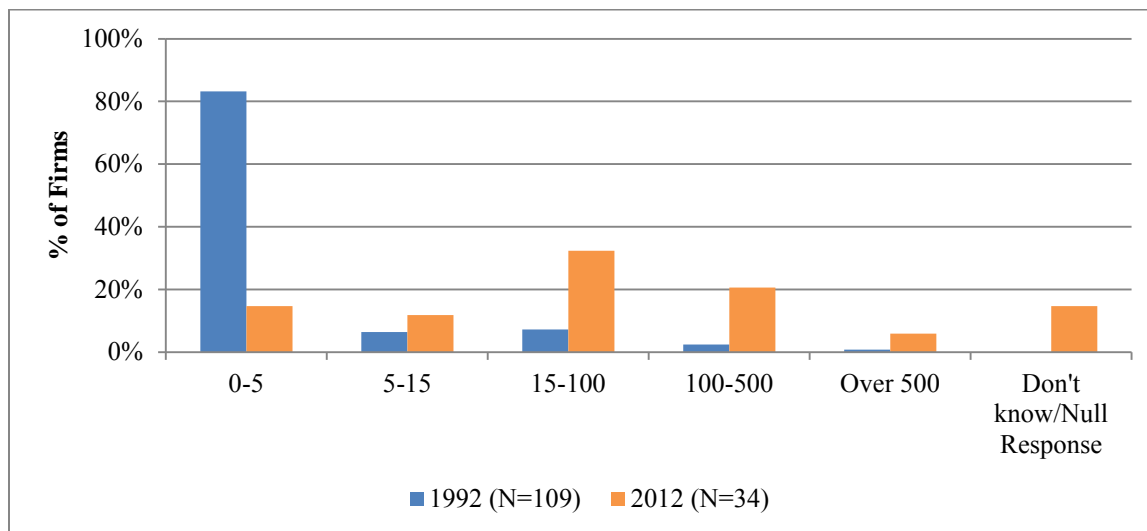
Figure 4. Average Total Assets (in Millions $, Nominal Value) for Previous 3-Year Period, 1992 vs. 2012.

Note. According to the Bureau of Labor Statistics, 100 USD (1992) = 164 USD (2012).

In 1992, the majority of agribusiness firms generated sales in the range of $0-5 million (in nominal terms). Furthermore, 83% of agribusiness firms owned assets within the same range. It is evident from both Figures 3 and 4 that firms have not only grown in size, in terms of both sales and total assets, but also that the distribution of firms is more dispersed across size categories. According to the survey results, average sales have increased from $69 million to

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$282 million; this difference was found to be statistically significant at the 1% significance level (see Table 3). There is also a significant difference between the average total assets owned by agribusiness firms in the two periods (see Table 3). In fact, 27% of firms were found to own total assets of between over $100 million (Figure 4). These values appear to be consistent with the satisfaction levels reported above.
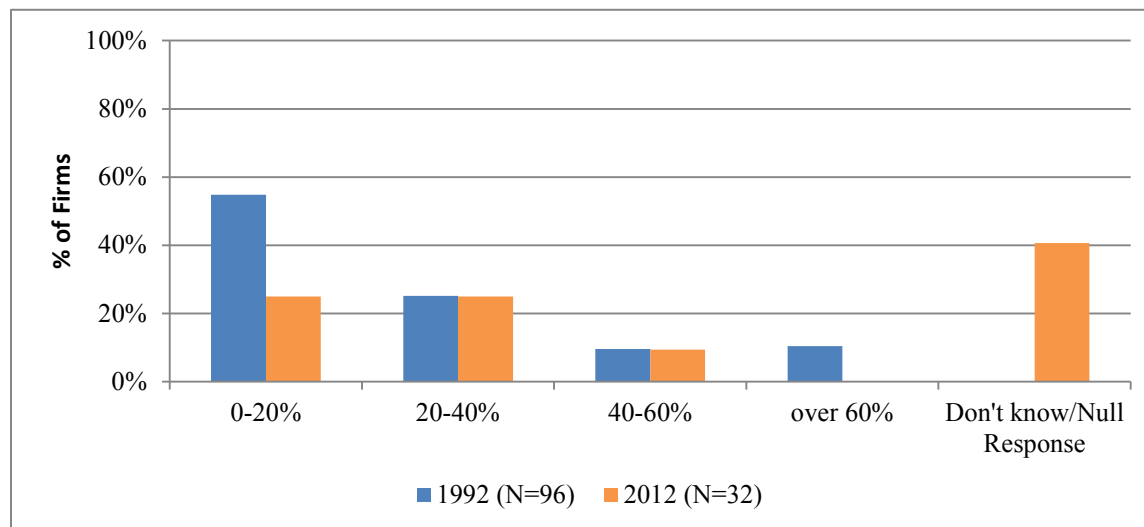
Figure 5. Average Debt-to-Asset Ratio in Previous 3-Year Period, 1992 vs. 2012.
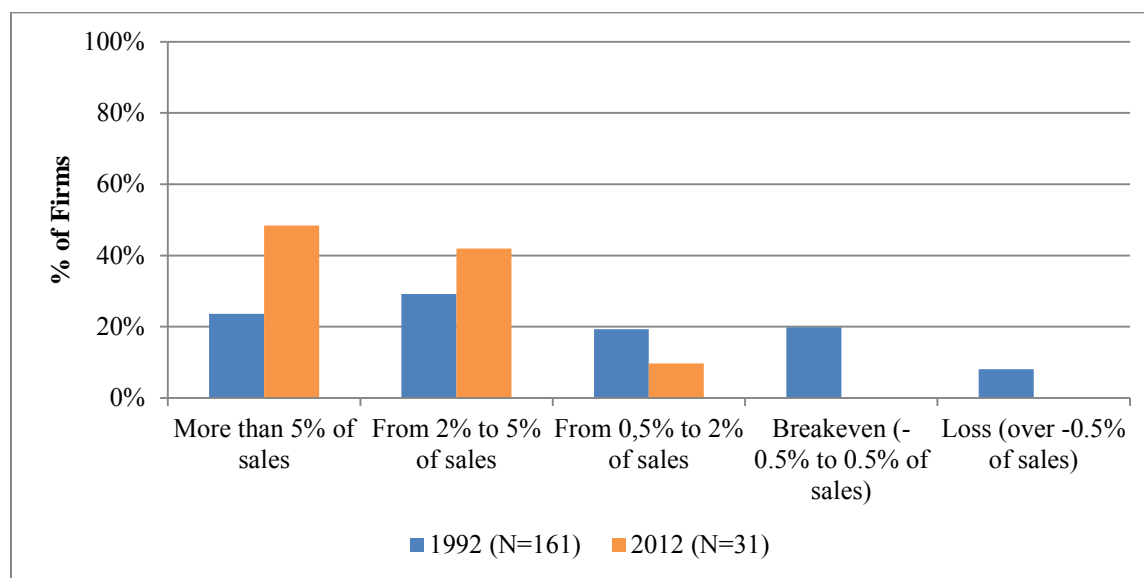

Figure 6. Average Pretax Profit in Previous 3-Year Period, 1992 vs. 2012.

The survey item related to the firm's debt-to-asset ratio returned a high amount of null responses, therefore not allowing for a very conclusive analysis. However, it is interesting to note that the 20%-40% and 40%-60% categories recorded very similar levels to 1992 and that there was a

very abrupt drop in firms within the 0%-20% class (see Figure 5). This would suggest that firms in 2012 are more highly leveraged, even though their assets have significantly increased in size.

Regarding profit margins, Figure 6 shows a clear shift to increased profitability over the last 20 years; consistent with the increase in satisfaction with performance observed previously. When comparing the two surveys, it is clear that the two classes above 2% pretax profit margins have substantially increased and that in 2012 the most frequent class is no longer "2% to 5%" but "More than 5%".

Figure 7 represents the distribution of firms by number of employees in the two time periods. In this case, the industry has shifted from a situation where the vast majority, 71%, of firms employed 50 or less people in 1992 to a more even distribution across employment categories in 2012. In 2012, the two most represented categories are "11 to 50" and "Over 500" with only 26% and 20% of the firms in those categories, respectively.
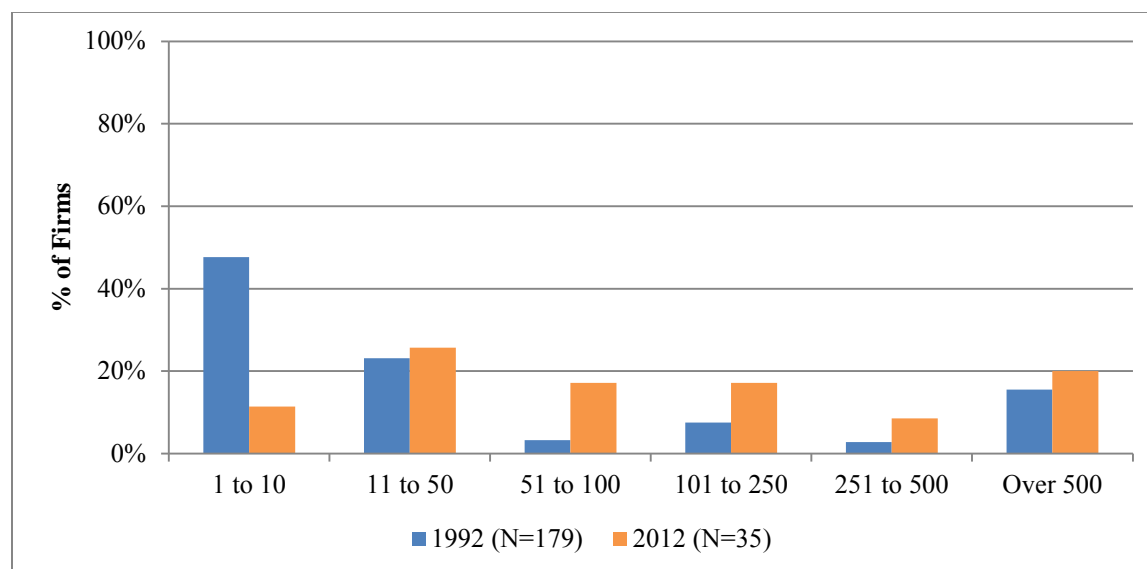
Figure 7. Total Number of Employees, 1992 vs. 2012.

With respect to type of business organization, Figure 8 also illustrates the tendency for a more even distribution of firms across organizational structure types in 2012 compared with the 1992 agribusiness industry. In the 1992 survey, 59% of respondents stated that their organization was a private corporation, while all other types of organizations where represented in the industry at levels of 15% or below. In 2012, the most common type of organization was a partnership, representing 36% of the industry, while public and private corporations presented very similar frequencies. The movement from private corporations to partnerships is surprising and in need of future research. It is also interesting to note that there was minimal change in the percentage of firms organizing as a cooperative or sole proprietorship, from 15% to 12% and from 4% to 3% respectively.

Figure 8. Distribution of Firms by Type of Organizational Structure, 1992 vs. 2012.

For each of the demographic and performance variables, a two sample t-test with unequal variances was used to test for significant differences between mean values in 1992 and 2012. The results are presented in Table 3. Support was found for significant differences between the two years for sales, total assets, profit margin and number of employees. These results also illustrate an industry that has evolved from a very stylized i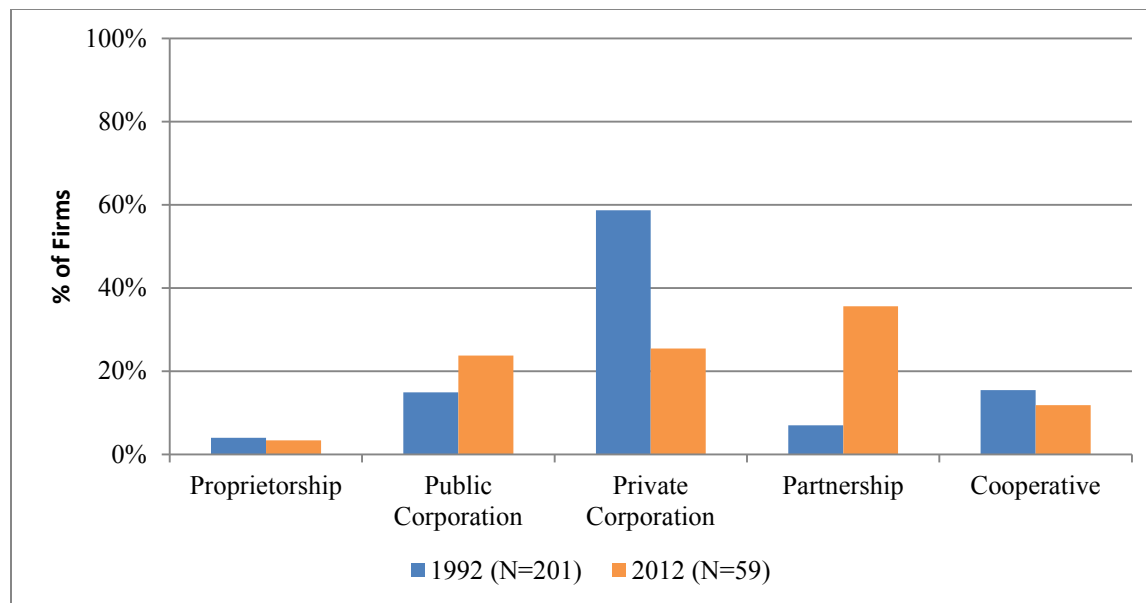ndustry in 1992, usually dominated by one demographic category, to an industry with firms that are much more varied and evenly distributed across various demographic categories in 2012.

Table 3. Average Demographic and Performance Characteristics, 1992 vs. 2012.

Variable	mean[6]		p-value
	1992	2012	
Sales[7]	$69 MM	$282 MM	**<0.01*****
Assets[8]	$32 MM	$165 MM	**<0.01*****
DAR	23%	25%	0.61
Profit	2.92%	5.63%	**<0.01*****
Number of employees	152	233	**<0.01*****

Note. ***= significant at 1% significance level.

The 2012 survey also inquired about the type of ownership regarding whether or not the firms were local (Michigan-owned) and whether or not they were family-owned. The results reveal that 60% of the firms reported to be local businesses and 43% reported to be family-owned

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[6]Because values were assessed in categorical questions, the values presented for the means correspond to the average calculated using the intervals' middle points.
[7]Mean values for sales presented in real 2012 dollars.
[8] Mean values for assets presented in real 2012 dollars.

businesses. This question was not asked in the 1992 survey and therefore, comparisons cannot be drawn between the two samples.

To examine *Relationship 2*, that there is a significant relationship between demographic characteristics of the firms and their performance level, chi-square tests were used. This series of tests was performed for each year and the demographic and performance variables used include sales, total assets, debt-to-asset ratio (DAR), number of employees and type of organizational structure. Table 4 presents the results of these tests.

Table 4. Relationship of Various Demographic and Performance Characteristics with Pretax Profit, 1992 vs. 2012.

Variable	1992		2012	
	Covariance	p-value	Covariance	p-value
Sales	0.08	0.10*	0.06	0.16
Assets	0.06	0.05*	0.12	0.82
DAR	0.32	0.03**	0.36	0.25
Employees	-0.04	0.01**	0.25	0.22
Business Organization	-0.07	0.14	0.19	0.32

Note. **= significant at 5% significance level. *=significant at 10% significance level

In 1992, a statistically significant relationship was found for 4 of the 5 variables with pretax profits: sales, total assets, DAR and number of employees. Of note, the results support the finding that firms with higher leverage positions and with less employees outperform other agribusiness firms. This could suggest that the most efficient firms were investing in more capital intensive technology and relying less on labor. As expected, the results also support that firms with higher sales and asset levels outperform other agribusiness firms.

With respect to the 2012 data, however, the covariance between each of the variables and pretax profit was not found to be significant. Similarly, no relationship was found with satisfaction with overall performance for any of the variables. These findings do not support the hypothesis that demographic characteristics are correlated with firm performance, *Relationship 2*, in 2012. In fact, they seem to suggest that a wide array of characteristics is suitable for success in Michigan agribusiness sector.

Expectations for the Future

Another important component of the surveys was the assessment of the respondents' expectations towards the future. The 1992 and 2012 datasets allow for a detailed comparison of what the firms foresaw in their future at those two points in time. Figure 9 illustrates the expectations for financial performance by agribusiness firms over the five years immediately after the survey year.

As Figure 9 shows industry expectations did not change substantially over 20 years. The majority of firms expected sales, market share, profits and assets to increase in the range of 5% to 15% in the following five years, while debt was expected to be stable in both surveys. It is

interesting to note, however, that in 2012 there are more participants expecting an increase in growth, either by means of sales, market share or profits, than in the 1992 survey. This is consistent with the high level of optimism that can be observed in the survey responses, where 97% of respondents stated that they were either optimistic or very optimistic about their organization's ability to perform well over the following five years. T-tests were used to determine if the differences in financial expectations were significant between 1992 and 2012. As shown in Table 5, only the increase in expected profit and total assets for the following five years were significant.

Table 5. Average Financial Expectations for Next 5 Years, 1992 vs. 2012.

Expectation Variable	mean		p-value
	1992	2012	
Sales	3.86	4.05	0.15
Market share	3.78	3.83	0.69
Profit	3.55	3.90	0.01***
Total Assets	3.62	3.92	0.05**
Total Debt	2.70	2.95	0.12

Note. **= significant at 5% level. ***=significant at 1% level.

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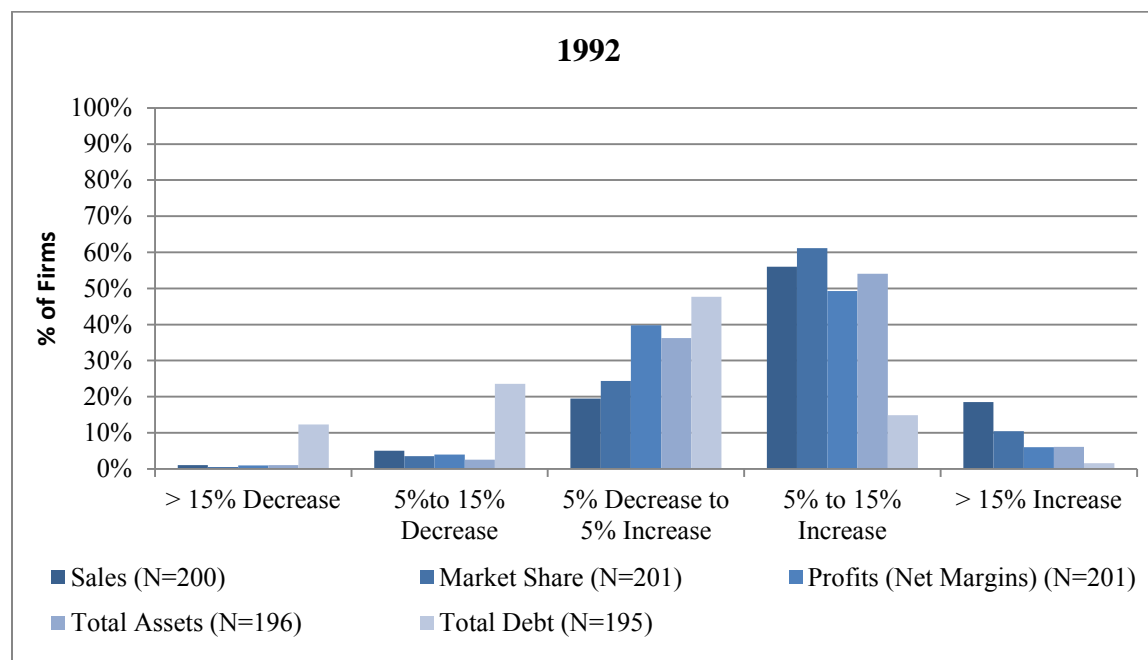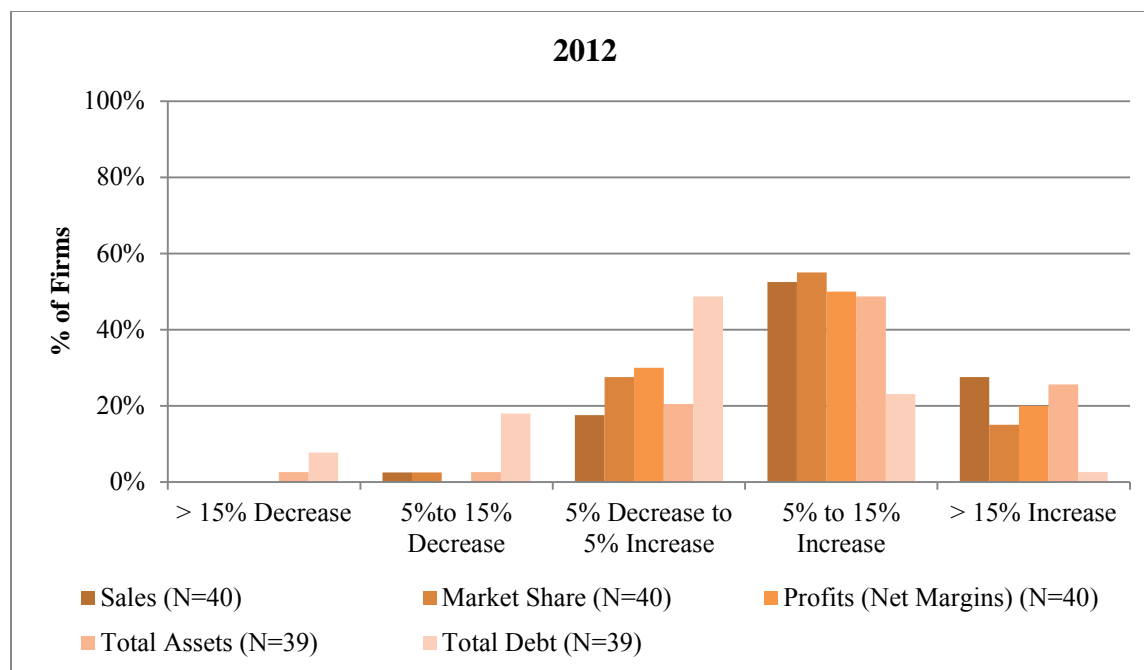
Figure 9. Financial Expectations for the Next 5 Years, 1992 vs. 2012.

In each of the surveys, respondents were also asked about the likelihood that their agribusiness firm would engage in a range of various strategic business activities in the following five years. The results are presented below in Figure 10 (growth related activities), Figure 11 (Efficiency Improvement Activities) and Figure 12 (Defensive Activities). This categorization of strategic business activities was done in accordance with Peterson's change grid framework (Peterson, unpublished).
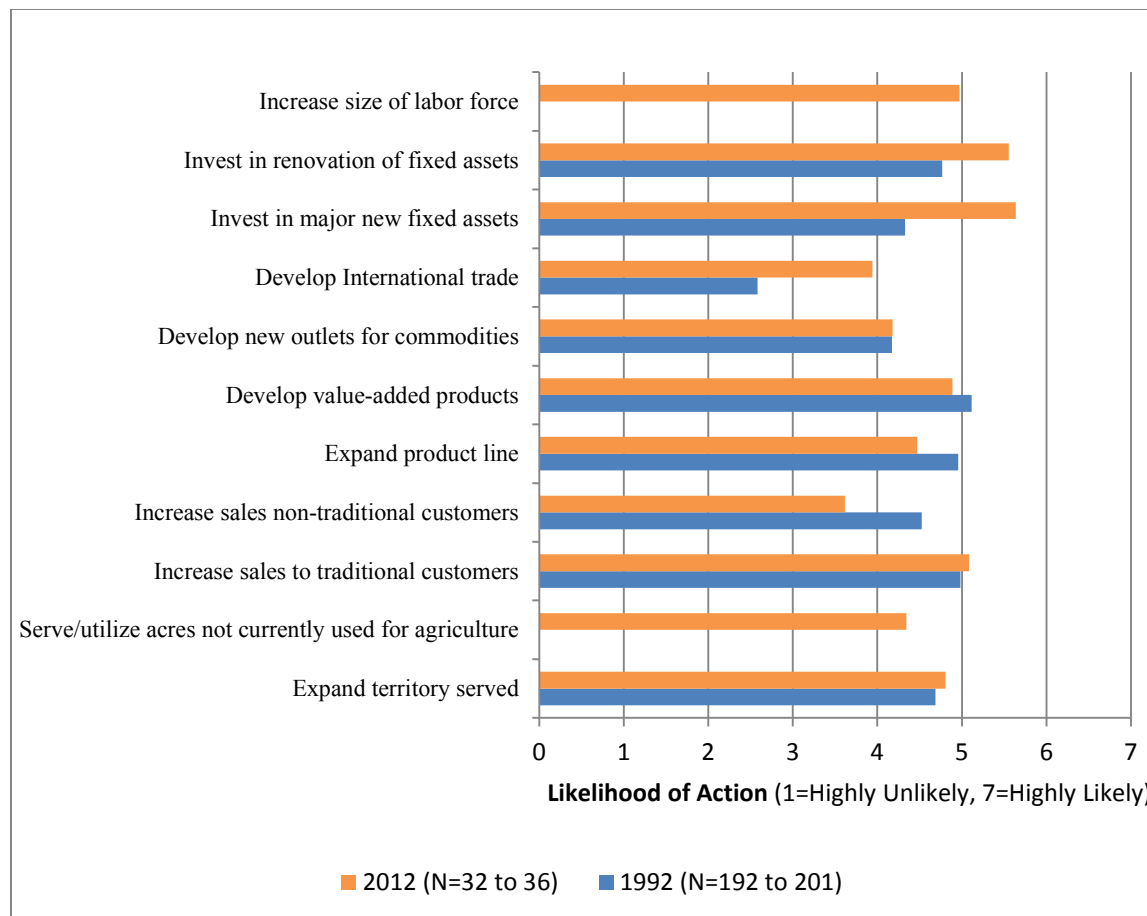
Figure 10. Expectations for Future Growth Related Business Actions in the Next 5 Years, 1992 vs. 2012.

As found above, Figures 10, 11 and 12 portray an agribusiness industry that is generally optimistic about the future, both in 1992 and 2012. Overall, agribusiness firms appear to be relatively more optimistic in 2012 than in 1992, though the differences are small. Nevertheless, all nine defensive actions were seen as less likely to occur in 2012, while most of the growth related and the performance improvement related actions were seen as more likely than 20 years earlier. The exceptions were "develop value-added products", "expand product line" and "increase sales to part time farmers and other non-traditional farmers". T-tests were used to determine if the differences in expected strategic business activities over the next 5 years were significant between 1992 and 2012. As shown in Table 6 only the decrease in likelihood of defensive actions was significant.

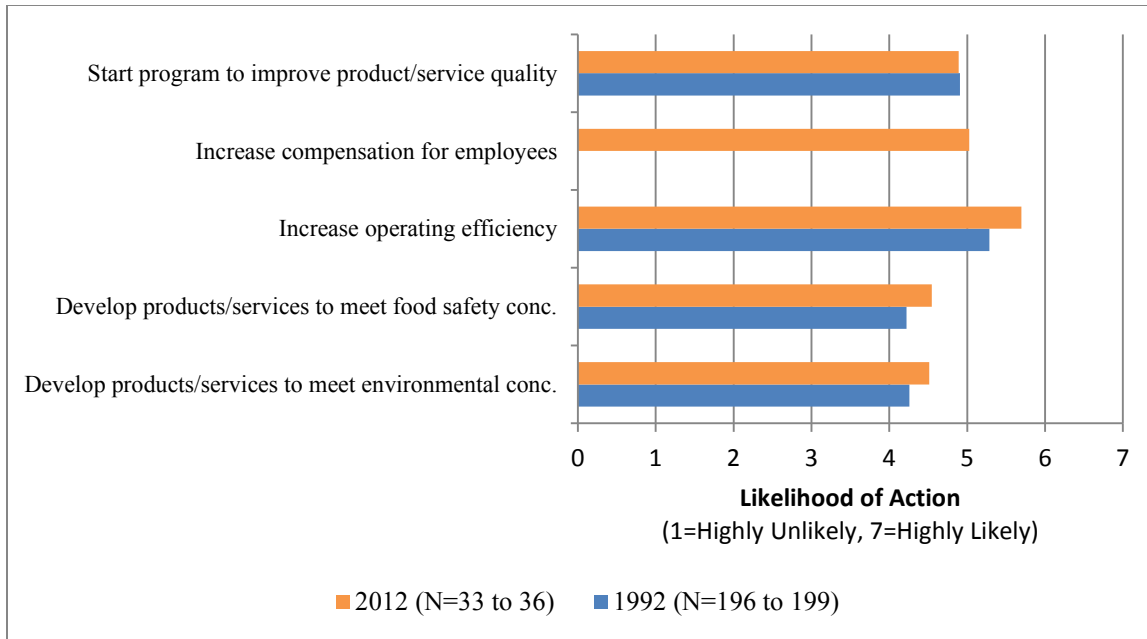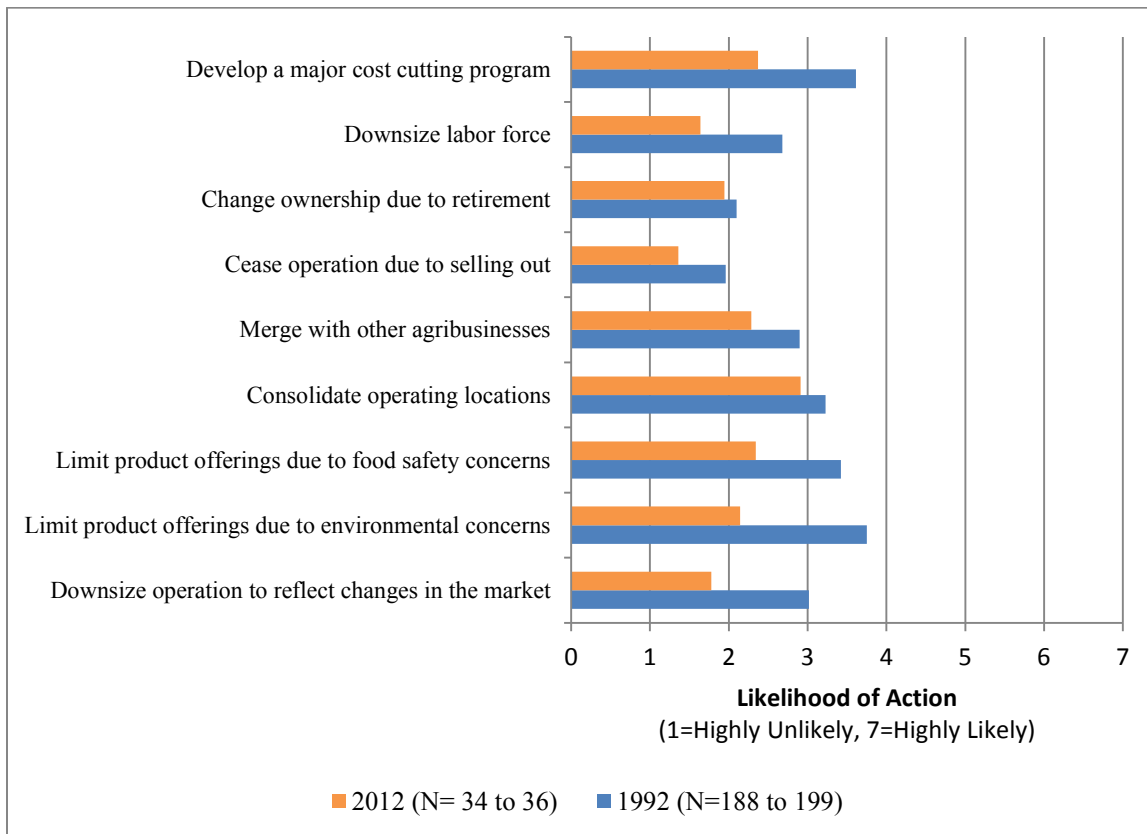**Figure 11.** Expectations for Efficiency Improvement Related Business Actions in the Next 5 Years, 1992 vs. 2012.

Figure 12. Expectations for Defensive Business Actions in the Next 5 Years, 1992 vs. 2012.

Table 6. Average Likelihood of 3 Types of Future Strategic Business Actions[9], 1992 vs. 2012.

Variable	mean		p-value
	1992	**2012**	
Growth Actions Index	4.47	4.68	0.24
Efficiency Improving Actions Index	4.65	4.92	0.23
Defensive actions index	2.93	2.14	<0.01***

Note. ***= significant at 1% significance level

Strategic Planning Practices

Both the 1992 and 2012 asked agribusiness firms to describe their strategic planning activities. Respondents were given a list of strategic planning activities and asked to identify which activities were used in their organization and to what extent: "Yes, formally", "Yes, Informally" and "No". A factor analysis was performed on both survey datasets and allowed the identification of four categories of planning: Short-range planning, goal setting and review, long-range planning and strategic analysis. The 1992 survey included 25 activities instead of the 2012's 13. However, the design of the 2012 survey was such that a simple manipulation of the 1992 data would convert it to parameters comparable to the 2012 format. Table 7 (see Appendix) reveals the frequency of usage of each of the activities for both 1992 and 2012. The 1992 variables are presented after harmonization with the 2012 format.

The variation of responses revealed in Table 7 depicts important changes in the usage of the strategic planning activities. For all activities, the frequency of "Yes, Formally" responses increased from 1992 to 2012 and the difference in the mean is statistically different at the 5% level. Also, firms reported "No" usage of a planning activity less frequently in 2012 for all items. The exceptions to this finding were "analysis of business/external conditions" and the "annual analysis of the firm performance" which were both already at low levels in 1992. On average, the non-usage of these activities was also statistically different between the two years. Test of statistical differences in usage of strategic planning activities in 1992 and 2012 can be found in Table 8.

Table 8. Average Usage of Strategic Planning Activities, 1992 vs. 2012.

Variable	Means		p-value
	1992	2012	
"Yes, formally"	35%	52%	0.04**
"Yes, informally"	46%	37%	0.15
"No"	20%	12%	0.03**

Note. **= significant at 5% level.

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[9] For each type of strategic business action the t-test was performed using an index consisting of the average of all activities in that category.

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The strong shift towards a higher degree of usage of the strategic planning activities is matched with the higher levels of satisfaction and financial performance that respondents' reported in 2012 relative to 1992. These findings seem to be consistent with the existence of *Relationship 1*, presented above, as well as studies by Andersen (2000) and Capon et al. (1994), which find positive relationships between strategic planning and performance.

The relationship between pretax profit and strategic planning activities in 1992 was tested for using the original items in the 1992 survey dataset (see Table 9 in Appendix). Only 8 of the 25 variables were found to have a statistically significant covariance with performance. As such, in 1992, the hypothesis that strategic planning is positively related with performance is only weakly supported.

In a previous analysis of the data, Peterson (1995) segmented the 1992 survey data to reanalyze this relationship between performance and planning activities, this time considering only the observations where firms were satisfied with their activities (i.e. firms that saw no need to change their behavior regarding the specific planning activity). By doing this, he was able to establish that there was a significant covariance between pretax profit and an annual analysis of each product line's performance (p-value = 0.002 from the chi-square test).

The strategic planning – performance relationship was also examined using the 2012 survey data. Of the 12 planning activities, only 2 were found to have a statistically significant covariance with pretax profit. These planning activities were "mission statement or statement of specific business objectives" and "an analysis of business conditions including trade area information, legal and regulatory changes, and/or industry trends" (see Table 10 see Appendix).

Using the same data segmentation procedure as Peterson (1995), a chi-square test was performed using only the cases of respondents that were satisfied with their current use of the planning activity. Under this scenario, two other strategic planning activities were identified to have a statistically significant relationship with the pretax profit of the firm. These two additional activities were "a 3 to 5 year general business plan to guide operations including a facilities plan, personnel plan and/or a financial plan" (covariance=0.183; p-value=0.088) and "an annual analysis of firm performance by department, product line, and/or employee performance" (covariance=0.164; p-value=0.039).

The relationship between the usage of the strategic planning activities and overall performance satisfaction was also examined for the 2012 agribusiness firms. The results of this analysis are presented in Table 11 (see Appendix). A chi-square test identifies four planning activities to have a statistically significant covariance with overall performance satisfaction. Interestingly, three of these activities coincide with those identified above for pretax profit in the 2012 survey.

One of the main results of this series of tests across the two datasets is the identification of three strategic planning activities that appear to have a robust positive relationship with firm performance over the 20-year time period. These three strategic planning activities were: (1) *Mission and objective statements*; (2) *External analysis of the industry characteristics and conditions*; and (3) *Annual operational and capital budgets and projections of sales and/or cash flows*.

The final analysis that was conducted using the 1992 and 2012 survey data was a cluster analysis of firm attitudes towards strategic planning[10]. Using this analysis technique, four significant clusters were identified and provided support for segmenting firms as high planners, long-term moderate planners, short-term moderate planners and low planners. Typically, high planners used most of the planning activities at a formal level. Low planners, on the other hand, were not using many of the activities. Moderate planners had an intermediate level of usage for the planning activities and either showed a tendency towards high usage of the 3 to 5 year horizon planning activities (long-term planners) or more short-term planning activities (short-term planners). This cluster classification was performed for both datasets and the results can be found in Figure 13.
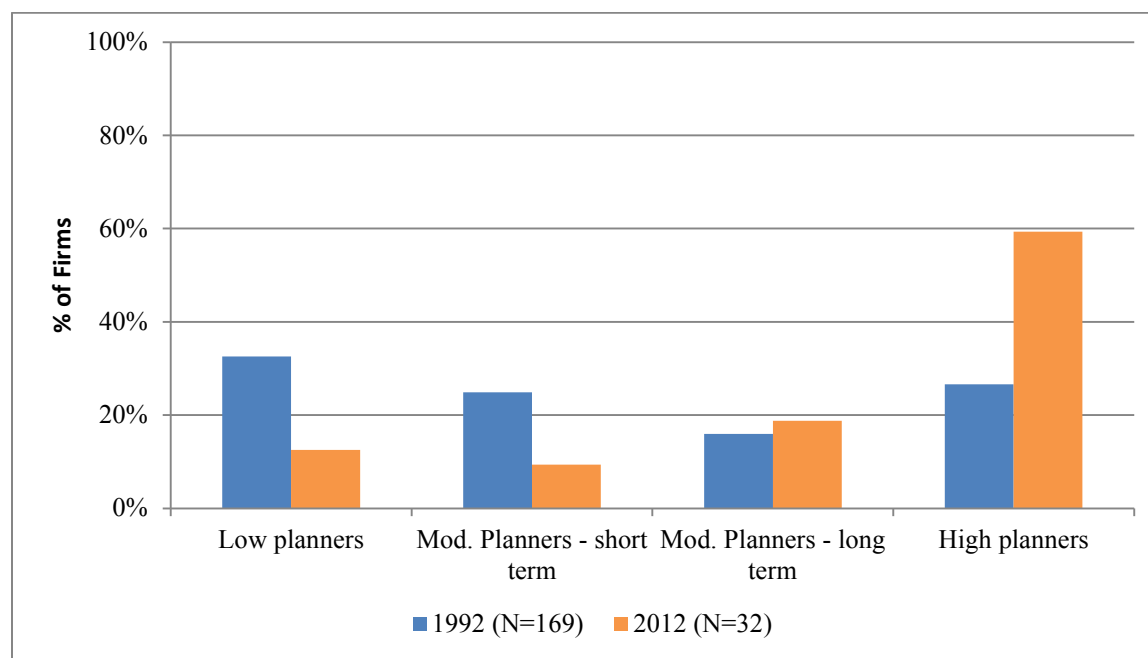
Figure 13. Results of Cluster Analysis on Agribusiness Strategic Planning Activities, 1992 vs. 2012.

Figure 13 clearly illustrates a shift towards higher levels of strategic planning activity from 1992 to 2012, a trend that was illustrated in Figure 7 as well. The effect of this shift, however, is mixed. With respect to the 1992 survey data, the distribution of firms into strategic planning clusters was not found to relate with pretax profit. Therefore, the hypothesis that strategic planning and performance are related was not supported with the 1992 data. A similar result was also found between planning behavior and pretax profit in 2012. However, using overall performance satisfaction from the 2012 survey as a measure of performance, a positive and significant covariance was found with the level of strategic planning activity (covariance=0.494; p-value=0.033).

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[10] The cluster analysis using the 1992 survey data was originally conducted by Peterson (1995).

Discussion

Significant changes have taken place in the global agribusiness industry over the past 20 years. The availability of data from a 1992 survey of agribusiness strategic planning practices offers us a unique opportunity to explore how the strategic behavior of agribusiness firms have changed over time as well. Using a 2012 follow-up survey of the same sample population, our study reveals several important changes that have occurred within the Michigan agribusiness sector. This section discusses those results.

Demographic and Performance Characteristics of Michigan Agribusiness Firms

A comparison of the results from the 1992 and 2012 surveys illustrate a significant shift in the many key firm characteristics and performance attributes. Firms have clearly grown in terms of size, profitability and strategic planning complexity. The industry has also become more fragmented in the sense that a dominant design does not seem to be apparent for Michigan agribusiness firms. At the same time, one the most significant findings of this study is the significant decline in the number of firms in the Michigan agribusiness sector. Given the relatively positive financial outlook for firms in 1992, this finding appears to provide empirical support for the increased level of consolidation in this industry over the past twenty years (Boelhje 1999; Boehlje 2011). Our results suggest that this consolation may have been driven by both the desire of agribusiness firms to increase efficiency as well as to increase their product portfolios, especially in terms of value-added products and serving non-traditional customers, in 1992 (see Figures 10 and 11).

Various demographic indicators (i.e. size) were found to relate with performance (i.e. pretax profit) in 1992, while no such relationship was found in 2012. As opposed to 1992, this latter finding may further indicate that there is no single strategy (in terms of firm structure characteristics) that dominates the 2012 Michigan agribusiness sector. This finding would be consistent with other studies that stress the importance of entrepreneurial behavior in today's current agri-food business environment (Ross and Westgren 2009).

The positive relationships between firm size as measured by sales and assets, and performance (i.e. pretax profits) that were found in the 1992 survey may also provide insights into the trend towards consolidation over the 20 years (Boehlje 1999). During this time, agribusiness firms that were below their minimum efficient scale and were faced with significant economic challenges would have an incentive and to merge with, acquire or sell to another firm in order to get bigger (or get out) and increase performance. This would be consistent with the evolution of strategic management field as described by Grant (2008). During the late 1980s and the early 1990s, the principal strategic management concepts and techniques focused on firm resource analysis and the identification of core competencies (Grant 2008). This became known as the resourced-based view of the firm (Barney 1991, Barney 2001, Wernerfelt 1984). As Grant (2008) describes, this led to a wave of corporate restructuring and business process reengineering, as well as to refocusing and outsourcing. In other words, firms had the incentive to achieve economies of scale and reduce costs by scaling up efforts to exploit their resources and capabilities that were valuable, rare, and costly to imitate (Barney 1991). With respect to the current (2012) environment, favorable economic conditions for agribusinesses and the fact that

the group of firms surveyed showed high heterogeneity could mean that this is a period where firms are typically above the minimum efficiency scale and are pursuing strategies related to growth and differentiation as illustrated in Table 10 (see Appendix).

Planning Activities and Performance

In the past 20 years, a clear change in the use of strategic planning activities was observed, as shown in Table 7 (see Appendix) and Figure 13. There was a clear and significant increase in the average percentage of "formally used" planning activities and a clear and significant decrease in the average percentage of "not used" activities. This finding is illustrated in Table 8. Overall, it appears that Michigan agribusiness firms are taking a more comprehensive approach in their strategic planning activities.

In 2012, five of the thirteen planning activities were found to have a significant positive covariance with firm performance (i.e. pretax profit) or the firms' level of satisfaction with performance. Even more interestingly, three of these five tools were also found to positively relate with performance (i.e. pretax profit) in 1992. This finding highlights the importance of these activities for the success of agribusiness firms as well as the robustness of these strategic planning tools over time. The three strategic planning activities were: (1) *Mission and objective statements*; (2) *External analysis of the industry characteristics and conditions*; and (3) *Annual operational and capital budgets and projections of sales and/or cash flows*. These findings further provide evidence that strategic planning activities have a positive effect on agribusiness performance. However, the fact that only some of the activities were found to be significantly related seems to suggest that not all planning activities are necessary for success, and that this may be especially true for an industry as diverse as agribusiness.

The results of a cluster analysis, which grouped firms according to their strategic planning intensity, also were mixed with respect to identifying a planning-performance relationship. No identifiable relationship was evident in 1992; however, in 2012 a positive and significant covariance was found between performance and the level of planning undertaken by firms. These findings support our hypothesis that performance is positively correlated with strategic planning but only for the later period. Given these mixed results, Michigan agribusiness firms are advised to make mission and objective statements, external analysis and annual operating and capital budgeting practices a regular part of their strategic planning programs while also continuing to use and explore other various strategic planning activities.

As mentioned previously, the existence of planning-performance relationship has been the center of debate in the past. The fact that a positive relationship was found in one period and not another appears to be consistent with other studies such as Boyd (1991) that found this relationship to be not always present and sometimes negative. What this study does show is that for this particular industry at a specific time, strategic planning and firm success have a positive relationship. Furthermore, together with the changes in demographics illustrated earlier, these results tell the story of an industry that has seen the usage of planning activities increase over the last 20 years and, at the same time, realized performance improvements and higher levels of performance satisfaction.

Although this study presents a unique examination of agribusiness strategic planning activity over time, it is limited in several ways. One particular limitation of this study is that given the small sample size in 2012, we are not able to provide a more comprehensive analysis of the drivers of the strategic planning-performance relationship. For example, we are not able to parse out whether the increased usage of strategic planning activities or the positive effect of strategic planning on performance in 2012 is a result of the increased size of Michigan agribusiness firms (and the resulting increased internal complexity of their activities) or due to the dramatic external changes that have occurred in the agribusiness sector over the past twenty years. It would also have been particularly informative to be able to more directly compare firms across the two sample periods. This might help us determine whether the importance of strategic planning activities is different or has changed over time for different firm criteria such as firm size, products or services offered, or level of vertical integration. The authors acknowledge that this is an important area of study and encourage future research on this issue.

Readers are also cautioned to interpret the performance relationships presented in this study in light of the potential for the results to reflect common method bias. While efforts were taken to remedy and identify any potential common method bias problems, we acknowledge this is a potential issue in survey research when data for all variables are acquired from a single source (Chang et al. 2010, Podsakoff et al. 2003). Although often difficult for relatively small private firms, future research should attempt to collect data from multiple respondents in the same the agribusiness firm or industry experts in order to obtain separate data sources for important independent and dependent variables (i.e. firm demographics, strategic planning activities, and firm performance) where possible.

Finally, the analysis in this study is limited to Michigan agribusiness firms and the findings of this study may not be valid for other contexts. Agribusiness managers and scholars are encouraged to compare the characteristics of the Michigan agribusiness sector with the agribusiness sectors in their regions and to judge whether the same findings would be relevant. Furthermore, future research should look to replicate this study in our regions, both at a national and an international level.

Conclusions

Significant changes have taken place in the global agribusiness industry over the past 20 years. The availability of data from a 1992 survey of Michigan agribusiness strategic planning practices offers us a unique opportunity to explore how the strategic behavior of agribusiness firms have changed over time as well. Using a 2012 follow-up survey of the same sample population, the purpose of our study was to explore how the strategic planning behavior of firms in the Michigan agribusiness sector had changed over the 20-year period. The results illustrate several important findings for agribusiness managers and scholars.

This study highlights that the number of Michigan agribusiness firms has declined significantly from 1992 potentially reflecting a period of consolidation in the industry. Furthermore, compared to their 1992 counterparts, Michigan agribusiness firms are larger, more profitable, and engage in a greater level of strategic planning activity in 2012. This study also finds that the diversity of Michigan agribusiness firms has also increased over the past twenty years with a

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relatively equal distribution of firms across various size and business organization categories. As in 1992, Michigan agribusiness firms are optimistic about their performance over the next five years and look to implement a range of growth activities during this period. Finally, we find support that strategic planning activities are positively related to firm performance. Three particular strategic planning activities were found to have a robust positive relationship with firm performance in 1992 and 2012, namely (1) *a statement of mission and objectives*; (2) an *external analysis of the industry characteristics and conditions*; and (3) an *annual operational and capital budgets with projections of sales and/or cash flows*. Managers of agribusiness firms may want to adopt these strategic management practices if they have not already.

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Appendix

Table 7. Usage of Strategic Planning Activities, 1992 vs. 2012.[11]

Usage of planning activities in the two surveyed years							
Activity	**Factor**	**NO**		**Yes, Informally**		**Yes, Formally**	
		1992	2012	1992	2012	1992	2012
An annual operating and/or capital budget including sales and/or cash flow projections	Short-Range Planning factor	10%	6%	28%	24%	62%	71%
Mission Statement or Statement of specific business objectives	Goals Setting and Review Factor	16%	3%	42%	21%	42%	76%
An environmental management plan		24%	12%	20%	18%	56%	71%
A food safety and/or sustainability management plan		N/A	18%	N/A	6%	N/A	76%
Inclusion of non-management personnel in planning process		18%	24%	59%	45%	23%	30%
A 3 to 5 year general business plan to guide operations including a facilities plan, personnel plan and/or a financial plan	Long-Range Planning Factor	15%	12%	44%	32%	41%	56%
A management succession plan	Strategic Analysis Factor	N/A	9%	N/A	59%	N/A	32%
A personnel management plan		39%	12%	45%	50%	17%	38%
Review internal strengths and weaknesses		25%	9%	52%	41%	23%	50%
Review opportunities/threats		26%	12%	55%	47%	20%	41%
analysis of competitors' strengths and weaknesses		24%	18%	58%	56%	18%	26%
An analysis of business conditions including trade area information, legal and regulatory changes, and/or industry trends		12%	12%	60%	53%	28%	35%
An annual analysis of firm performance by department, product line, and/or employee performance		7%	9%	39%	21%	54%	71%

Note. 1992: N= 192 to 199; 2012: N= 33 to 34.

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[11] The definitions given for each type of usage in the surveys were as follows: "Yes, Informally" means that you regularly engage in the activity but rather than produce a formal, written document you keep the ideas either in your mind or in some informal written form. Yes, Formally" means that you regularly engage in the activity and you produce a formal document to guide management action. In order to compare the responses in the two surveyed years, the data from figure 6 was condensed to the format in the 2012 survey.

Table 9. Relationship Between Strategic Planning Activity and Pretax Profit,1992.

Variable	Covariance	p-value
A mission statement	0.06	0.96
Statement of specific business objectives	0.13	0.04**
A 3 to 5 year general plan to guide operations	0.01	0.44
A 3 to 5 year facilities plan	0.03	0.07*
A 3 to 5 years personnel plan	0.08	0.80
A 3 to 5 years financial plan	-0.05	0.57
An annual operating budget	0.01	0.46
An annual capital budget	0.06	0.37
Monthly cash flow projections for the coming year	-0.04	0.25
An annual sales plan	0.07	<0.01***
An annual plan for the use and maintain of facilities	0.05	0.77
An annual plan for personnel replacements and promotions	0.09	0.21
An annual budget for each department	0.03	0.74
A review of internal strengths and weaknesses	0.17	0.05**
A review of opportunities and threats from outside of the firm	-0.02	0.50
An analysis of competitors' strengths and weaknesses	0.03	0.04**
An analysis of trade area data to evaluate market potential	0.11	0.81
An analysis of business conditions at local or state levels	0.03	0.22
Analysis of industry trends	0.08	<0.01***
An annual analysis of each department's performance	0.04	0.86
An annual analysis of each product line's performance	0.01	0.30
An annual evaluation of each employee's performance	0.18	0.06*
An environmental disaster plan	0.05	0.13
Input from non-management employees in planning	0.01	0.09*
A wage and salary plan	0.13	0.36

Note. *=10% significance level. **= 5% significance level. ***=1% significance level.

Table 10. Relationship Between Strategic Planning Activity and Pretax Profit, 2012.

Planning activities correlated with profit	Covariance	p-value
Mission Statement or Statement of specific business objectives	0.15	0.03**
A 3 to five year general business plan to guide operations including a facilities plan, personnel plan and/or financial plan	0.14	0.10
An annual operating and/or capital budget including sales and/or cash flow projections	-0.02	0.98
A review of its internal strengths and weaknesses	0.07	0.73
A review of opportunities and threats from outside the firm	0.14	0.35
An analysis if competitors' strengths and weaknesses	0.19	0.10
An analysis of business conditions including trade area information, legal and regulatory changes, and/or industry trends	0.21	0.01**
An analysis of firm performance by department, product line, and/or employee performance	0.10	0.64
A food safety and sustainability management plan	-0.04	0.35
An environmental management plan	0.01	0.12
A management succession plan	0.12	0.20
Non-management personnel included in the planning process	0.12	0.50

Note. **=5% significance level.

Table 11. Relationship Between Strategic Planning Activity and Overall Performance Satisfaction, 2012.

Planning activities correlated with overall performance satisfaction	Covariance	p-value
Mission Statement or Statement of specific business objectives	0.26	<0.01***
A 3 to five year general business plan to guide operations including a facilities plan, personnel plan and/or financial plan	0.20	0.46
An annual operating and/or capital budget including sales and/or cash flow projections	0.27	0.07*
A review of its internal strengths and weaknesses	0.24	0.42
A review of opportunities and threats from outside the firm	0.18	0.30
An analysis if competitors' strengths and weaknesses	0.17	0.15
An analysis of business conditions including trade area information, legal and regulatory changes, and/or industry trends	0.12	0.05**
An analysis of firm performance by department, product line, and/or employee performance	0.32	0.01**
A food safety and sustainability management plan	0.31	0.18
An environmental management plan	0.27	0.16
A management succession plan	0.09	0.75
Non-management personnel included in the planning process	0.19	0.70

Note. *= 10% significance level. **= 5% significance level. ***= 1% significance level

Next Steps: The Evolution of CSR at Novus International, Inc.

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Abstract

It is October 2011 and the seven billionth person has just been born. Novus International, Inc., a global leader of "Health through Nutrition" solutions for livestock, pets, and people, has just released its Sustainability Report. The Report details Novus's many investments towards increased sustainability in its operations. Recognizing that innovation and sustainability are inextricably connected, the CEO reviews Novus's strengths to set a new sustainability strategy. What can Novus do differently to increase the sustainability of the company and all of its stakeholders? How can Novus best contribute to solving the challenges at the nexus of company owners, society and the environment?

Keywords: sustainability, Corporate Social Responsibility, innovation, business integrity, Creating Shared Value, Novus International, Inc.

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Introduction

On the 31ˢᵗ of October 2011, Damica May Camacho was born in Manila's Dr. Jose Fabella Memorial Hospital weighing just over five pounds. According to the Associated Press, she was welcomed into the world by flashing cameras, official speeches, and a "gift certificate for free shoes" (The Associated Press, 2011) Top United Nations (UN) officials presented the child and her mother with a small cake. Damica is one of many children born on that day that was chosen to symbolically represent planet Earth's seven billionth human inhabitant. According to UN, the next time such a milestone is expected in 2025, when the world's population will reach eight billion and in 2083, when it will be 10 billion (United Nations, 2011). This rate of growth is alarming given that it took until 1804 for the world's population to reach one billion, and then another century to reach two billion in 1927 (United Nations, 2011).

Against the backdrop of this breaking news, Thad Simons, Jr., President and CEO of Novus International, Inc., is reflecting on the company's recently published Sustainability Report entitled *Innovation with Integrity* as he meets with his executive team at the global headquarters in St. Charles, Missouri, USA.

"Reporting and accountability are key elements of our strategy for sustainable growth, so we are very pleased to achieve the Global Reporting Initiative (GRI) Level B-Check with our third annual sustainability report," notes Thad Simons. "Significant progress is being made toward our Mission of sustainably meeting the growing global needs for nutrition and health."

This success reflects the constant innovation in balancing social, environmental, and economic (S.E.E.) sustainability that is the hallmark of companies that will stand the test of time. The first innovation challenge is in the research and development of products that meet nutritional and health requirements from population growth pressures. Product and program innovation is the forte of Novus. With solid scientific roots, Novus has brought to market more than 100 new products over the last decade. The second and more elusive innovation challenge relates to the company's overall business approach to sustainability.

Thad and his executive team, along with Novus's first Global Chief Sustainability Officer, must build out a new strategy to engrain sustainability in business operations while achieving more rigorous sustainability goals – internally across the global network of offices, and externally throughout the diverse markets where Novus does business. The model must be consistent with the company's vision, mission, core values and limited resources. Called "Next Steps", the transition strategy should address several questions. First, how does the current "operations integration" model of sustainability compare to the "separate foundation" model of sustainability when it comes to impactful? Second, how can the company streamline its broad portfolio of sustainability activities in the long term? The strategy must anticipate the challenges of food, energy, water, air quality, income generation and community that Damica May Camacho - the world's seventh billion inhabitant – and her children will face in the coming decades.

Welcome to Novus

To understand the challenge faced by Thad and his executive team, one needs to look at the history and current structure of the company. Novus International, Inc. (hereafter referred to as Novus) derives its name from a Latin word meaning new, unusual, extraordinary, or novel. Novus, founded in 1991, builds on its origins dating back to the 1950s when St. Louis-based Monsanto Company launched an Animal Health Division, which focused on the production of feed additives. In 1991, Monsanto sold this division to Mitsui & Co. Ltd. (65%) and Nippon Soda Co. Ltd., (35%). Novus's founding leadership team envisioned a strategy of sustainable health through nutrition as the mainstay for the new company. Twenty years ago, articulating Novus's Vision "to help to feed the world affordable, wholesome food" was seen as bold and revolutionary. At that time, Novus was a two-product, single-industry, business-to-business company. Mitsui Co. Ltd. and Nippon Soda Co., Ltd. continue to be the sole owners of Novus. A brief history of Novus, highlighting some of the company's Sustainability initiatives, is outlined in Table 1.

Novus's products and programs serve eight market segments, namely poultry, pork, beef, dairy, aquaculture, feed quality, pets and humans. Backed by a solid base of scientific research and technological innovation, Novus has brought to market more than 100 new products over the past decade. Novus Nutrition Brands (NNB) expands science-based health through nutrition to equine and companion animal markets through Arenus and to people through Stratum Nutrition, which focuses on improving the quality of life through food and supplement innovation. Stratum offers a portfolio of specialty and functional ingredients for dietary supplements, foods and beverages.

"Novus Nutrition Brands will continue targeting nutrition and health for companion animals and humans through innovative science. We look forward to delivering high-quality, value-added products and technologies that help in optimizing health, performance, and longevity aspects of individual species, whether it is for your companion animal or you." Jeremy Moore, President, NNB (2010 Sustainability Report).

Novus's global headquarters is located in St. Charles, Missouri, USA. The company's global footprint is based on over 800 employees, serving more than 3,000 customers worldwide in 100 countries. A reflection of its commitment to sustainability, Novus's global headquarters is certified Platinum LEED (Leadership in Energy and Environmental Design), the highest designation offered by the United States Green Building Council (AgWired 2011), with a 3-Star SITES rating for sustainable landscape design. The vision, mission and core values of Novus are shown in Figure 1.

Table 1. Brief history of Novus highlighting CRS

Year	Events
Early 1950's	Monsanto begins metabolism studies and the development of methionine hydroxy analogue (MHA feed supplement) production begins at Monsanto's Everett, Massachusetts location.
1954	MHA project moves to Monsanto's St. Louis research centre
1959	SANTOQUIN is the first feed additive approved by the FDA.
1979	ALIMET is introduced. First sale of ALIMET feed supplement to ConAgra Foods in El Dorado, Arkansas.
1991	Mitsui & Co. and Nippon Soda acquire Monsanto's MHA and ALIMET businesses and form Novus International, Inc.
1992	Novus enters into a contractual joint venture with Monsanto for SANTOQUIN feed preservative.
1993	Novus Research Centre completed and occupied at Missouri Research Park in St. Charles, Missouri. Novus begins managing customer inventories and automated order for bulk ALIMET and SANTOQUIN customers.
1996	Novus launches ALIMET for dairy.
2003	Novus completes purchase of SANTOQUIN and AGRADO from Solutia. Novus launches aquaculture business.
2007	Novus hosts the first Sustainability Roundtable discussion in St. Louis, Missouri. Arenus, a division of Novus Nutrition Brands, LLC (a Novus International Company) is formed. Arenus is dedicated to producing equine nutrition products as well as nutrition products for the canine market.
2008	Novus completes global headquarters in Missouri Research Park, St. Charles, Missouri. Novus publishes First Sustainability Report.
2009	Global Headquarters awarded LEED Platinum Certification. New packaging improvements to support Safe Feed/Safe Food Initiatives. Novus augments Novus Graduate Scholars program initiated in China, enters 5-year agreement with the African Women in Agricultural Research and Development (AWARD) Program as the first, private sector partner. Novus initiates "add-on" technical philanthropy to the East Africa Dairy Development Program (EADD) to address the farmer cooperative challenges of calf weaning. Stratum Nutrition, a division of Novus Nutrition Brands, is launched. Stratum focuses on human nutrition through functional and specialty ingredients. Novus entered into a multi-sector partnership in Alagoas, Brazil. The project is designed to offer small-scale poultry farmers a way to produce more affordable protein.
2010	Novus joins The Sustainable Sites Initiative to promote sustainable land development and management practices. As a member of the International Egg Commission (IEC), Novus celebrates World Egg Day in October several geographies by partnering with local industry organizations, sharing production and nutrition knowledge via the EggTruth.com website. Annual "Science in Action Day" initiated. Undergraduate level students from Missouri universities, the FFA program and 4-H Organization participate.
2011	Novus launches Heifer International project in Vietnam. Novus's AIMS program, which reduces the carbon footprint in the animal feed value-chain, wins the first-ever Information Technology Innovation Award from the American Feed Industry Association (AFIA). Novus's 3rd Sustainability Report, *Innovation with Integrity*, is awarded GRI Level B-check for the first time. Novus International Launches C.O.W.S. Program to Help Producers Enhance Dairy Herd Well-Being
2012	SITES™ Certifies Novus International Campus, One Of The First Pilot Projects To Be Certified, The First With A 3-Star Rating

Source. Novus 2012; Wikipedia 2012

> ## Vision, Mission and Core Values of Novus
>
> **Vision:** *To help feed the world affordable, wholesome food and achieve a higher quality of life.*
>
> More food will need to be produced over the next 50 years than has been produced during the past 10,000 years combined. Satisfying this increasing food demand by the world's population without straining, depleting or polluting the earth's natural resources will continue to be a complex challenge. It will require innovative solutions in nutrition, combined with a solid commitment to global sustainability.
>
> **Mission:** *Make a clear difference in sustainably meeting the growing global need for nutrition and health.*
>
> Novus's science-based, core expertise in nutrition technologies and experience in health and nutritional research empower Novus to move toward this mission by driving Innovation with Integrity to achieve health through nutrition for populations around the world.
>
> **Core Values**
> - Excellence from all employees
> - Providing products with demonstrable value
> - Long-term customer satisfaction
> - Protecting our employees, the public and the environment
> - Act with integrity
>
> Novus's Core Values bring the Company's Vision and Mission to life, defining how Novus employees conduct business with each other, with customers and with all stakeholders. The Core Values guide all business strategies, plans and objectives, and shape our organization's culture.

Figure 1. Vision, Mission and Core Values of Novus
Source. Novus 2011

Understanding Corporate Social Responsibility (CSR)

To develop unique solutions that meet the needs of company owners, society and the environment, Thad and his executive team look outside Novus to build their understanding of the ever-evolving concept of CSR. This section gives a brief history on the evolution of CSR, followed by a highlight of the controversial aspects aspects and a look at CSR in practice.

Evolution of CSR

Although the phrase Corporate Social Responsibility (and other, related, terms such as sustainability) have become household phrases only in the last decade, academic thinking and research on the topic goes back to 1953, when Howard Bowen published his ground-breaking work *Social Responsibilities of a Businessman* (Bowen 1953). In it the author defines these responsibilities as "…the obligations of businessmen to pursue those policies, to make those

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decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society." (Bowen 1953).

The next influential model of CSR that has held up for decades and has also been supported empirically was put forth by Carroll in 1979 (Visser 2006). Often represented as a pyramid, the concept identifies four key dimensions to CSR - economic, legal, ethical, and philanthropic. The order of the four elements in the pyramid is not random; according to Carroll, they represent the historical evolution of CSR, starting initially with an overarching concern for making profit, which was complemented, over time, with concerns about legal then ethical business practices. The fourth element has been added more recently and it reflects movement towards the idea that above and beyond legal and ethical business practices, businesses have a moral obligation to be good corporate citizens and concern themselves with pressing world problems beyond direct profit. Note that while CSR subsumes parts of sustainability; sustainability is often beyond CSR. Sustainability efforts should go beyond telling outsiders that a company is doing a good job for the society and the environment. Sustainability should provide ways for firms to cut waste and improve efficiencies resulting in smaller environmental or societal footprint (Hawken et al. 1999).

Figure 1. CSR Pyramid (Carroll 1991).

Although Carroll's concept has been influential and empirically tested, in recent years it has been replaced by concepts such as *sustainability* and *Triple Bottom Line (TBL),* which measure the concept along social, environmental, and economic dimensions (Hansford et al. 2003; Detre and Gunderson 2011). Importantly, they both incorporate a concern for the environment, reflecting the coming together of business and society to address the increasing awareness of the "top of mind" challenges of limited natural resources and burgeoning demand associated with rapid, global population growth. In short, the idea of the Triple Bottom Line (TBL) is that businesses should operate in ways that have no negative impact on people, the planet, and the company's profits (Elkington 1999). Importantly, tools, such as the Dow Jones Sustainability Index, which is widely used to build a ranking of companies based on their CSR or sustainability practices, are

also built around the three dimensions of societal, environment, and economic impacts (Detre and Gunderson 2011).

The continued evolution of CSR as a competitive business strategy has led to the perspective that approaching the tensions between people, profit and planet from the lens of "shared value" is a more robust framework than the previous ones. Porter and Kramer's 2011 article "Creating Shared Value" (CSV) proposes the idea that the strong link between societal and economic progress is the key to "unleash(ing) the next wave of global growth" (Porter and Kramer 2011). Figure 2 below compares the CSR and CSV approaches. While the two frameworks are based on the same "doing well by doing good" CSR is based on responsibility, whereas CSV is about creating value. Communities and companies, together, can better innovate solutions to natural resource limitations that transcend country borders. By reconceiving products and markets, redefining productivity in the value-chain and enabling local cluster development, the synergy opportunities for innovation and growth that benefit companies and societies are reachable (Porter and Kramer 2011). The CSV approach recognizes and capitalizes the links between a company's competitiveness and social or environmental goals.
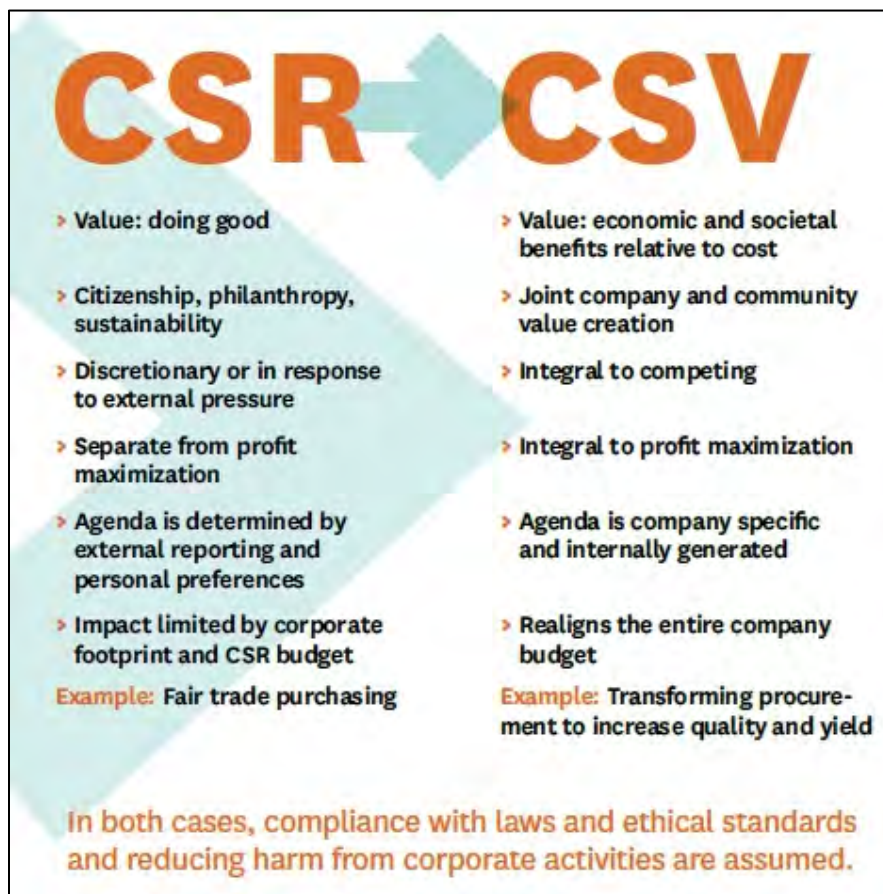

Figure 2. From Corporate Social Responsibility to Creating Shared Value
Source. Porter and Cramer 2011.

On-Going Debate on CSR

Researchers differ in their assessment as to whether CSR or its derivations are desirable, sustainable or, indeed, responsible business practices. Writing about Environmental Social Responsibility (ESR), authors such as Siegel contend that ESR should be practiced only to the extent that it promotes the company's business objectives (the generation of profits); in other words, while Siegel is not opposed to CSR, he feels that it should be considered just like any other strategic initiative. He writes:

> An ESR initiative should be viewed as an investment decision, and thus should be evaluated in a rational, calculative fashion. Financial and human resources allocated to ESR have alternative uses, and managers must be mindful of the "returns" on these activities. Managers should not adopt green management practices because of societal pressure alone, but rather because it advances their organization's strategic goals (Siegler 2009,14).

Representing the opposite viewpoint, Marcus and Fremeth (2009) argue that "Green Management Matters Regardless," claiming that "Regardless of whether it pays, society expects management to be green. If one accepts an absolute imperative that management must strive toward greening, then the question of whether it pays or not is not that relevant" (Marcus and Fremeth 2009, 24).

While these two camps hold contradictory views, there is broad consensus in the literature that, despite the relatively large number of articles written about CSR and its various forms and derivations, academics and practitioners are yet to develop a clear understanding of how CSR practices impact on the success and profitability of the company, especially in the long run. Some evidence exist that certain consumers are sensitive to the social positioning of products (Auger et al. 2008; Devinney et al. 2006); however, it is not clear how sustainable these effects are (Devinney 2009).

Further, even a brief foray into the CSR literature reveals a multitude of definitions; in this paper alone we have seen CSR, TBL, sustainability, ESR, among others. One gets a feeling that coming up with new definitions is part and parcel of the strategy that companies use to differentiate themselves. But such multitude of terms not only results in a lack of clarity, it also stands in the way of objective and rigorous research. As Devinney puts it, "until there is a clear understanding and articulation of the domain and subdomains of CSR, few fruitful generalizable conclusions will be possible, as every result will be contingent on the corporate and social context and the relevant "responsibility" under investigation" (Devinney 2009, 54).

Closer to the consumer, appreciation of CSR and its influence on purchasing decisions have been marred by a barrage of misleading or deceptive environmental claims - also known as "greenwashing". As consumer awareness of environmental and social causes began to increase in the 1970s, advertising companies saw the potential to capture consumers who sought to improve the environment through their purchases. This resulted in opportunistic companies spending more resources on advertising their "greenness" than on environmentally sound practices (Naish 2008). The unintended consequence of increased greenwashing is that

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consumers, especially in western nations, are becoming either numb or skeptical to all claims of CSR including sincere efforts of legitimate corporate environmental accomplishments. A more damaging outcome is that successful greenwashing, especially by big corporations, can result in complacency by consumers and regulators (Davis 1992).

CSR in Practice

Precisely because of the wide-ranging definitions, the actual practices of CSR (and its various forms) have been wide-ranging. They include programs and policies that promote the health, wellness and community links of the employees complemented by similar concerns for members of the community(ies) where they operate. Initiatives may include workplace safety programs to supporting charitable causes in the communities where the business operates, building on the recognition that the business is an integral part of the community and the well-being of the community is of interest to the business. Incorporating concern for the environment, CSR programs have included environmental impact assessments and product innovation in response to a recognized environmental problem (an often cited example is that of hybrid cars).

Although concepts of CSR and sustainability continue to evolve, they share certain common characteristics. One is that today CSR concerns itself with stakeholders – as opposed to the earlier concern with only shareholders, and consequently, profits. Stakeholders, broadly defined, include shareholders, owners, employees, supply-chain partners, competitors, customers, and community members, and anyone else that may be impacted by the business's activities (Post, Lawrence, and Weber, 2002). Further, as we have seen above, the various elements of sustainability, such as the intertwined concern for the environment, the people, and the profits, can be in constant tension. Over emphasizing one may jeopardize the other, in the process jeopardizing the survival of the business itself. Therefore the task of creating a sustainable business is to seek and maintain a delicate balance among the three elements.

While in smaller companies CSR may be a fairly simple set of activities, (e.g., a small, local company may support the local school in some form) CSR at larger, global companies such as Novus is multi-faceted and dynamic. In general, one way to structure the discussion about CSR activities is to differentiate whether they address internal or external needs of the company. In other words, activities that are carried out principally by or for employees characterize the internal CSR program. These activities include employee health and wellness programs and community and disaster charity drives. In contrast, external programs focus on the world beyond the company, and include programs that link technology innovation with community needs through education, health care, and the arts that can contribute to green product innovation. Nestlé's charitable giving, which focuses solely on the study of nutrition problems in the world, (Nestlé Foundation, 2011) is an example of external dimensions to their CSR program that link to the operational goals of Nestlé. What has historically dominated external dimensions of CSR is charitable sponsorship of sporting events, the arts or social causes that are outside the bounds of the company's strategy.

Some companies similar in size to Novus that include a variety of CSR programs in their business models have found it beneficial to separate some of their CSR activities and manage them under a separate entity, most often a corporate (not-for-profit) foundation. Examples of

such foundations set up by multinational agribusiness firms include Syngenta Foundation for Sustainable Agriculture, The Coca Cola Foundation, and Kraft Foods Foundation. This organization structure separates operational risk/return from the longer-term risk/return that characterizes CSR investments.   This arrangement often minimizes conflicts of interest (of perceptions thereof) between charitable work and commercial operations.   Consequently, such foundations have more opportunities for collaboration with other charitable organizations and public entities that share the same goals.   Tax law in the U.S. and a few other countries may provide distinct advantages building this organizational firewall between for-profit activities and Foundation based charitable work, as the later is tax exempt. There are some serious drawbacks to the separate foundation model.   First, there is limited scope for employee engagement in CSR activities.   Legal restrictions require a firewall between the activities of the corporation and the not-for-profit entity in order to retain the tax except status.   Second, there are more stringent reporting guidelines for such Foundations that may be costly to maintain.   Some companies also fear the loss of control over the foundation's activities as these are legally separate entities from the company. Last and perhaps most importantly, the foundation model can result in smaller and volatile budget allocations that are closely tied to company performance.

Sustainability at Novus

Sustainability has been at the heart of Novus's Mission from its inception more than twenty years ago.   The company's forward-looking mission statement reads, "Make a clear difference in sustainably meeting the growing global need for nutrition and health."

Novus's current sustainability program has evolved, almost as a parallel to the growth of the business. As such, the initial phase focused on strengthening the company's license to operate, managing risk and providing a strong value proposition to Novus's customers.   The next phase saw the company actively improve its "sustainability performance," focusing on innovating agricultural practices to deliver improved animal and human well-being, while reducing environmental impact and creating economic stability for its customers, and its customers' customers.   The next layer of sustainability focus linked recruiting and retaining a high-quality workforce with employee programs, such as no-cost access to health and wellness programs and community engagement.

Sustainability at Novus today is evolving into the third phase, where the company recognizes that sustainability is a business differentiator and accepted as critical to achieving business growth through a strong value contribution, enhanced reputation, deepening relationships and underpinning innovation in existing and new markets.   Having adopted the approach that all stakeholders are important to the long-term success of the company, Novus "believe[s] that positive value for all stakeholders is created when the Company progresses with economic, social, and environmental objectives in alignment.   The synergistic result is *Innovation with Integrity* and a continuation to improving the quality of life for people today and tomorrow."
The 2010 Sustainability Report identifies a set of sustainability issues for Novus stakeholders, which the company identified through extensive engagement with stakeholders and through an internal evaluation process.   The three key issues identified are "Increasing global food availability," "Supporting food production efficiency and food safety," and "Increasing global

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food capabilities through science and education." The three main issues all tie back to Novus's mission to provide nutritious and affordable animal and human food products for the world's growing population, reflecting the strong commitment to building on the S.E.E. Sustainability foundation.

Among the second-tier issues there is still a focus on food, for example, through "supporting healthy food consumption" and "making food affordable" by making products that help farmers reduce their costs. Another set of issues focuses on mitigating the environmental impact of operations. This is especially important for the livestock production value-chain. A third set of issues illustrates Novus's investment in people – both inside and outside the company. Beyond the rigorous programs in employee health and safety, as well as other internal programs that aim to create a well-trained, motivated and engaged workforce, Novus also invests considerable time in working with its suppliers. Further, the company has invested significant resources into education, in a variety of programs and formats, ranging from scholarships to internships for university students from several countries. Finally, partnership with regional, national and international non-profit enterprises is instrumental to Novus's engagement with farming communities.

This section has sought to summarize and highlight select important elements of Novus's sustainability program. Sustainability at Novus has deep roots and is multi-faceted:
"Sustainability at Novus is more than a set of projects. It's part of the Novus DNA, built right into the heart of our core business strategy and culture and in the hearts and minds of Novus people. Everything we do at Novus starts with sustainability, because we believe that is the only viable way to do business. We believe this is as economically sounds as it is socially responsible".

These words aptly capture the company's vision with regard to sustainability; at the same time, they also highlight the challenge that promoting sustainability at a complex organization such as Novus presents.

Sustainability Measuring and Reporting

In a world where greenwashing is prevalent, Thad and his executive team recognize the importance of transparent reporting. Novus adheres to the guidelines of the Global Reporting Initiative (GRI) Reporting Framework, one of the most widely used standards for sustainability reporting in the world.

Although sustainability appears in marketing materials for an increasing and broader range of companies, sustainability reporting is limited to a few organizations. The challenge for these organizations is choosing which indicators or frameworks to base their sustainability assessment on. Some reporting guidelines focus solely on the environment, namely: Ecological Footprint, Environmental Performance Index and Environmental Sustainability Index. However, measurement and reporting over the years has evolved from a single focus on the environment to integrating the three pillars of sustainability.

The International Organization for Standards, (ISO) which provides guidance for socially responsible business behavior, is more likely to be adopted by organizations that focus on CSR. National indices also exist, with countries developing measurements that are specific to their industries and focus on their own environmental, social and economic concerns. For example, Canada's Sustainability Indicator and The Swiss Monitoring System for Sustainable Development. In 1999 the UK published a paper entitled "A Better Quality of Life" with its own set of indicators.

The advent of the Global Reporting Initiative (GRI) in 2006 offered some cohesion in the way organizations address sustainability reporting. GRI currently provides the most comprehensive and widely used reporting index with over 700 companies using this framework as a guide. This framework is effective for companies adopting TBL as their sustainability tool. The 2010 sustainability report list provided by GRI lists approximately 739 countries from around the world within various industries producing reports in 2010. GRI appears to be achieving consistency across company reports, allowing for improved monitoring of sustainability and has also given organizations the opportunity to crystallize the requirements as stated in the Brundtland Report (United Nations 1987).

Companies such as IBM, ING Group, Novus International, Inc., Kellogg, Nestle, Barclays, Tyson Foods, Monsanto and many others now produce sustainability reports utilizing the GRI framework. These companies have achieved GRI level B rating and above, demonstrating high quality sustainability reporting, in areas of economic, environmental, human rights, labour, society and product responsibility performance as presented by GRI.

The Future of Sustainability at Novus – "Next Steps"

Although Thad Simons recognizes that Novus's growth to a multi-product and diverse geographic portfolio is effective in moving towards "helping to feed the world, affordable, wholesome food", the birth of the seven billionth person and the anticipated dramatic increases in the world population drives him to examine the past as input to setting the future of Sustainability at Novus. Very different from the early days of Novus more than 20 years ago, there is rapid, real-time communication via the internet and mobile phones. The feedback loop of market signals from geographically dispersed societies is much quicker.

As Thad closes the recently published Sustainability Report entitled *Innovation with Integrity* he knows that Novus must continue to innovate not only in its products but also in its approach to balancing social, environmental, and economic sustainability. The new model for sustainability – Next Steps – must be consistent with the company's vision, mission, core values and limited resources. All options are on the table. The team must evaluate the suitability of the current "operations integration" model of sustainability against to the "separate foundation" model of sustainability. Is the "creating shared value" approach within reach and what are the implications for Novus's stakeholder business model? How can the company streamline its broad portfolio of sustainability activities in the long term to ensure a bright future not only the current generation of stakeholders but for Damica May Camacho's children.

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Corporate Social Responsibility in Swedish Food Retail: The Case of Tiger Shrimp

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Abstract

Food retailers are particularly exposed to ethical scrutiny given their central position in the supply chain. One way for retailers to differentiate is by taking responsibility for what is being offered to the consumers, referred to as category management. This case focuses on one food product, the tiger shrimp.

Corporate Social Responsibility offers an extended perspective of values and criteria for evaluating organizational performance, which is founded in economic, social and environmental aspects of corporate conduct. The case offers a unique perspective on how a traditional company rationalizes choices that go beyond maximizing pure profit objectives. Social media is a new mechanism being utilized for accountability and governance of stakeholder relationships.

Keywords: category management, ethical sourcing, fish policy, social media, stakeholder, supply chain

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Introduction

Linda, 42 years old, is the Head of Corporate Social Responsibility (CSR) at Axfood, the second largest food retailer in Sweden (see Appendix 1 for background on Axfood). Linda's main task at Axfood is to communicate and facilitate dialogue with internal and external stakeholders regarding sustainability issues and to advise Axfood on corporate strategies. She is one of the seven board of directors, which also includes Axford's Chief Executive Officer (CEO) and its Chief Financial Officer (CFO).

Linda is passionate about driving ethical issues and describes herself as an activist. This has led to her interest in addressing whether Axfood should be selling tiger shrimp. Tiger shrimp, a popular shellfish item and has become an issue at Axfood's management board meetings. Even though sustainability issues in aquaculture production are of general concern, the case of tiger shrimp has provoked a desire to create an official policy on sourcing and marketing of fish and seafood for the company. Given the increased interest and debate about this product in Sweden, Linda was asked to investigate and present a recommendation on how to handle this issue.

Corporate Social Responsibility at Axfood

In Sweden, the view that corporations are responsible and accountable for social and environmental issues is not new, but public interest and explicit corporate communication regarding these issues has grown greatly over the last decade. Axfood has responded by developing an overall Code of Conduct (CoC), which states that it will recognize the implications of environmental and social issues when making decisions about products it carries and its corporate conduct. In practice, such ambitions are challenging to implement, especially when there is a direct trade-off between profits and ethical conduct.

As a food retailer, Axfood is in direct contact with consumers and also has the power to influence supply chains on what and how food items are produced. Further, food retailers can choose what to stock and how to educate consumers in stores about lifestyle food-related choices, including health and environmental aspects or locally-produced products. Yet, food retailers must go beyond their product range to attract consumers, given that the industry is highly competitive. This is why branding, communication and differentiation strategies are important.

Linda Turns to Social Media

Linda has recently engaged in social media activities as a new way of managing stakeholder relationships. Social media is thought to carry strong political power, empowering consumers as well as 'democratizing' internet content. From a corporate perspective, it is described as one of the most important mechanisms for accountability in the 21st century. This development was driven by globalization in combination with technological advancements (smart phones, internet, etc.), which has led to a revolution in how information is created, shared and communicated. Social media increases transparency and credibility, by enabling an instant dialogue with a wide range of internal and external stakeholders. Having a social media presence also acts as a risk or

crisis management strategy, as stakeholders can 'voice' their opinion, which is crucial in fostering 'loyalty' and preventing 'exit'.

Linda came across a large number of comments regarding 'tiger shrimp' on diverse blogs and internet forums as she explored Facebook, Twitter and Youtube. It seems that tiger shrimp receives a lot of traditional and social media attention, locally and internationally, which is mainly driven by a diverse range of consumer interest and activist groups. For example, one video pronounced the tiger shrimp cultivation was 'one of the world's worst environmental hazards' (http://www.youtube.com/watch?v=kw0tkYK7oEM).[1]

During her investigation, Linda learned that their two main competitors, ICA and KF-Coop, have recently implemented a Fish Policy, outling their approach to offering of fish and shellfish. ICA decided to remove tiger shrimp from their centrally controlled wholesale product range. Linda knew that this did not prevent individual and privately run ICA stores from continuing to sell tiger shrimp. KF-Coop initially declared on their website that it would continue to sell only organic tiger shrimp certified by Naturland.

Linda decided to gather a more holistic view on the issue. She contacted several consumer groups, suppliers, public institutions and other stakeholders that had an interest in the issue. Collecting a number of statements and opinions regarding tiger shrimp, she had the following information on her desk:

- The World Wide Fund for Nature (WWF) is a large and well-respected global environmental organization. WWF operates on a global level with local branches, providing expertise on primarily environmental questions. In the case of aquaculture production, WWF communicates its knowledge through a color scheme, categorizing each fish and seafood product with a green, yellow or red color, which indicates the sustainability level of various fish species, whether they come from a threatened population or there is a concern for production methods. In this way, WWF offers a hands-on guide that helps consumers eat more ethically. WWF Sweden classifies both farmed and wild-caught tiger shrimp as 'red listed', which suggests that consumption should be avoided. Although tiger shrimp is not endangered, they are mostly produced in developing countries in Southeast Asia (80%) and South America (20%). The production and trade of tiger shrimp has caused controversy in terms of social and environmental implications for the developing countries (see discussion below).

- According to the WWF, the labeling of tiger shrimp was problematic because the information available on how the shrimp were produced was inadequate. Therefore, the WWF collaborated with other Non-Governmental Organizations (NGOs), governments, scientists and fishers with the aim of making tiger shrimp fishing, production and consumption more sustainable. The goal of this initiative, referred to as the Aquaculture Shrimp Dialogue (ASD),was to create standards that minimize social and environmental

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[1] Tiger shrimp, also referred to as tropical shrimp (*Caridea),* belonging to the family of prawns. According to the Linnean (1735) taxonomy, prawns were classified as 'insecta' so technically crustacean, such as prawns, were not fish, although treated as such in food retailers like Axfood.

impacts of aquaculture production at the farm level. The WWF, in collaboration with Aquaculture Stewardship Council (ASC) and other stakeholders, are currently in the final stages of the ASD.

- According to environmental activist organizations, the social and environmental effects of commercial aquaculture has a significant impact on the quality of human life and often leads to increased poverty in the communities where tiger shrimp are cultivated. On the environmental side, issues include the decline of biodiversity and water quality, degradation of mangroves (salt-water tolerant trees) and pollution. Furthermore, 'trawling,' a popular method for shrimp fishing, is one of the most damaging and unsustainable fishing methods, given the disproportional amount of by-catch (turtles, sea horses, sharks, etc.). Social aspects encompassed the loss of livelihoods in the producing regions and the potential rise of rural unemployment due to changes towards intensive farming methods.

- At the same time, the WWF reported that tiger shrimp generates income and livelihoods for about 900,000 fishers globally. From a macro-economic perspective, tiger shrimp is an important commodity for export-led growth in the producing countries. Some countries in Southeast Asia use them to earn Foreign Exchange (FX). FX is crucial if they hope to trade with other countries, for example importing commodities that are produced cheaper somewhere else. Therefore, tiger shrimp production is an important source of comparative advantage for the developing countries. Furthermore, even though sustainability of commercial aquaculture production is a concern, there are many positive benefits associated with it such as lower production costs and higher reliability of production, thus allowing for increased fish consumption, which reduces the pressure to overfish.

- One social matter is the use of child labor in agribusiness in developing countries. According to the International Labour Organization (ILO), officially about 21.6 million children are involved in child labor in South Asia. The United States Department of Labor reported that Thailand, which is a significant producer of tiger shrimp, is considered to have the worst child labor conditions including: physical abuse, heavy workloads and lack of safety equipment with pay below minimum wages.

- The Swedish Food & Drinks Retailers Association's (Svensk Dagligvaruhandel) role is to develop principles and professional guidelines for Swedish food retailers. Most of the guidelines are voluntary, yet they aim to harmonize standards regarding such issues as food pricing, the use of chemicals in agriculture, health claims on food products as well as environmental and social standards. Its main objective is to ensure consumers' interests. All three major retailers in Sweden are members of this organization. Given that there are no officially established guidelines in regards to the fish category, the retailers understand that marketing fish and seafood is competitive. This provides each actor with the freedom to choose the products as well as the marketing strategy.

- Naturskyddsföreningen, also known as The Swedish Society for Nature Conservation (SSNC), is a non-profit environmental organization that works to preserve natural assets, both in Sweden and globally. The SSNC is against the sale of tiger shrimp and created an anti-(tiger) shrimp day (16th March) to mobilize consumers to protest against the trade of tiger shrimp irrespective of whether sourced organically or not. The SSNC used social media such as Facebook to organize and inform individuals (https://www.facebook.com /KeepEmOffYourPlate). The SSNC suggested replacing tiger shrimp with crayfish, crabs, oysters, mussels or lobster.

- KRAV and Naturland are two organic certifying organizations and accredited members of International Federation of Organic Agriculture Movements (IFOAM). Their views on the tiger shrimp diverged. Naturland, a German-based association for organic agriculture, certified organic tiger shrimp for markets in various European countries. Naturland certified the organic product itself, which also included social and environmental requirements associated with the production process. KRAV, 'a key player in the organic market in Sweden since 1985', did not certify tiger shrimp due to social issues associated with the production processes. This position was strongly influenced by the Swedish Society for Nature Conservation (SSNC). Naturland's products were sold on the Swedish market through Pandalus, but it has discontinued their sale due to the lobbying efforts of the SSNC and KRAV.

- Pandalus, a wholesaler in the fish and seafood industry, works exclusively on retail and wholesale trade where sales are made at the central level. KRAV did not approve the organic certification of Naturland, which was the only accepted certification for organic aquaculture products sold in Sweden. Pandalus is waiting for the outcome of the Aquaculture Shrimp Dialogue (ASD), while simultaneously working to supply traceable shrimp that meets the criteria that might come out of the dialogue.

- Stockholm Consumer Cooperative Society (Konsumentföreningen Stockholm, KfS) is a consumer cooperative membership organization, which does not operate in the retail business, but partners with KF-Coop. KfS supports KF-Coop's ambition in trying to sell better products, rather than totally removing the products from its stores.

- GlobalGap (previously EurepGAP) is concerned with Good Agricultural Practices (GAP) for retailers and suppliers internationally in order to harmonize different agricultural standards as part of self-regulation. Standards are enforced through the control of internationally recognized independent inspection. The associated Swedish certification body, SMAK AB, provides auditing for a list of certification schemes including KRAV. The standard's aim is to improve food safety, production conditions and address environmental concerns. Through its logo, the certification is theoretically easy to communicate to consumers but the level of consumer awareness is unknown even though the logo is widely used. GlobalGap offers a general aquaculture standard and certification, which is not specifically developed for the tiger shrimp issue.

Linda Recognizes the Extent of the Dilemma

At first Linda thought the decision seemed binary: either Axfood should continue selling tiger shrimp or it should not. Yet, she realized that the decision is more complex because it has political and economic implications for Axfood and other stakeholders. She is aware that some consumers still demand the product and one of Axfood's tasks is to fulfill such consumer wants.

One factor to consider in making the decision was a precedent Axfood had set earlier in respect to a popular disposable BBQ grill (Engångsgrill). Such BBQ grills are ready-to-use charcoal fuelled grills that are used only once. Most disposable BBQ grills sold in Sweden are produced in China. Axfood has started to control production methods in China to meet health and safety standards and ensure child-labor free production. Implementation and enforcement of control are challenging and resource intensive, yet it is considered worthwhile since a substitute for the product is not easy to find and there is no other collective solution that addresses the issues. In this way, Axfood is able to continue selling disposable BBQs with added value while satisfying Swedish consumer needs and wants. But could this be a reasonable and manageable solution for the tiger shrimp case? Perhaps yes, but what about the other products in the fish category? Was it Axfood's responsibility to find special solutions for each product in its entire supply chain? Where are the boundaries? What is the (new) role of business in society? And how would Axfood communicate its decision?

Linda Seeks More Views

Linda decided to have a meeting with 33-year-old Henrik, the seafood category manager at Axfood. As a category manager, Henrik is responsible for not only the assortment but also the profit maximization of a product category. His decisions are relevant for all shops and store formats on a national level. He earns a sales commission at the end of the year based on the profits the seafood category has made. Henrik is aware that the tiger shrimp has been in the news lately, yet he did not know the details. He considers himself a reasonably conscious consumer who is interested in the production processes of consumable goods, specifically food products. Yet, when it came to his job, he knew that the overall goal of the organization was to be profitable and his commission depended on it.

Recently, Henrik noticed the increasing popularity of tiger shrimp as a food item both at restaurants and for at-home consumption. He's observed that tiger shrimp is a very popular ingredient in many television-based cooking shows. Using shrimp provides a bit of luxury in the everyday life of their viewers, while offering fresh and nutritious, easy-to-cook meals that look festive. Given consumer demands for the shrimp, Henrik stocks them in all stores. Tiger shrimp generates a relatively high marginal profit compared to other items in this category.

In preparation for his meeting with Linda, Henrik summarized some key data which he gave to Linda (see Appendix 2 for background on tiger shrimp consumption).

During their meeting, Henrik told Linda about a dinner party that he recently attended where the serving of tiger shrimp had provoked a heated discussion among the dinner guests about whether one should consume or boycott them. A couple of the dinner guests, Per and Peppi who worked

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for different international non-governmental organizations (NGO) with branches in Sweden, were outraged about the production practices of tiger shrimp and put pressure on Henrik to encourage Axfood to stop selling the product. Per, who worked for Greenpeace in a local branch in Stockholm, stressed the irreparable environmental degradation caused by the type and increased production of tiger shrimp. Even though initiatives were taken to address the problem, no reliable labeling system or universal information standard existed regarding whether shrimp were farmed or wild-caught. This made it difficult for food retailers to know where the product came from and under which conditions it was produced.

Peppi, who worked for Amnesty International in Gothenburg, was irritated by the working conditions for tiger shrimp production in the developing countries, including the use of child labor, which is accepted there yet often unthinkable from a Western perspective. These issues were common in countries with weak political and legal systems. Peppi emphasized that, according to the United Nations Guiding Principles for Business and Human Rights, even though the role of the state was to *protect* human rights, businesses had the role and responsibility of *respecting* human rights. Peppi believed that it was unfair and unethical for Western societies to proudly consume products, such as tiger shrimp. She said trade of all products that were related to human rights abuses should be stopped. Peppi considered this decision to be mainly in the hands of Multinational Corporations (MNCs) as they had the privileged position under global capitalism to be change agents and should have a moral obligation to social justice.

Mathias, the host, intervened and tried to reconcile the opinions about serving tiger shrimp. Mathias admitted that he might not be totally aware of the environmental and social implications of tiger shrimps, yet he believed that a boycott would not improve or solve local conditions. He emphasized that food production, especially linked to global supply chains, by default caused extensive environmental and social issues and that solving them required holistic change on a global level. Looking at each single product would cause people to run out of options on what to consume and how to feed the world in the future. Therefore, until a holistic solution was found by critically evaluating and improving the way food was produced and consumed, it should be up to the individual to make the choice of whether to consume products such as tiger shrimp and there should be no discrimination of either side. Mathias's wife Nurgül, for example, loved sushi and especially tiger shrimp. Given her Islamic roots, she decided to become a 'pescetarian', a person who did not eat meat but ate fish, because it provided protein and dietary minerals and was low in fat.

Henrik mentioned to Linda that, after the dinner, he found himself intrigued by the complexity of the issue and conducted some private research regarding the debate over tiger shrimp. He read articles and watched videos that showed terrible working conditions for the locals, as well as the environmental degradation and pollution caused by the production. He concluded that information was rather one-sided, as it was much easier to find negative publications than ones showing potential benefits and opportunities. Still, he decided he would try to find a substitute for tiger shrimp in his diet. But, in relation to his job, he was unsure of how to proceed. As a large supermarket chain, he believed that Axfood had a responsibility towards society, other stakeholders, and investors. Henrik realized the difficulty in reconciling his roles as a consumer and as a manager of a for-profit business.

Like Henrik, Linda believed that Axfood had a larger responsibility towards educating consumers and had to make and then sell decisions about which products would be made available to customers.

A Recommendation is Needed

After spending several weeks exploring the issue of tiger shrimp, Linda now has to make a recommendation to the management board of Axfood on how it should address the issue of tiger shrimp and the broader issue of sustainable aquaculture. Options she was considering included boycotting the product, doing nothing and continuing the sale of tiger shrimp, or perhaps forming a partnership with an NGO. She also contemplated how social media, as a new communication tool, could be used to help make and communicate the decision.

Appendix 1.

A Corporate Background

Three large retailers dominate the Swedish food retail market, namely ICA, Axfood and KF-Coop. ICA owned the majority of the total market with 45.9%, followed by Axfood with 19.3% and KF-Coop with 18.5%. Smaller retail chains, such as Bergendahls, including Vi-stores, accounted for 5.3% of the total market share, while Lidl held 3.2%, Netto 2.1% and others 5.7%. Figure 1 shows the relative market shares of Swedish food retailers.
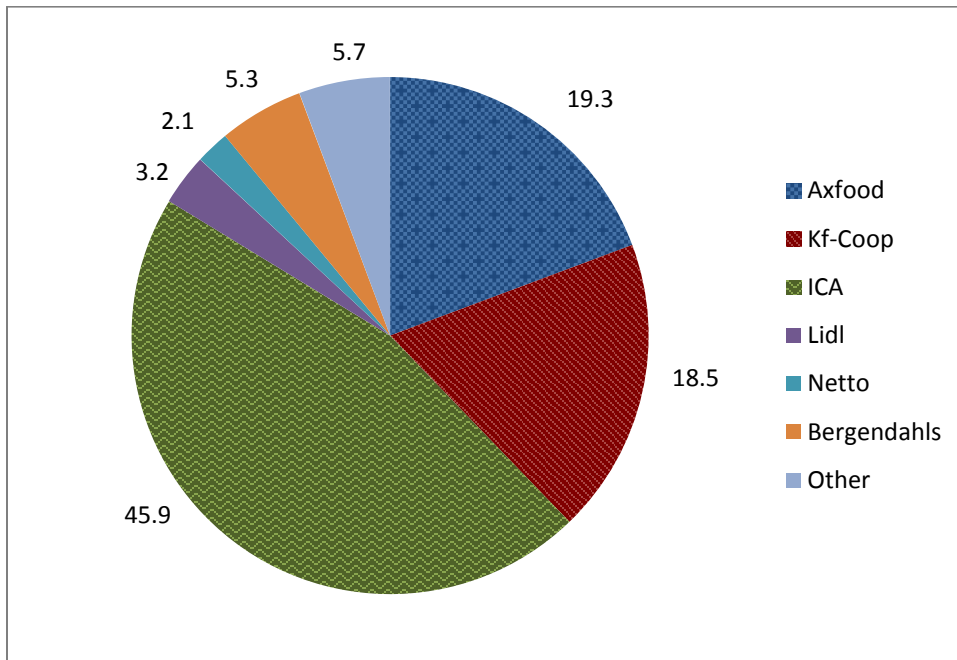

Figure 1. Market shares of Swedish food retail (2007)

Axfood, being Sweden's second largest food retailer by market share, has a corporate identity closely tied to sustainable development. Axfood has different store formats and operates under

chains such as Hemköp, Willys and PrisXtra. In 2007, Axfood owned 217 shops and five distribution centers. Axfood's workforce in 2007 was 6,436 employees. This contrasts with Axfood's main competitor, ICA, which is a combination of privately-owned shops and franchises—which therefore affords individual shops more autonomy. In 2007, ICA Sweden owned 1,382 shops and employed 5,107 people. KF-Coop was a consumer-owned cooperative, and therefore, is sometimes referred to as an NGO.

For more information, please visit their websites:

- ICA (http://corporate.ica.se/en/home/),
- Axfood (http://www.axfood.se/en/).
- KF-Coop (http://www.coop.se/Globala-sidor/In-english/).

Appendix 2.

Tiger Shrimp

Due to the constant rise in demand for tiger shrimp, especially from Western societies, production had drastically increased over the last three decades in order to meet this demand. Figure 2 shows the total tiger shrimp import in Sweden between 1997 and 2007.
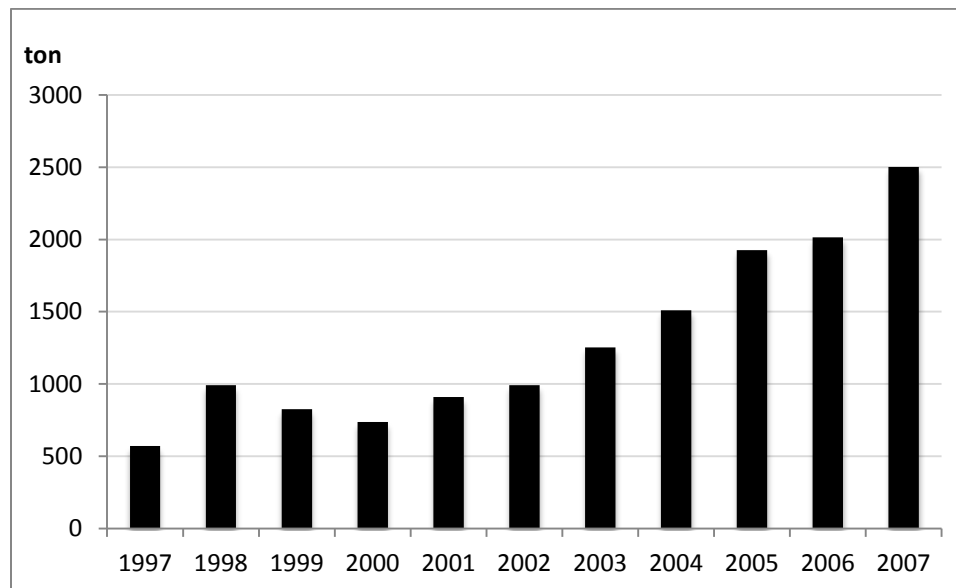

Figure 2. Total import of tiger shrimp in Sweden between 1997-2007.

In 2007, Axfood's share of total tiger shrimp sales in Sweden was 13.25%, which amounted to approximately 18.9 tons of tiger shrimp (Figure 3). The retail price was on average 278 SEK/kg*, with a profit margin of 65%. Figure 3 presents the total value of tiger shrimp sale in tkr (SEK) of the main food retailers in Sweden. Axfood's total revenue in 2007 was 29,189 MKr (SEK). In comparison, ICA Sweden's total revenue was 51,438 Mkr (SEK).
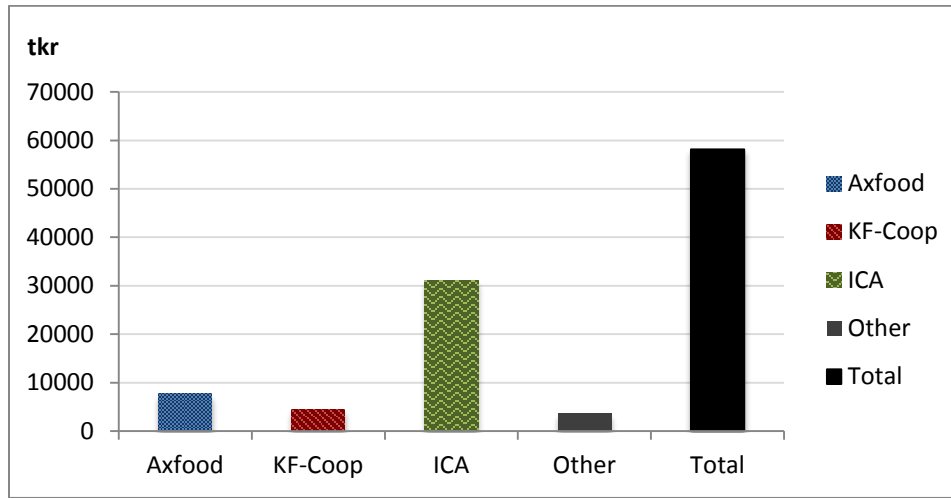
Figure 3. Total sales for tiger shrimp among main Swedish food retailers.

The increasing demand for tiger shrimp among consumers might be explained by the favorable nutritional value of fish in general, as well as being a popular, festive food item. For example, Table 1 presents a comparision of the average nutritional value for 100g of raw tiger shrimp, crayfish, tuna and salmon.

Table 1. Nutritional facts of selected fish and shellfish° (http://nutritiondata.self.com/)

	Crustaceans		**Fish**	
Product	Tiger Shrimp	Crayfish	Tuna (bluefin)	Salmon
Calories	106	72	144	208
Fat	2g (3%)	1g (1%)	5g (8%)	13g (21%)
Saturated	0g	0g	1g (6%)	3g (15%)
Cholesterol	152mg (51%)	107mg (36%)	38mg (13%)	55mg (18%)
Protein	20g	15g	23g	20g
Sodium	148mg (6%)	62mg (3%)	39mg (2%)	59mg (2%)
Carbohydrates	1g (0%)	0	0g (0%)	0g (0%)
Vitamin C	3%	1%	0%	6%
Vitamin A	4%	1%	44%	1%
Iron	13%	3%	6%	2%
Calcium	5%	2%	1%	1%
Price/ kg*	278 SEK	90 SEK	220 SEK	180 SEK

° percent daily values based on a 2,000 calorie diet.
* 7 SEK equals 1 $USD

All four fish and shellfish products in Table 1 are low in sodium and considered a good source of protein, niacin, selenium, phosphorus, vitamin B6 and B12. Additionally, tiger shrimp is a good source of copper, iron, vitamin D and selenium although it is also high in cholesterol. Crayfish are also relatively high in cholesterol but offer a source of folate, magnesium, copper and potassium while tuna is a good source of thiamin and riboflavin.

Helping Consumers "Know Who Grows" Their Coffee: The Case of THRIVE Farmers Coffee

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Abstract

Michael Jones is the CEO of THRIVE Farmers Coffee. THRIVE Farmers International is a socially-oriented start-up with a new model for the coffee supply chain. The traditional supply chain for coffee is often criticized as being exploitative of farmers and the environment. The THRIVE system allows farmers to own their product further along the supply chain. Thus, the farmers function like a vertically integrated operation, selling a high-value product and retain the corresponding profit margins—5 to 10 times what they would get in traditional markets. As a result, the THRIVE model connects farmers and consumers directly. THRIVE offers customers the value of "knowing who grows" their high quality coffee. In consideration of its value proposition and social goals, how does Michael grow THRIVE? This case is a teaching case suitable for an advanced undergraduate or graduate course in marketing or strategy.

Keywords: specialty coffee, THRIVE Farmers' Coffee, supply chain, fair trade

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Introduction

The familiar sound of an incoming Skype call disturbs the cool, quiet January morning in suburban Atlanta, Georgia, causing Michael Jones, sitting at his office desk, to turn from his documents to his computer. Michael, chairman and CEO of THRIVE Farmers International, answers the call. After pleasantries are exchanged, Michael awaits the first question from his interviewers, a team of academics seeking to understand THRIVE Farmers Coffee and the THRIVE model.

As one of the company's co-founders, with Alejandro (Alé) Garcia and Kenneth (Ken) Lander (see Exhibit 1), Michael knows the THRIVE story well. This 43 year old, serial entrepreneur has started and led other firms, so, he is not new to the start-up world; however, coffee is a new area of work for him. Michael's father-in-law introduced him to the world of coffee production and the challenge of coffee producers. Michael says that he wants to contribute to economic development of people in developing countries. Understanding the challenge of coffee farmers, he saw a way to use his passion for economic development, his entrepreneurial prowess and past experience with start-ups to help develop a new model to sell coffee. THRIVE Farmers International is a startup that is drawing attention from the media and the coffee world because of the creative destruction—the Schumpeterian idea that a new business model destroys and replaces the old, traditional model—of the THRIVE model, and its potential to rewrite the economics of coffee.

With cool confidence, Michael explains the model. He takes great care to contrast the THRIVE model to the global value chain of fair trade coffees, but never negatively. The THRIVE model tries to get as much money into the pockets of the farmers as possible, all the while providing the farmers market-based incentives to improve the quality and sustainability of the product. Michael often argues that money in the pockets of the THRIVE farmers is money in the community: Money in the community means that kids go to school, nutritious food is on the plate, communities grow and develop—they thrive. Market incentives mean that farmers can make appropriate improvements in the product that they provide. Higher quality product means more money back to the farmer and the development of entrepreneurs who are not dependent on charity. Social entrepreneurship—businesses that generate social value as well as profits—at its best, as suggested by Ken Lander, Michael's business partner, is businesses helping communities help themselves rebuild appropriate social and economic structures so that the communities can contribute to the vitality of their people.

As the conversation proceeds, Michael's responses slow. The recitation of the goals of THRIVE causes him to reflect on the strategy of the company. Incorporated in the social goals of THRIVE is connecting consumers to producers. The THRIVE model is predicated on the idea that consumers "know who grows" their coffee. This connection and the high quality of the coffee are part of the value proposition of THRIVE and support the price premium for the coffees. In consideration of its value proposition and social goals, how does Michael grow THRIVE?

The Beginnings of THRIVE Farmers

The THRIVE Farmers story began in 2010 with Ken Lander and Alé Garcia, two small-holder coffee farmers in San Rafael, Costa Rica. Ken is from Atlanta, Georgia U.S., formerly-retired and is currently a coffee farmer after financial losses in the U.S. real estate market. Alé is a fifth-generation coffee farmer, working his way through the process of vertical-integration. After each founded their own coffee shops and roasteries in the tourist-heavy area of nearby Monteverde, Costa Rica, Alé and Ken realized the community of coffee farmers in San Rafael could do better collectively than they could do on their own. Calling themselves the San Rafael Sustainable Coffee Initiative (SRSCI), 13 farmers in the community came together under Ken and Alé's leadership and established a new channel in which to sell their crop directly to the end-user rather than simply selling their cherries into the traditional markets. The idea was simple—each farmer would consign coffee to SRSCI, Alé would mill it, Ken would roast it, either of the two coffee shops would sell the product, and the farmers would split the resulting revenues. But simple as it sounds, this structure represented a radical departure from the traditional coffee supply chain.

The new structure developed by the SRSCI caught the eye of Atlanta-based entrepreneur Michael Jones, who had been searching for ways to help his father-in-law, a coffee farmer in Jamaica, earn more revenue through a higher price for his coffee. Discussions began between Michael, Ken and Alé to implement a similar program in Jamaica. But Michael, ever the entrepreneur, soon realized that the SRSCI model could work on a much bigger scale and could add value to many more farmers than they initially realized. Michael immediately got to work raising capital and putting systems in place to bring coffee from Central America to the United States, and Ken and Alé got to work networking with other farmers in Costa Rica, Guatemala and Honduras who were interested in selling their coffee in this new way.

By late 2011, the San Rafael Sustainable Coffee Initiative had become THRIVE Farmers Coffee. Instead of being restricted to one farming community and two cafés in Costa Rica, by the second year, THRIVE had expanded to over 400 farmers supplying tens of thousands of North American consumers via retail chains, coffeehouses, churches, and roasters throughout the United States. Despite the increased scale, the structure is relatively the same as the SRSCI. Small farmers join THRIVE as partners and own the inventory until a customer (whether roaster, retailer or consumer) pays for it, and the farmer shares in the majority of the revenue generated from the sale. This vertical integration allows the farmer to retain between 5 and 10 times higher profit margins than they would have obtained from selling into traditional markets.

Enhancing the Farmer's Position in the Supply Chain

The traditional coffee supply chain is comprised of seven principal nodes: the farmer, the mill, the exporter, the importer, the roaster, the retailer and the consumer (see Exhibit 2). This is, of course, only a basic structure and does not capture the potential complexities added by brokers between any two nodes or by varying levels of vertical integration. When small farmers participate in this market, they typically sell their cherries to a local association or cooperative that pays them based on current international commodity market (C-market) prices.

The traditional supply chain for coffee is often criticized as being exploitative of farmers and the environment, and accusations of low prices from market concentration are not uncommon. But even if all the players in the traditional market act ethically, a fundamental problem that prevents coffee farmers from obtaining sustainable revenues remains: most farmers sell unprocessed cherries, which are of inherently low economic value. In 2012, C-market prices had been below $2 per pound (for processed, unroasted green beans) with some suggestions that it could drop to $1.25 before mid-2013, a 3.5 year low. Currently the coffee supply is so great that some farmers, especially out of Brazil, are holding stock and waiting for a price increase. This problem is not new. In the early 2000s coffee prices had sunk to $0.50 per pound (see Exhibits 3 and 4). In contrast to these prices the retail price for a high-quality, roasted specialty coffee can range from $10-$20 per pound.

Coffee prices are also very volatile. These low, fluctuating prices have larger implications than low and uncertain revenues: For example, Costa Rican coffee farmers face credit constraints because banks base loans to coffee farmers on the C-market price. Because this price has been low for years, coffee farmers are often denied loans for their farms. In these markets, farmers operate with very small and wildly fluctuating profit margins. This market structure puts farmers at a disadvantage in two primary ways: 1) farmers cannot retain the value-added from successive nodes on the supply chain, and 2) farmers are left exposed to often-drastic information asymmetries since information on consumer preference must pass through a complex supply chain in order to reach them. In short, producers cannot readily react to changes in consumer preference because of the structure of the supply chain and the agronomic realities of coffee production.

The Old Solution: The Fair Trade Model

Since the 1940s, the fair trade movement has led to enhancement in the conditions of producers of commodities in the developing world, beginning with producers of handicrafts to now include producers of coffee, cocoa, apparel and numerous other food and non-food items. While a number of different fair trade organizations exist, the basic mechanism of the fair trade model is a certification scheme, where a non-profit organization with a third party certifier evaluates the production practices of the group of farmers in a developing area. The certification supports the producers of covered products in three primary ways: 1) by providing a floor price, a minimum price below which the fair trade product will not be sold, and a price premium when the C market price is above this minimum; 2) by linking producers directly with product importers, eliminating some intermediary nodes in the supply chain, and thus creating a competitive advantage for fair trade producers; and 3) the price premiums paid for fair trade products are reinvested in community development projects in the producer community.

While fair trade is well established and continues to find growing support in some quarters, its critics point out some notable flaws, including: 1) while limiting the downside under poor market conditions, relatively long-term contracts often preclude producers from taking advantage of upswings in the market and 2) market asymmetries often allow significant premiums at the retail end of the supply chain for fair trade certified coffee, while very little of that retail premium results in increased income at the producer end.

The New Solution: The THRIVE Model

In the THRIVE system, farmers consign coffee cherries, and they pay the variable costs for milling, export and import, and shipping to a roaster if the coffee is sold green. THRIVE Farmers International makes all the capital investments, pays the fixed costs and pays all roasting and marketing expenses. This system allows farmers to own their product until one of THRIVE's customers (be it a roaster, retailer, or consumer) pays for it. As the farmers retain ownership of the coffee until it is sold, they receive the price that the buyer pays less a percentage return for selling the coffee through THRIVE. When product is sold green to a roaster, the farmers retain between 75 and 80% of the final price, and THRIVE receives the remaining 20 to 25% of the price. However, if THRIVE roasts and markets the coffee, the farmers retain 50% of the price while THRIVE receives the remaining 50%. The end result is a model in which farmers act as if they were a vertically integrated operation, selling a high-value product and retaining the corresponding profit margins—5 to 10 times what they would get in traditional markets, all without having to make the capital investments typically required. For example, if THRIVE sells green coffee from Costa Rica at $4 per pound, the farmers receive $3 (75%) less the variable costs of getting it to the customer. These variable costs typically total around $0.70 per pound for wet milling, dry milling, export/import taxes, packaging and shipping, resulting in "farm gate" revenues of $2.30 in this example. By contrast, farmers that participate in Fair Trade certified cooperatives are expecting farm gate revenues of no more than $1.20 per pound this year, according to Ken Lander. Comparing this with a baseline cost of production of around $1.16 per pound, farmers who participate in THRIVE are making a profit of $1.14 per pound compared with a somewhat shocking $0.04 per pound in the fair trade model.

The traditional and fair trade models leave farmers in an extremely fragile situation. Consider the current epidemic in Central America of the fungus *Hemileia vastatrix,* commonly called "*roja*" or "coffee rust." This fungus can decimate harvest yields and requires expensive investments of pruning and fungicide application to keep it from spreading. At such slim profit margins in the traditional markets, it is no wonder that many farms are going bankrupt and the Costa Rican, Guatemalan and Honduran governments have declared a state of national emergency and are allocating emergency funds in the tens of millions of US dollars to assist affected farmers.

The identifiable presence of the farmer much closer to the consumer end of the supply chain also facilitates a relationship between the consumer and producer, a factor that is increasingly desirable to growing segments of contemporary consumers. The consumer-perceived value of this source-specific differentiation may result in additional price premiums in which the farmer can share (see Exhibit 2).

One of the greatest challenges to the THRIVE model is the timing of payments. Because the farmers consign their coffee to THRIVE, they are not paid immediately after harvest. In the typical coffee supply chain, the farmer gets paid by the cooperative, miller, or whoever is the first buyer of the coffee cherries immediately after harvest. In the THRIVE model, farmers typically get paid when the roaster or retailer pays for the product. At minimum, the wait to receive the first payment is four months: Coffee takes at least three months after harvest to get to market. For THRIVE, additional time is needed to complete sales and return payments to farmers. While waiting on receiving payment, the farmer has to bear the cost of getting the

product to THRIVE's facility in the U.S., and must make immediate investments in pruning and fertilization for the following year's harvest. Currently, THRIVE is developing mechanisms and partnerships to help producers along the way through operating loans. As suggested earlier, typical commercial loans based on the C market price are hard to obtain and often carry very high interest rates; therefore, THRIVE is exploring alternative markets for these necessary operating loans.

Beyond the payment timing, another challenge to the THRIVE model is convincing farmers and consumers of the differences in the model compared to the traditional model and to fair trade. For the farmers, the difficulty is moving from a mindset of producing a bulk commodity to selling a high-quality, differentiated product. THRIVE has to work with the farmers to assure quality and consistency of product. For the consumers, educating them about the THRIVE difference is a challenge in terms of marketing and branding.

Who is THRIVE Today?

THRIVE Farmers International, LLC is the parent company with subsidiaries in Costa Rica (THRIVEWorx Costa Rica), in Guatemala (THRIVEWorx Guatemala) and in Honduras (THRIVEWorx Honduras). THRIVE denotes that it has a staff between 10 and 50 people. The sales staff is divided by channel: half work with roasters and the other half work with fundraising, retail and direct sales. Fundraising sales are made to non-profit organizations (schools, religious organizations, civic organizations, etc.) to raise money for social causes. The sales team is responsible for identifying and signing up roasters and retailers. Ken Lander, one of the co-founders based in Costa Rica, is charged with identifying and signing up farmers to the THRIVE program.

THRIVE has experienced substantial growth in terms of the coffee that it moves through its marketing channels. Currently, THRIVE sells its entire product in the U.S. In the first year of operation, 2011, THRIVE moved 20,000 pounds (9,072 kg) of coffee. That year was more of a "proof of concept" year. In the 2012 crop year, THRIVE moved 350,000 pounds (158,757 kg) of coffee. In crop year 2013, they expect to move one million pounds (453,592 kg). They anticipate that in crop year 2014 that they will move five million pounds (2,267,962 kg). Farmers are fairly evenly distributed across the three current source countries, Costa Rica, Guatemala and Honduras, and THRIVE is actively recruiting farming partners in other producing nations. In terms of the number of farmers in the THRIVE model, in 2011, they worked with 15 farmers. In 2012, they worked with 400 farmers. This year, they are working with over 1000 farmers, and they predict that they will work with 6000 farmers in 2014 (see Exhibits 5-7).

THRIVE moves coffee through three general channels (these will be broken out into more defined channels later): roasters (Green-Sales Roasters: Green-Affiliate Roaster with Co-Brand, Green-Affiliate Roaster and Green-Roaster Traditional Sales), retail outlets (THRIVE Roasted-Retailer), and other (THRIVE Roasted-Direct: the THRIVE website, fund raisers, etc.). In crop year 2012, the Green-Sales Roasters received 60% of the beans. THRIVE Roasted-Retailer received 25% of the beans and the THRIVE Roasted-Direct received 15% of the beans. Across the three channels, 95% of sales from THRIVE were to customers on the East Coast of the U.S.,

the geographic region where THRIVE is headquartered. In terms of THRIVE direct web sales, 20% are from subscriptions, the Coffee Club, while the other 80% are one-off sales.

Facing the Market

The U.S. coffee market is mature and composed of several large firms such as Starbucks and the J. M. Smucker Company, which provides brands such as Folgers© and Dunkin' Donuts © (see Exhibit 8-10). This market includes high-end specialty coffees and lower valued soluble blends. Providing nearly 80% of the coffee in the U.S., these firms are experiencing revenue growth as the coffee industry grows at a rate just above GDP growth. However notable exceptions include the rise of products like the Keurig single-serving cups (K-Cup) and specialty coffees. THRIVE products are one of the many "Other" coffees, but THRIVE provides a specialty coffee with additional intrinsic value based, in part, on the THRIVE model (See www.IBISWORLD.com for additional market trends).

THRIVE considers the unique relationship with the farmer to be one of the most compelling parts of the company's value proposition for buyers. Every opportunity to tell the story, to connect the face and name of a farmer to the coffee-drinking experience at the end of the supply chain, adds value to the THRIVE Farmers brand. However, THRIVE is not always in position to tell the story to the end consumer.

As THRIVE scaled rapidly, and tried to balance supply and demand, numerous paths developed by which consumers obtain coffee grown by THRIVE's partner farmers. These include:

- Sale of roasted coffee directly to end consumers via internet, which also includes fundraiser sales (**THRIVE Roasted-Direct**),
- Sale of roasted coffee to grocery stores or other retail outlets (**THRIVE Roasted-Retailer**),
- Sale of green coffee beans to affiliate roasters, who purchase coffee on consignment and market to the end consumer and retail outlets with the THRIVE logo on bags (**Green-Affiliate Roaster with Co-Brand**),
- Sale of green coffee beans to affiliate roasters, who purchase coffee on consignment and markets to the end consumer and retail outlets without the THRIVE logo on bags (**Green-Affiliate Roaster**),
- Sale of green coffee beans to a roaster, who purchases coffee outright without consignment and markets to the end consumer and retail outlets without the THRIVE logo on bags (**Green-Roaster Traditional Sale**).

Each of these channels is unique in that they offer THRIVE more or less ability to tell the story of their brand, as well as offering different margins and volumes.

The THRIVE Marketing Channels

Roasted-Direct

The most direct contact that THRIVE makes with customers is through its web site (http://www.thrivefarmers.com/). This connection includes direct sales and sales through the

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fundraising programs. The site provides the full array of THRIVE coffees. All of the coffees are roasted beans and packaged with the farmer's picture on the package. For each coffee, the site provides details of the farmer, the origin, the variety, the altitude and many other quality descriptors. Through several portals, the site directs readers to learn more about the THRIVE model and to purchase the coffees and related products directly from the THRIVE site. Little on the site provides evidence that THRIVE coffees are available on other sites or retail outlets. The one notable exception is the blog which has stories of roasters and retailers.

The THRIVE site is structured in a way to draw the customer into a full coffee experience. With information on the coffee industry, brewing techniques, fundraising activities, etc. THRIVE uses its website to educate customers and to generate excitement around the products. THRIVE argues that customers can "know who grows" their coffee through their model. The farmer's stories are integral to the product display on the site. Customers are asked to join a coffee club to receive a regular supply of coffee via THRIVE direct from the farmers. THRIVE uses the usual social media outlets Facebook, Twitter, YouTube, etc., to cultivate a community of coffee enthusiasts.

In this direct interaction with the customer, THRIVE completely controls the message and the brand. Additionally, the margins earned are the highest of the channel options because no intermediaries exist between THRIVE and the customers. Sales volumes, through this channel, are on the lower end of the spectrum at 15%.

THRIVE Roasted-Retailer

The second channel through which THRIVE reaches customers is retail outlets. Currently, THRIVE has a regional grocery store chain in the Southern U.S. and other retailers that sell the coffee. These retailers provide shelf space for the coffee along with other specialty, single-sourced coffees. The product is roasted and packaged by THRIVE. Therefore, the package has the picture and name of the farmer that produced that product. As a result, the customer can make a connection to the coffee farmer. The THRIVE story, in short form, is readily available on the package. THRIVE provides the store point of sale promotional material. The regional chain hosted events where Alé and Ken talked with customers.

THRIVE has medium-high control of the message through this channel because these products are packaged by THRIVE, and THRIVE provides the content for the displays and has opportunities to connect directly with customers. This channel also provides high margins for THRIVE; however, this channel represents lower volumes relative to Green-Sales at 25%.

Green-Sales Roasters

Green-Affiliate Roasters

The majority of THRIVE coffees are sold through a rapidly growing number affiliate roasters, which are located throughout the U.S., mostly in the eastern portion of the country. The Affiliate Roaster Program allows roasters to act as part of THRIVE. Under the Affiliate agreement, THRIVE Farmers consigns coffee to the roaster and the roaster pays for coffee only after it is "sold" to the final consumer (Specialty coffee roasters work hard to ensure roasted coffee is in

the hands of the end user as soon as possible after roasting to insure freshness; thus THRIVE accounts the green product as "sold" to a roaster once they have roasted the coffee). THRIVE invoices the roasters for the coffee once they report it as roasted, and the Affiliate agreement stipulates the time frame in which the coffee must be used, penalties for returning the product to THRIVE, etc. The affiliate roasters also agree to insure the coffee against loss. In order to support roaster sales, THRIVE offers free digital media (written farmer stories, videos, photos, labels and graphics) and passes through the cost of hard media such as printed posters, signs, PR events, and so forth. The farmers themselves also participate in this effort by joining video calls with customers of the roaster so that the customers can know who grows their coffee.

These affiliate roasters are attracted to THRIVE for at least two reasons 1) high quality beans and 2) direct trade coffee. Quality is paramount for these roasters, and THRIVE provides them high quality. Many of the affiliate roasters are also committed to the idea of direct trade coffee. While direct trade takes on many different meanings, the basic concept is roasters have some knowledge of and connection to the producer of the coffee. Even if the supply chain is long the roaster generally knows something about the farmer, and is assured that the farmer played an active role in the negotiation of the price. The THRIVE model meets this interest in an innovative manner.

The key distinction between sales from THRIVE and retailers to the affiliate roasters is that the affiliate roasters transform, through roasting, the green coffee beans that they purchase from THRIVE. Roasting is an art and a science. Roasters have distinctive methods to enhance flavor of the high quality beans. As quality is the key, roasters are careful to distribute only the highest quality in coffee; therefore, roasters are meticulous about roasting techniques and the product that they sell. A bad roast can hurt their sales. Because the retail price of THRIVE coffees can be above other Latin American coffees, roasters are extremely careful to roast the product well. Additionally, the high quality of the THRIVE product makes roasting easy. The quality is readily seen as in the figure provide (see Exhibit 8). The number of defects (underdeveloped, broken, discolored or misshapen beans) is relatively low for the THRIVE coffee sample compared to a lower quality product from a large importer. The lower quality and priced products are harder to roast well because of the variation in quality and defects. The extreme care that Rob Tuttle, Vice President of Operational Excellence, provides in terms of quality assurance gives roasters confidence and the capacity to roast a coffee well. Unlike with large importers, roasters can easily communicate issues of quality with THRIVE and the farmers—some of whom are "friends" on Facebook. Probably the greatest aid to the roaster is that the roaster does not pay for the coffee until it roasted. Terms of payment that are extremely beneficial, since cash flow is a primary management challenge for roasters who must buy large quantities at a time to save on shipping costs (coffee is a relatively heavy product—the minimum order size for most green coffee distributors, including THRIVE, is 750 pounds (340.19 kg)).

As these roasters transform the THRIVE product, the packaging and information on the bags of roasted coffee may have little to no information about THRIVE. These affiliate roasters sell product directly to customers as roasted beans or drinkable coffee for roasters/coffeehouse and wholesale to other retailers and coffee shops. Two types of affiliate roasters purchase from THRIVE: co-branded and non-co-branded. Generally, affiliate roasters provide low margins for THRIVE. Through this channel, THRIVE has medium-low to medium control over the message.

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Green-Affiliate Roasters with Co-Branding

Co-branded affiliate roasters sell THRIVE coffee with the THRIVE logo along with their own logo on the package. Some of the roasters/coffeehouses that co-brand have hosted Meet-the-Farmer sessions. These video conferences are available to retailers so that customers can meet a THRIVE Farmer in an online, video forum. The customers develop a community with each other and the farmers.

Because the level of engagement between THRIVE and co-branded affiliate roasters, THRIVE has, on average, medium control over the message. These firms generate low margins for THRIVE and represent a minority share of the Green Sales volumes of sales.

Green-Affiliate Roasters

Non-co-branded affiliate roasters sell THRIVE coffee without the THRIVE logo. These roasters tend to have very little to no information about THRIVE on any of their products or promotional material. While these roasters are interested in the THRIVE model, they choose not to share this information directly (if at all) with their customers.

THRIVE has little control over the message with these roasters. However, these roasters represent the majority share of Green Sales volume and generate relatively low margins for THRIVE.

Green-Roasters via Traditional Sale

These roasters purchase THRIVE coffee outright, that is, not on consignment. These roasters make no effort to identify the THRIVE product. While they appreciate the high quality product that THRIVE offers and value the sustainable trade mechanism, they tend not to be interested in promoting or "selling" the THRIVE model.

THRIVE has little control over the message of these firms about their coffee. These roasters provide THRIVE low margins and account for a small minority share of the Green Sales volume.

Next Steps for the THRIVE Team

The interview sparked new ideas for Michael because it gave him perspective and time to think. The busy tactical activities of operating a start-up can present a huge distraction from the strategic thinking necessary to develop a well-established firm. With the rapid growth of THRIVE, Michael has to balance the two carefully. But to grow the business, Michael needs to consider who and what THRIVE is now—not only to its farmers and customers, but also to himself and his staff. In the span of an hour, Michael had an opportunity to slow down and reflect on the opportunities and threats that THRIVE faces.

Michael wants THRIVE to do more. He sees that THRIVE can do more as he considers the reasons he got into the coffee business: economic development of farmers in developing countries and a chance to earn a profit. There is a delicate balance between the two. When it comes to telling the farmers' stories, how can he keep this as the primary focus? His deep ethical

convictions are pushing him to think deeply about the THRIVE's strategy. Michael knows that it is time to gather Ken and Alé in Costa Rica and his team in Atlanta for a Skype conference. In what new direction should Michael send the firm and the THRIVE farmers?

Appendix

Exhibit 1. Biographical Sketches[1]

Michael Jones, Founder & Chief Executive Officer

After exiting a healthcare services company that he had started ten years prior, in January of 2011, Michael planned to spend some much-needed time with his family while deciding what his next business venture would be. He revisited a prior conversation he had with his father-in-law, a long-time Blue Mountain coffee farmer in Jamaica, who had suffered severe disadvantages in the value chain of coffee. This ultimately led to the creation of THRIVE Farmers – an innovative platform designed to change the world of coffee and align the interests of producers and consumers for the first time.

Michael is the quintessential entrepreneur, having founded and operated several privately held companies. He has managed high growth companies and has been successful in building significant market value for shareholders. Most recently, Michael founded Implantable Provider Group (IPG), a provider of market-based medical implant solutions for payers, manufacturers, providers and patients. In his role as President/COO, Michael was named one of Atlanta's top 25 entrepreneurs by Catalyst Magazine in 2008 (#4). Jones was selected because of his role in founding IPG and turning it into one of the country's fastest-growing businesses. In 2008, Inc. Magazine ranked IPG as the sixth-fastest growing healthcare company in the country (1,500% three year growth rate) and the 138th fastest-growing overall. FORBES Magazine recently ranked IPG at #5 in its list of 100 Most Promising Companies in America.

Michael has been instrumental in raising capital from high profile private equity firms including Sequoia Capital, arguably the most revered venture capital firm in recent history due to its investments in Apple, Atari, Oracle, Cisco, Yahoo, Paypal, Google and others, who invested in IPG in early 2010. Michael's background prior to IPG includes an early career in the financial services industry in corporate finance. He then segued into healthcare in the mid 90's pursuing two other ventures.

Kenneth Lander, Founder, President & Chief Origin Officer

As a retired trial lawyer from Georgia, Ken has extensive experience in advocating client's interests on long-term projects and complicated litigation for both the private and public sectors. After 14 years in the practice, Ken decided to move the entire family to a coffee farm in Costa Rica. With the transition from trial lawyer to coffee farmer, Ken quickly began to understand the injustices that farmers face in the current value chain of coffee.

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[1] All of the biographical sketches are directly from Thrive Farmers Coffee www.thrivefarmers.com.

With the combination Ken's never-failing passion for advocacy and his new found vocation as a coffee farmer, Ken decided to make the case for the coffee farmer and to reveal the truth about your morning cup of coffee. THRIVE Farmers is the direct result of Ken and Alejandro starting the San Rafael Sustainable Coffee Initiative in 2010. The SRSCI became the initial local platform and test case for the farmer in San Rafael. THRIVE Farmers is the natural next leap to take the case of the coffee farmer to the entire world.

As President and Chief Origin Officer of THRIVE Farmers, Ken seeks to find, advocate and project the voice of the farmer and to tell the world that a new day has arrived in the world of coffee. His passion to stand and advocate on behalf of his fellow coffee farmers has found a place in THRIVE Farmers.

Prior to law and farming, Ken was a marketing director with Feld Entertainment, Inc. working in public relations and marketing for Ringling Brothers and Barnum & Bailey Circus and Walt Disney's World on Ice.

Alejandro Garcia, Founder and Managing Director, THRIVEWorx International

Alejandro is a fifth generation coffee farmer. The name of the family farm is Finca Santa Marta located in San Rafael de Abangares, Costa Rica. The Garcia family had a vision that farmers could participate at all levels of the supply chain of coffee, which arose from a necessity of survival. The farm had its challenges in the late 1990′s and early 2000′s stemming from the inability of the cooperative to find sustainable markets.

Through guiding and educating groups of students around Central America for the University of Washington, Alejandro found new insight into the world of coffee and the true injustices in the system to farmers. Alejandro came to the U.S. where he worked tirelessly for more than two years, saving enough money to return and invest in the farm. Under his leadership, the farm was completely overhauled and the family vertically integrated the processes from seed to cup using modern equipment and sustainable farming practices, and delivering coffee to the end user by opening a coffee shop at the mouth of the Monteverde Cloud Forest. The entire family is involved in the operation with brothers overseeing production and processing including wet-milling, dry-milling and roasting, and his sister in charge of various administration aspects of the operation. Their father, "Don" Alejandro still works the farm every day and participates with his wife and children in the operation of the new vision of coffee at Finca Santa Marta. Café Santa Marta is named after Luis Alejandro's mother, Marta Villalobos who greets every visitor of coffee tours to the farm with a warm smile, a cup of Cafe Santa Marta, and a home cooked empanada or fresh baked bread.

The farm has been recently recognized by the Food and Agricultural Administration of the United Nations for its innovative initiatives in sustainable production of coffee, receiving top prize including $10,000, in a global competition of more than 300 applicants across five continents. Alejandro's work resulted in the founding of the San Rafael Sustainable Coffee Initiative with Ken in June of 2010. THRIVE Farmers is the realization of Alejandro's desire that the farmer participate at a meaningful level in the world of coffee. Alejandro is representative of a new generation of coffee farmers, and he is the voice of the farmer at THRIVE, through which

Alejandro is taking his family's vision and sacrifice and applying it to bring hope to farmers around the world.

Exhibit 2.
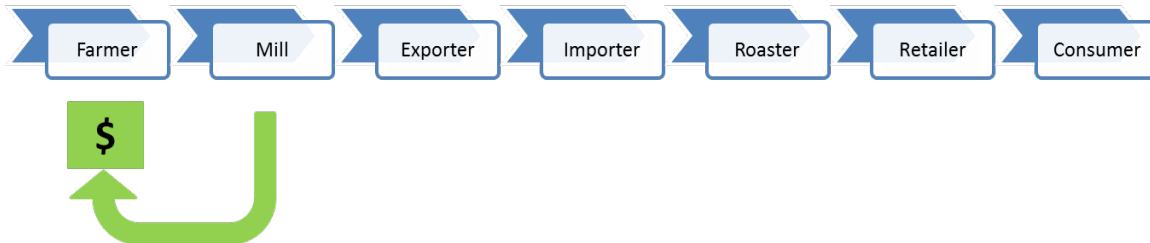Contrasting Coffee Supply Chain Models

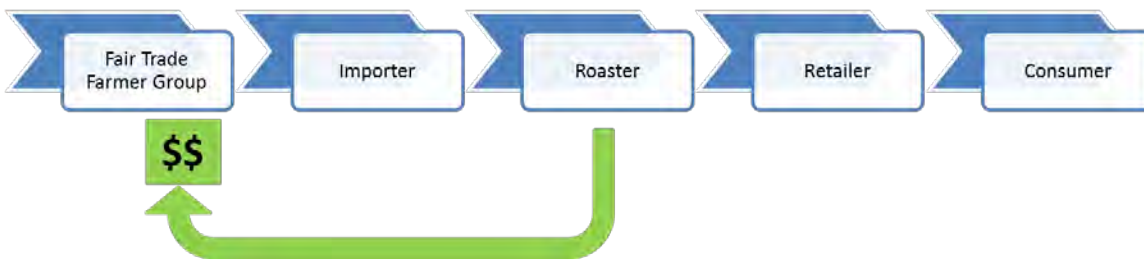**Figure 1a:** Traditional Coffee Supply Chain (simplified)

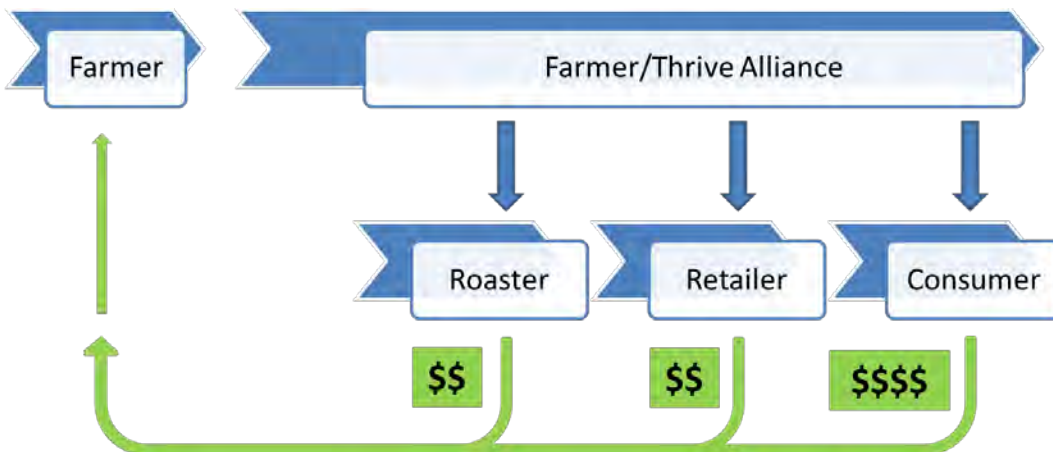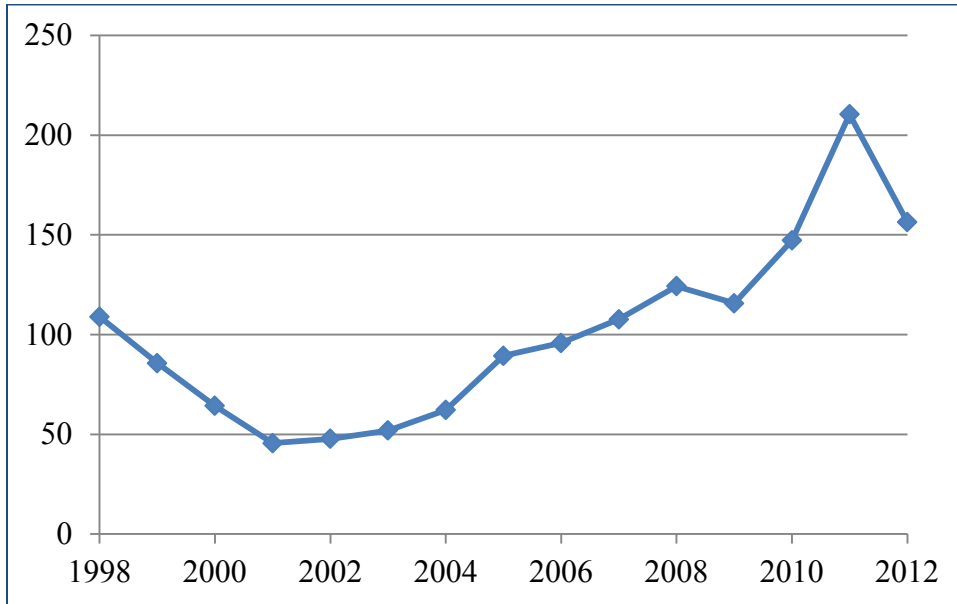**Figure 1b:** Fair Trade Coffee Supply Chain (simplified)

Figure 1c: THRIVE Farmers Coffee Supply Chain
Note. Blue arrows represent flow of coffee. Green arrows represent flow of revenue to farmers.
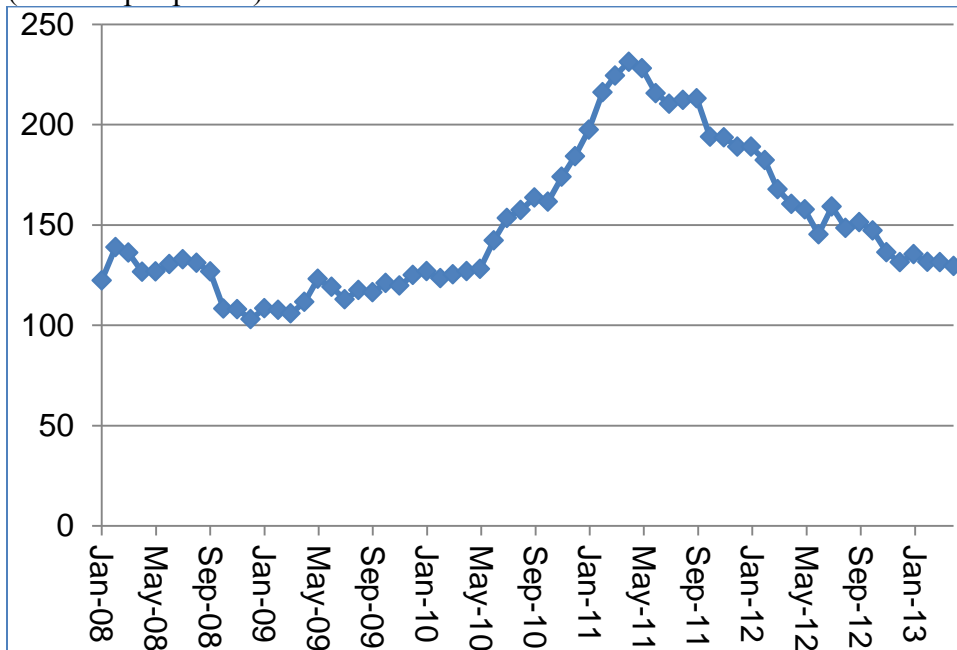
Exhibit 3.
Nominal Annual Composite Price from the International Coffee Organization (ICO)
(in U.S. cents per pound)

Source. ICO http://www.ico.org/coffee_prices.asp?section=Statistics

Exhibit 4.
Nominal Monthly Composite Price from the International Coffee Organization (ICO)
(in cents per pound)

Source. ICO http://www.ico.org/coffee_prices.asp?section=Statistics

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Exhibit 5.
Pounds of Coffee Moved by THRIVE Farmers in Crop Years 2011-2014
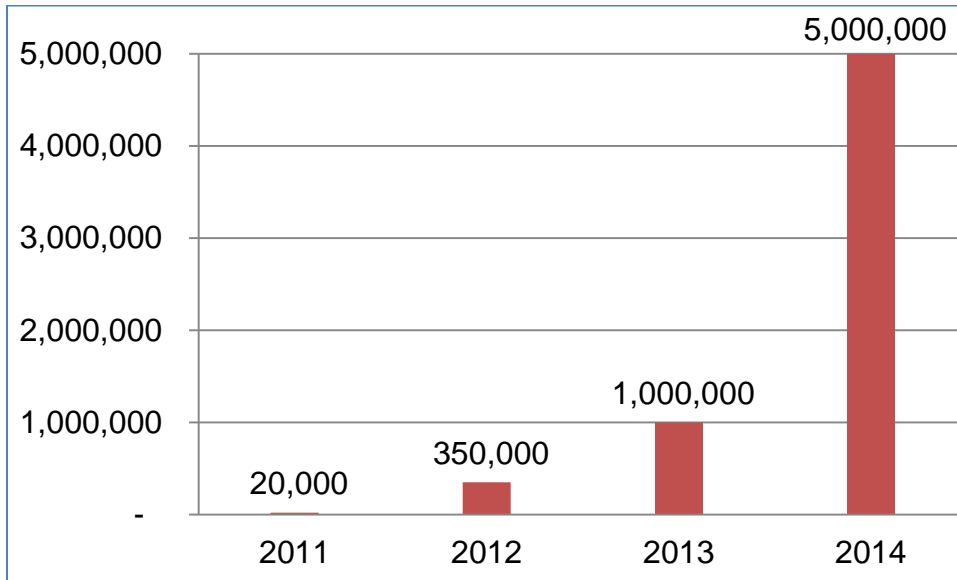
Exhibit 6.
Number of Farmers Participating in the THRIVE Network
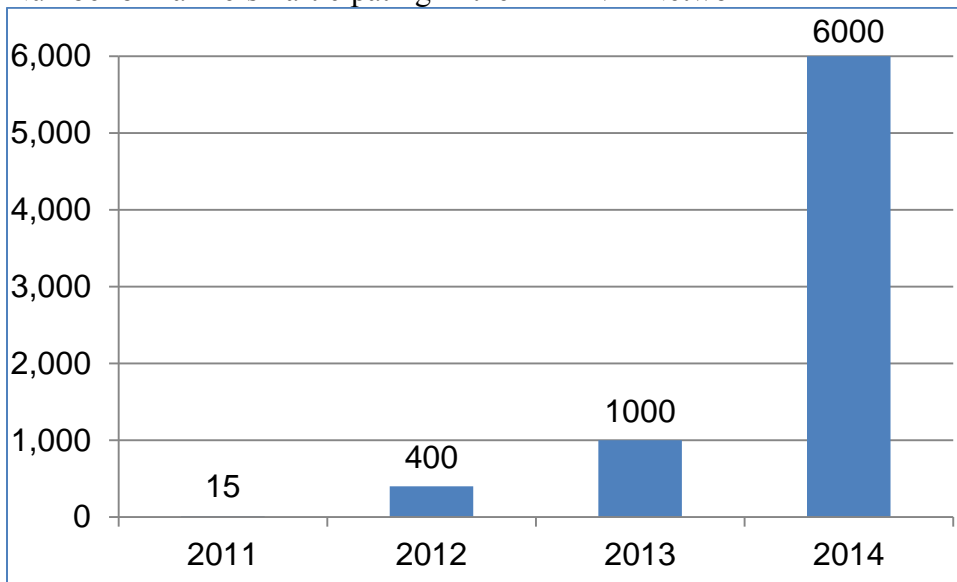
Exhibit 7.
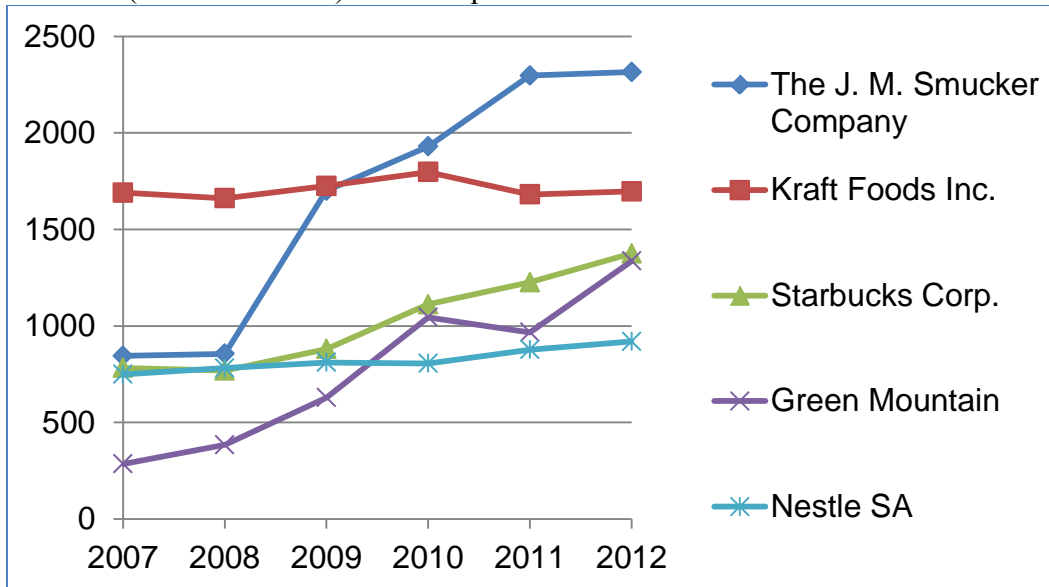Pounds of Coffee per Farmer Moved by THRIVE
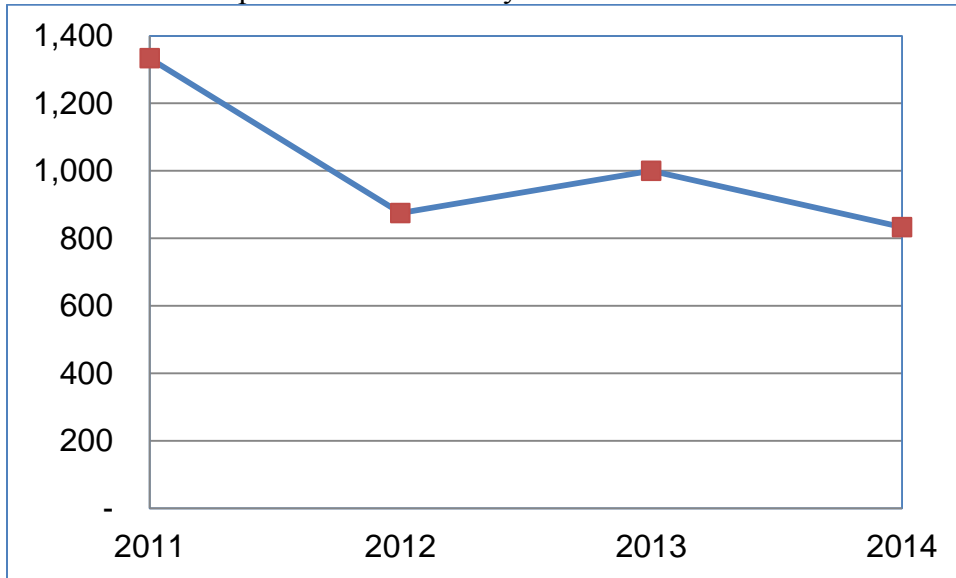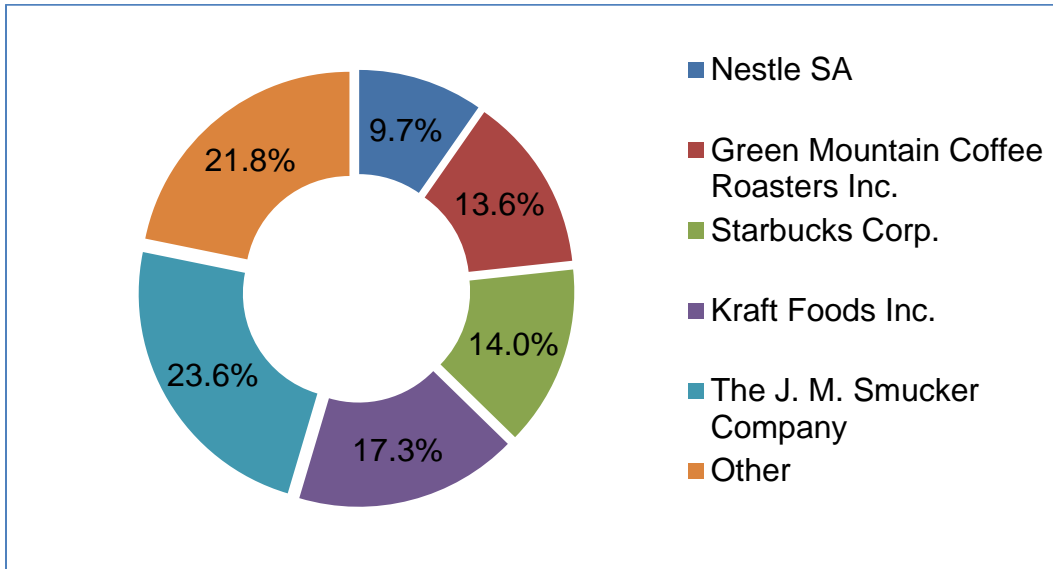

Exhibit 8.
Revenue (in million USD) of the Top Coffee Firms in the U.S.

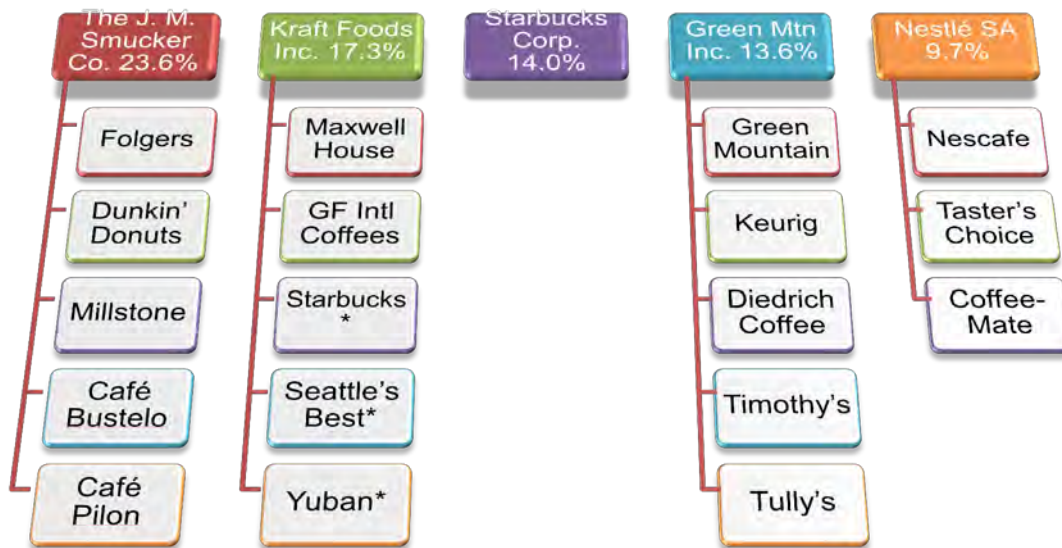**Source.** Coffee Production in the US June 2013, WWW.IBISWORLD.COM

Exhibit 9.
Market Share of U.S. Coffee Market

Exhibit 10.
Top Brands is U.S. Coffee Marke

Exhibit 11.

Quality Differences: Random samples of coffees drawn from THRIVE and a leading competitor.

A Case Study on Building the Certified Angus Beef® Brand

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Abstract

This case is intended for use by undergraduate students studying agricultural economics, agribusiness, animal science, or food science. Junior level class standing, or higher, would be beneficial. The learning outcomes sought from this case are for students to: (1) distinguish between a commodity marketing system versus a vertically integrated brand; (2) understand the first-mover advantages that have been realized by CAB; and (3) understand the problem of Angus confusion and then explore its possible solutions.

A teaching note associated with this case expands upon the above. The note incorporates an excel-formatted data set. With this information, the case can be customized by the professor for use as an exercise; therefore making the case suitable for use in a quantitative analysis class in agricultural economics.

Keywords: Angus, beef, Certified Beef Program, food marketing chain, first-mover advantage, price analysis

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IFAMA Agribusiness Case 16.3 C

Introduction

A low quality steak dinner sent Angus breeder Harold Etling on a research mission. "In checking with some of these Black Angus steakhouses, I found none used Angus exclusively, and that the Angus used was not very top quality." (Minnick, 11) This discovery, back in 1975, culminated in the creation of the Certified Angus Beef® brand (CAB), which today accounts for retail and restaurant beef sales estimated to total $4 billion per year. (CAB-b).

CAB's success results from aligning the interest which consumers have in a positive eating experience, with the interest Angus cattle owners (and other marketing chain participants) have in receiving above average prices for their beef. Steve Olson, a CAB board member, explains, "CAB has provided a Best Practices Manual to guide us in our ranch management decisions. I retain ownership of my cattle through the feedlot and thus I can see the percent of my cattle that make the CAB grade. Over the years, my acceptance rate has increased quite a bit. This year I was right at 60% and that was really good."[1]

What is the CAB Business Model?

There are sixty-five different beef cattle breeds listed on the Cattle Today website. Most of these different breeds have their own separate trade association whose purpose is to maintain the breed registry and also advocate the desirable traits of their particular cattle breed. Seedstock ranchers (i.e., ranchers primarily selling bulls) and cow-calf operators (i.e., ranchers primarily selling calves) are able to command higher prices if their breed is positively perceived. It is safe to say that most, if not all, of these breed associations wish that they had the first-to-market status of CAB. As genetic science and consumer food tastes continue to evolve, CAB faces many competitors and many challenges.

Certified Angus Beef® brand sales began in 1978. This brand sales effort had much in common with the introduction of any other high-quality, new product. However, its foundation was the creation of a USDA-certified brand which gave CAB legitimacy and the first-mover status that still propels its brand success today. Angus rancher Fred Johnson, American Angus Association Chief C.K. Allen, and Certified Angus Beef Program executive Mick Colvin fought a see-sawing battle through various levels of USDA and Congress until final approval was obtained for what is now know as Schedule G-1, Certified Angus Beef® . (Minnick) According to Mick Colvin, "[this was] the best thing that could have happened to Certified Angus Beef. Without a science-based approach and USDA approval, we would be just another Angus brand."

Certified Angus Beef® Brand is one of 71 different officially-recognized Certified Beef Programs operating under the USDA, Agricultural Marketing Service, Livestock and Seed Standardization Branch (USDA 2012). Many of these certified programs merchandise their brands separately based upon the meat's grade of Prime, Choice, Select and/or Standard. Consequently CAB estimates the number of competing brands at closer to 132. As a side note,

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[1] Authors' personal interviews are identified solely by quotations. All such interviews have been conducted in compliance with Texas A&M University, Institutional Review Board, project IRB2011-0626, as amended.

53 Certified Beef Programs carry the word Angus. However, that number rises to 96 when all different brands and all their different grade levels are considered. The beef carcass certification program policy of USDA is shown in Exhibit 1.

According to Clint Walenciak, CAB's Director of Packing, "in USDA's fiscal year 2011, the total number of cattle certified into the above programs equaled 7.73 million head. The CAB subset figure within that total for 2011 equaled 3.43 million head. Therefore, CAB achieved a 44.4% market share."

CAB has grown to introduce other products such as CAB Natural and also CAB Prime. Both Prime and Natural are market niches that competitors are eager to fill. Thus it was competitively important for CAB to have such product offerings for its licensed distributors. Similarly, CAB has expanded its retail presence by offering steak strips, beef bologna, beef knockwurst, frankfurters and other products. Globally, CAB products are available in 45 different countries outside the US. The top six CAB export markets are Canada, Mexico, Hong Kong, Japan, South Korea, and Taiwan.

The U.S. Beef Industry

Amongst competing meats, beef has faced, and continues to face, heavy competition from the poultry and pork sectors. Brester et.al argue that productivity gains (i.e., improvements in output per unit of input), the introduction of new consumer products, and the intensity of advertising and branding all pose challenges for the beef sector when it is compared to pork and especially poultry. These and many other economic forces have caused all US animal protein industries to trend toward fewer larger operations. The beef industry remains, by far, the most disaggregated counting a total of 753,000 different US cattle operations in 2009 (USDA NASS).

Looking to the future, Brester et al. recommend that the beef industry "develop products that provide increased value to consumers." They note that "improved product quality requires accurate identification of live animal quality, increased use of value-based cattle pricing, better identification of quality in consumer beef products, production of differentiated products and increased sorting of beef products by quality characteristics." (p.25).

The beef industry's food marketing, or value chain, consists of seedstock producers; cow-calf operators; stocker operators; and feedlots. Assisting these operations to bring their products to the consumer are packing plants; distributors; retailers, restaurants and institutions. The National Cattlemen's Beef Association conducts its National Beef Quality Audit approximately every five years. This report has a number of core principles. The principle most important to this case study is that of providing, "direction to individual decision-makers across the beef supply chain to improve the quality and value of the U.S. beef supply." (Field 3)

The job of transmitting consumers' beef demand needs back upstream to all parties in the beef marketing chain is very complicated. For example, the slaughtering of a Choice grade steer produces an incredibly wide variety of salable products. For the week ending May 17, 2013, the wholesale prices of these products ranged from the most valuable tenderloin cut at $10.06/lb., to the ribeye area average of $6.45/lb., to less valuable 73% lean ground beef at $1.72/lb. (USDA

Market News) In addition to these commonly consumed products, a wide variety of edible and inedible by-products are also created when an animal is slaughtered. Consulting a USDA Market News By Product Drop Value report on May 21, 2013, one can find products with wholesale prices wide distribution of products ranging from tongue at $3.60 per pound down to inedible lungs at $0.04 per pound.

Colorado State's Beef Cutout Calculator provides a means to put the above into perspective. For mid May 2013, a 1,301-1,400 pound steer grading Choice is estimated to produce a total wholesale value of $625 in the valuable loin, rib, and sirloin cuts; plus an additional $1,250 in all other carcass cuts; plus (per USDA's Drop Value) an additional $189 in non-carcass by-products. Hence the total value of a Choice steer can thus be estimated to equal to $2,064, 30% of which is high-valued beef cuts, 61% of which is low-valued beef cuts, and 9% of which consists of by-products.

Whereas most USDA Certified Brands concentrate on adding value to that 30% of the carcass which consisting of the middle meats, CAB is different. Of course middle meat demand is always central to CAB efforts, but much of CAB's growth in the past 10-15 years has been achieved through increased sales of round and chuck cuts, thin meats (like flank and skirt), and ground beef. As a result, on a poundage basis, CAB's 2012 sales consisted of 24% middle meats, 64% end meats, and 12% ground beef.

The History of Price Transmission

The USDA's quality and yield grade system underlies CAB, all other USDA Certified Brands, and the entire beef industry in general. USDA is responsible for grading and defines the terms Prime, Choice, Select, and Standard. CAB's criteria call for the carcasses to grade as either Prime or the upper two categories of Choice. A description of USDA beef quality and yield grades is provided by Hale et.al.

Even with USDA grading, before the 1990s price transmission in the beef industry was plagued by a critical flaw. At the feedlot, where animals were sent to gain weight just prior to slaughter, live animal sales prices paid by beef slaughter houses was based on a pen-by-pen basis. Such group pricing caused high-quality cattle to be penalized as they received only the average price per pound among all the cattle in their pen. Similarly, lower quality cattle were unjustly rewarded because they too received this same average price per pound. This price transmission externality unwittingly caused an industry-wide race to the bottom. In other words, seed-stock producers, cow-calf operators, and feedlots all focused upon producing cattle for weight-gain (so as to receive the positive externality) instead of for quality (so as to avoid the negative externality).

As a consequence, in 1990 the Value Based Marketing Task Force of the National Livestock and Meat Board and the Beef Industry Council called for many changes. One of their consensus points was that cattle be sold on the basis of individual carcass grade and carcass yield. (Cross) As this new type of pricing, referred to as grid pricing, began to be implemented, industry genetics advanced rapidly through the use of individual electronic animal id tags (called EID or RFID) in combination with digitized sire and dam records regarding expected progeny

differences (EPDs). Mark McCully, Vice President of Production for CAB, explains, "Ribeye area, marbling and fat thickness and many other traits can be optimized through EPD evaluation. This information is based on data collected from packers, from ultrasound measurements of yearling bulls and heifers, and from DNA blood samples too. The American Angus Association (AAA) then accounts for pedigree information and computes the EPDs on individual animals registered with the AAA. We even have all this information summarized in dollar value EPDs."
These innovations helped CAB to create higher prices for Angus bulls and Angus cattle. "Cumulative grid premium rewards for hitting the CAB brand target stood at nearly $300 million at the end of 2009, and they keep growing at an annual rate of about $25 million paid to producers." (CAB-a) Such higher prices earned for the carcass are transferred back to all upstream owners of the animal, giving all participants a financial reward. An examination of USDA Market News entitled "5-Area Weekly Weighted Average Direct Slaughter Cattle – Premiums and Discounts" shows that CAB premiums relative to Choice exhibit variation between slaughter plants. Consequently, feedlots selling to different slaughter plants may not receive the same premium payments. Such variations, relative to the Choice price level, also exist for Prime, Select, Dairy-type cattle, and other cattle. Such variations likely reflect a differences in plant need (demand) and/or cattle availability (supply). Consequently, each different packer's grid is uniquely designed.

The efficiency of cattle pricing is an area of important area of research. Although a somewhat unresolved research topic, the reason for the importance of such research is best expressed by Vanek, Watts, and Brester who state: "if the marketing chain is not clearly signaling consumer demands for higher quality beef cuts (i.e., more tender, consistent and flavorful) to fed cattle producers, then fed cattle carcass quality would not be substantially improved by value-based pricing methods. Furthermore, feeder cattle (i.e., cow-calf) producers would be expected to ignore the potential for higher fed cattle carcass quality when purchasing bull seedstock." (p.350)

The ten criteria for beef carcasses to qualify for CAB, are presented in Exhibit 2. The first two criteria add value because they pertain to beneficial marbling attributes. "A" maturity, adds value because young beef tends to be more tender than older beef. Limiting the allowable range of rib eye area adds value because the resulting steaks can be cut to a uniform thickness relative to their weight. Requiring a carcass of less than 1,000 pounds adds value. This is because larger size is to be avoided as it results in cuts of meat that are too large and/or because processing plant automation is difficult. (Ward and Vanoverbeke) Less than one inch external fat adds value because less is lost due to excessive low-value trim. Superior muscling pertains to a higher proportion of meat-to-bone and adds value because it enhances yield grade. It also eliminates dairy-influenced cattle that produce cuts with a less desirable plate appearance. Avoiding capillary rupture adds value because it prevents unsightly cuts of meat. Not permitting dark cutters adds value because unsightly meat receives a discount in the market place. No neck hump adds value because it excludes cattle breeds from India and Africa (Bos idicus) which have been shown to provide beef of tougher eating quality.

Because CAB is a brand owned and maintained by the American Angus Association, it is only natural that it be run so as to the benefit of Black Angus cattle owners. In order to qualify for consideration as CAB, the animal in question must also be 51% black hided (black hair is a dominant trait of Angus cattle) or have documented Black Angus genetics.

Marketing Chain Participation

CAB is a voluntary marketing effort held together by each participant's desire to receive an above average price. The CAB beef marketing chain consists of seedstock producers, cow-calf operators, stocker operators, feedlots, slaughter plants, distributors and, restaurants and supermarkets. The only job seedstock producers, cow-calf operators, stockers and feedlots are responsible for is to produce cattle whose carcasses will be accepted as meeting the CAB brand criterion discussed above. This is not easy to do since only 24% of Angus influenced cattle did so in 2011 and this was close to a record-high percentage. (Corah and McCully 7).

CAB and the American Angus Association provide guidance to help producers increase profitability through exclusive use of Angus genetics to achieve a predictably higher acceptance rate. CAB's Industry Information Director, Steve Suther, states, "the Angus breed has great predictability and data base information. By breeding 100% Angus genetics, cow-calf operators can stack that predictability. Building cow families, many have achieved more than 20% Prime and 70% CAB acceptance."

The meat packers, distributors, restaurants and retailers who use the CAB brand must all fulfill licensing agreements and audit requirements to maintain their right to participate. Beef packers pay a commission fee to participate in CAB. The commission fee ranges from $0.01 - $0.07/lb. The packer is the logical location for levying the fee because this is where carcass eligibility is determined. Also all carcasses must pass through the limited number of packers. This fee constitutes the only revenue CAB receives. Other CAB marketing chain participants do not pay a fee. In total there are 30,000 members of the American Angus Association, 28 CAB-licensed packing plants, 124 CAB-licensed foodservice distributors, 91 CAB-licensed retail distributors, 8,000 CAB licensed restaurants, and 6,000 licensed retail stores which sell CAB.

Competition Among Beef Brands

Initially vertical coordination efforts in the beef industry were referred to simply as marketing alliances. Writing back at that time, Schroeder and Kovanda stated, "… beef alliances have taken two paths in design structure: equity-based and non-equity-based. Equity-based alliances require a financial investment to participate, often by purchasing shares in the alliance. Non-equity-based alliances require a formal agreement but no financial investment." (p.399) Schroeder and Kovanda also noted that, "one of the main choices that beef alliances face is how to compensate alliance partners for profits generated by the alliance itself. Sharing of positive and negative marketing margins and sharing profits generated from increased coordination are the two most common forms of compensation. Designing the mix of these compensation alternatives has critical impacts on the economic signals communicated to alliance partners. As a result, vertical coordination can be stimulated or hindered by alliance design." (p.399)

Views of CAB-Licensed Distributors

CAB's vertical coordination was aided by the fact that no up-front investment was required by any marketing chain participants. Almost from the start, CAB emphasized a pull-through-demand strategy focusing on serving the needs of established meat distributors. Today this

strategy is still in evidence. Robert Turbow, Vice President of Sysco's Specialty Meat Group Contracting Team states, "selling is not an easy job. It takes determination and resilience. Once you've worked hard to gain the trust of your customers, the last thing you want to do is to let them down: in price, quality or service. CAB has always allowed us to sell with confidence. When a chef tries a Certified Angus Beef steak, well aged and cut to their specification, there is no doubt that steak will provide a memorable dining experience."

Tim Husman, the President of Newport Meat Company states, "top of mind, the quality of the product is as powerful as the brand. So I buy CAB for three reasons. First, it is the most consistent, high quality beef I can find. In order to provide value to the end user, the beef must perform well in the dining room. Second, the integrity of the people associated with CAB is very high. Third, it is fun to sell and see our customers succeed with it. Our success is only as good as theirs."

Robert Turbow sheds light on the competition faced by CAB. "There are several other quality upper-Choice programs out in the market right now. If we didn't have the benefit of selling as a licensed CAB distributor, I would take a serious look at Sterling Silver. Tyson produces a strong program in Chairman's Reserve also. The programs I mentioned have drawbacks though. They are program specific to each packer, meaning you have just limited your supply…and neither one is breed-specific like CAB. This makes the program less consistent than CAB."

Once distributors put the word out that they want CAB, then packers serving such distributors have the opportunity to make sales at profitable price levels. Consequently, packers adjust their grids to reward the CAB-qualifying carcasses which are needed to do this. Further upstream, feedlot operators want their cattle to qualify for these higher prices, as this attracts the retained-ownership business of cow-calf operators, helping their feedlots to operate profitably. These cow-calf operators benefit from the higher chance of CAB acceptance. The linkage culminates at the final upstream point, that of the seedstock producer who is able to sell their bulls for an enhanced price.

The Role of Other CAB Partners

Jerry Bohn is the General Manager of Pratt Feeders in Pratt, KS. "We enter calf data into CAB's system, letting them know which cattle are likely eligible for CAB acceptance. Once these cattle are slaughtered, the cow-calf operator can, from CAB, learn how each animal did and make breeding decisions accordingly. Our job is to do a good job of feeding. When calves come to us preconditioned with good supplement support and weaned, they are much more likely to be successful."

Because CAB's model focuses solely on attributes increasing sales prices and sales volumes, all participants are free to act in their own self-interest and little external coordination is necessary. Even so, CAB does facilitate education, and sales promotion along the entire food marketing chain. For example, seedstock producers benefit from the Angus Source® program which provides the USDA Process Verified Program for the tracking and validation of animal performance. In this regard, from the slaughter plant to the seedstock producer, animal genetics and ownership are verified. Further, cow-calf and stocker operators can access educational materials. Feedlots can be licensed by CAB and receive help in developing their incoming

supply of animals. Food service distributors benefit because they have dedicated CAB sales territories. Restaurants and food retailers benefit by being able to use and advertise their CAB product offerings. Exhibit 3 summarizes CAB's various activities in regard to the above.

Competing Brand Strategies

With several different shopping formats and over 300 locations in both Texas and Mexico, retailer HEB must satisfy a wide range of customers. HEB offers many different types and/or brands of beef including: value-ungraded; Select; HEB Natural Angus Beef; HEB Prime1®, Kobe (Wagu) Beef; Central Market® Organic; Grass Feed Beef; and Texas Beef. HEB has been selling Natural Angus for eight years and this is their brand that competes head-to-head with CAB. Natural Angus is guaranteed to have no antibiotics or hormones with much of this beef coming from Meyer Ranch in Montana.

Craig Huffhines, the executive vice president and CEO of the American Hereford Association, explains, "CAB is in fact the most successful branded beef business model in the US beef industry. Today the US beef industry is estimated to be over 70% black-hided in color with a high percentage of straight bred Angus genetics. However, the use of crossbreeding utilizing two or more diverse breeds to produce heterosis/hybrid vigor and breed complimentarity from a production standpoint versus the straight breeding of the commercial cow-calf population is currently the great debate of modern animal breeding. Production economics often times trump market-price incentives for traits that are more vital to cow-calf producer profitability (traits such as fertility, heifer pregnancy rate, survivability, longevity, and hybrid growth), particularly when only 24% of black-hided cattle qualify for the brand premium."

Charlie Bradbury, the Chief Executive Officer of Nolan Ryan All Natural Beef, credits CAB for pioneering the development of USDA certified brands of beef. However, Nolan Ryan All Natural has taken a very different approach. CEO Bradbury explains, "we developed a program using southern-adapted cattle. Then we visited experts and hired consultants to conduct studies. We wanted to address the perception that these cattle often produced beef with a tougher eating characteristic. After this research, we developed a HAACP-like program with a focus on identifying tender beef and avoiding tough beef. We use a second generation Infrared camera to select carcasses with desirable tenderness. We also age the carcasses we purchase. This and other procedures allow us to rely on more than marbling to insure a great eating experience. The Nolan Ryan name and the marketing efforts we put forth around that name incentivize the consumer to try our products the first time but the success of the scientific selection process is what propels them to become loyal repeat customers." Today, Nolan Ryan Beef is sold in all Kroger stores in Texas and Louisiana. Further the brand is advertised on television by Kroger Southwest Division President Bill Breetz, a personal testament to its success.

A look at websites for major packers such as Cargill, Tyson and JBS shows that, when taken together, these packers are listing forty-six different brand names for beef. Further, it is likely that they produce many more labels than those listed. Craig Huffhines, of Certified Hereford beef explains the economic reasoning for so many brands: "Because CAB is licensed to virtually every packer in America, it can at times fall prey to commodity markets if CAB supplies get long or consumer demand is seasonally low. A unique packer brand is an attempt to avoid these

seasonal demand shifts and commodity price wars. There is a tremendous amount of marketing investment to avoid commodity devaluation."

One unique packer brand posing a strong challenge to CAB is Cargill's Sterling Silver. Advantages which Sterling Silver has include the fact that it is only packed in three plants and that all those plants have electronic (camera) grading.

Sustaining Positive Brand Differentiation

A challenge faced by Certified Angus Beef® pertains to the many fast food restaurants marketing Angus branded products. These businesses have the right to claim that their beef comes from the Angus breed of cattle. The breed, however, is not the same as the Certified Angus Beef® brand name and it specifications (Exhibit 2).

John Stika, President of Certified Angus Beef®, summarizes this challenges as follows, "Angus has evolved into something more than the original intent for what our brand was. That has created confusion because today Angus product represents the gamut of quality levels and eating experiences. Since day one [we've positioned our program on] taste and that there are different eating experiences. Our tagline says we're 'Angus beef at its best.' We identify Angus as a category and challenge the consumer to question the differences about others out there. Certified Angus Beef is sold at some of the highest-end restaurants and retail markets in the country, and yet we also see generic Angus beef in fast food. We're trying to communicate that…not all Angus is created equal." (Johnston 4).

One can define Angus confusion (i.e., the failure to distinguish the purchase of any beef from the Angus breed versus the purchase of CAB) as a problem of stimulus generalization. Miaoulis and D'Amato state, "…If the respondent reacts identically to the two [different] stimuli, one could take this to mean the respondent does not distinguish between the stimuli at all….We take the position here that 'confusion' is in effect stimulus generalization."

Exhibit 4 shows that as of December 20, 2011 there were six different fast food restaurant chains promoting Angus products. Arby's website, perhaps the most aggressive, states that: "Angus Beef is regarded as some of the best beef in the world for its fine quality, amazing flavor and exquisite marbling. At Arby's we only serve 100% Black Angus beef, lightly seasoned with just the right touch of our special blend of cracked black pepper, herbs and spices. Our premium 94% lean top round is oven roasted to perfection and served freshly sliced for the 'ultimate' in Angus." Every impression is given to the consumer that this dining experience will be superior, even though it could very easily be the case that the CAB criteria in Exhibit 2 are not satisfied. At retail stores a similar problem can exist.

Angus confusion can open up the doors for non-Angus competition. According to Craig Huffhines, "the desire for retailers to private label their own Angus brand has initially made Certified Hereford Beef's growth challenging. However, as "me-too" programs lose their luster and the Angus name has become more of a commodity, differentiation of other quality focused brands has become more appealing. Certified Hereford Beef currently enjoys a 4% market share within the branded beef category, but has experienced double digit growth in the last three years."

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Exhibit 5 shows that consumers can have a wide range of brand recognition levels. The lowest is little/weak identity. Confusion is the next highest level of recognition where the brand name in question is only able to create the same stimulus as similar sounding/appearing names. The next highest level is that of strong identity. This is where CAB brand managers strive to reside, even though advertising approaches like that of Arby's continually drag a certain segment of customers backwards to confusion. The highest level of brand recognition is Genericide. Although very rare, as it name implies, Genericide is not a level to which any brand manager should aspire. Taylor and Walsh state that, "brand names such as Monopoly and Thermos have been ruled generic and have lost their trademark protection." (p. 160) Consequently, CAB's on-going efforts to distinguish itself from all other beef and other certified brands of beef are important.

For Discussion

1. List the different vertical coordination efforts CAB undertakes so as to assist all its different marketing chain partners. Such partners include seedstock producers, cow-calf operators, stockers, feedlots, packing plants, food distributors, retailers and restaurants.
2. From the point of view of Angus cattle owners, what are the beneficial (and also the damaging) implications of Angus confusion? Next, repeat this exercise from the point of view of CAB program managers. How might short-run, and alternatively long-run, implications play into the viewpoints of these two groups?
3. What specific business benefits does CAB currently experience due to its first-mover status?

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Exhibit 1.

The Beef Carcass Certification Programs Policy of the USDA.*

1. Specific requirements will be determined by the originator of the program and will be included in the publicly available specification approved by the LS Program.

2. Certification will only be provided to carcasses with an official USDA quality grade.

3. Programs with a range of quality extending to more than two quality grades must identify the actual grade of the product in each package.

4. Terms indicating a non-specific or unofficial level of quality (e.g. "premium") must be preceded by the company's name in the carcass certification program name and on all labels.

5. Claims of breed of cattle must meet the requirements promulgated by the appropriate U.S. breed association.

6. The Food Safety and Inspection Service (FSIS), Labeling and Consumer Protection Staff must approve labels for products making a breed claim and/or referencing USDA Certification.

7. All point of sale and marketing materials (i.e., other than product labels) shall list the claims that are certified.

8. USDA Certified shall not precede a breed name, and can only be used in reference to a certified "program."

9. Carcass certification program originators are responsible for subsequent use, or misuse of labels and marketing materials by handlers and marketers of their products. The finding (by USDA) of materials not in compliance may result in cancellation of the carcass certification program….

* **Source.** USDA, AMS, Livestock and Seed Program, Livestock and Seed Program, LS Policy: SP-2, Approved July 25, 2002. Note that the above represents an abbreviated and partial description of the full Procedure, SP-2, which contains twelve different detailed policy points.

Exhibit 2.

Carcass Criteria for the Certified Angus Beef® Brand*, **, ***

1. Modest + marbling
2. Medium to fine marbling texture
3. A maturity (i.e., approximately 9 to 30 months of age)
4. 10 to 16 square inch ribeye area***
5. Carcass less than 1,000 lbs.***
6. Less than 1" external fat***
7. Superior muscling
8. No capillary rupture
9. No dark cutter
10. No neck hump greater than 2 inches

* The information presented here is given in more detail in USDA Schedule G-1.
** In order for a carcass to be considered for inclusion in the CAB program, the beef animal in question must be 51%, or more, black hided or have documented Angus genetics. (Refer to point 5 in Exhibit 1.)
*** In 2007 these three specifications (numbers 4, 5, and 6) were replaced a single specification requirement for USDA Yield Grade of 3.9 or better. This change was made in order to better satisfy the fabrication needs of CAB customers. Specifically, this change was made because the on-going trend of increasing beef carcass size, while beneficial to cattle producers, was not beneficial to the CAB Brand consumer. [Suther].

Exhibit 3.

Marketing Chain Assistance from the American Angus Association and also from CAB

Stage in the Marketing Chain	Assistance Provided
Seedstock Producer	Angus Source®, provides a USDA Process Verified Program to enhance the marketing of Angus cattle. For any carcass, this program serves as documentation for the source animal, its genetics, and chain of ownership of the animal. Educational resources are also provided for assistance with genetic selection.
Cow Calf Operator	The CAB partners website pertains to all aspects of running a successful cow-calf operation. A "cow-calf guide" which is a best practices manual.
Stocker	A "stocker and backgrounding guide" which is a best practices manual.
Feedlot	Program advertising licensed feedlots to cow-calf operators and stockers. Provide assistance to licensed feedlots for incoming supply development.
Beef Processor	The carcass criteria (Exhibit 2), production of, and use of the brand.
Food Distributor	Certified Angus Beef® logo, POS material, training and education.
Restaurant	Certified Angus Beef® logo, POS material, training and education. Interactive web search locator
Retailer	Certified Angus Beef® Logo, POS material, training and education. Interactive web search locator

Exhibit 4.

Fast Food Menu Offerings Featuring the Word "Angus" as of December, 2011

Restaurant	Number of U.S. Stores[g]	Specific Terminology by Which the Name Angus is Presented	Number of Different Menu Items Using Angus Name	Types of Items
Arby's[a]	3,649	Ultimate Angus	Three	Sandwiches
Carl's Jr.[b]	1,097	100% Black Angus Beef Six Dollar Burgers	Five	Burgers
Hardee's[c]	1,692	100% Black Angus Beef Thickburger	Thirteen	Burgers
Krystal[d]	364	Big Angus	Four	Burgers
McDonald's[e]	14,027	Angus	Eight	Burgers and Wraps
Quizno's[f]	3,103	Black Angus on Rosemary Parmesan	One	Sandwich

Sources.
a. arby's.com/menu,
b. www.carlsjur.com/system/pdf_menus,
c. www.hardee.com/menu,
d. krystal.com/menu,
e.www.mcdonalds.com/us/en/full_menu_explorer,
f. www.quiznos.com/menu,
g. www.qsrmagazine.com/reports/top-50

Exhibit 5.

Range for Consumers' Brand Name Recognition

	Little / Weak Identity	Confusion	Strong Identity	Genericide
Consumer Recognition:	Unfamiliar with brand name	Brand name creates the same stimulus as similar names	Brand name conveys product from a single source	Brand name becomes so common it is declared invalid by the courts

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