SURVEYING THE FEASIBILITY OF A VOLUNTARY BEEF CHEKOFF: DO DEMOGRAPHICS AND ATTITUDES MATTER?

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INTRODUCTION

Background

A cattle producer who desires to promote beef consumption faces two options. The first is establishing some criteria to differentiate or brand their beef as different, and in some way superior to all other beef. This requires assuming additional costs with no guarantee of a reward, as most beef is quite similar and the federal government already sorts and clearly identifies beef by quality grade. The second option is a cooperative effort, where multiple producers pool their money to generically promote beef. However, unless participation was mandated, all producers, regardless of participation, would enjoy the benefits.

This is the dilemma that encouraged beef producers to authorize a generic marketing assessment in 1987. The beef checkoff collects one dollar on each head of cattle sold in the United States, and an equivalent amount on foreign cattle and beef. The fee is levied each time cattle change ownership, so an animal may generate several dollars for the program over its lifetime. The entire program collected $84.3 million in revenues in 2003 (Cattleman's Beef Promotion and Research Board). Approximately half of these revenues remain in the state where they were generated to fund marketing oriented agendas put forth by state beef councils. Assessments collected on foreign cattle are kept solely for the national campaign, and in 2004 accounted for approximately $8 million (Henderson, personal communication). The Cattleman's Beef Board (CBB)

consists of 111 representatives from states with more than 500,000 head of cattle. Members are nominated by their respective states' beef council based upon cattle populations (one member for 500,000 head, one member per each additional 1,000,000 head) and are appointed to the CBB by the Secretary of Agriculture.

The CBB annually establishes federal expenditure of checkoff revenue with an allocation over several activities. Advertising beef is the primary focus, occupying 53% of the budget for federal checkoff dollars in 2004. Another significant proportion of money is spent on marketing research[1] relevant to the beef industry; food safety and new product development are examples of items in this category. Some of the other activities funded by federal checkoff dollars are foreign market development and consumer education.

Replacement Beef Checkoff?

The Beef Checkoff was initiated in 1987 with approval of 79% of producers. Estimates of producer support are frequently sought by concerned industry organizations, especially those that receive checkoff dollars. The CBB funds regular third party inquiries of checkoff support. The most recent survey was conducted in January of 2004 by Aspen Media and Market Research and concluded that producer support was approximately 70%. Support levels change over time. The discovery of a BSE infected cow in December of 2003 is an example of an event that may change producer support levels quickly. Producers realize that no one individual or organization possesses a credible enough or sufficiently loud voice to provide adequate damage control. In a time like this, checkoff dollars are used to communicate the position of the beef industry, and

[1] Marketing research refers to an activity that seeks to increase the demand for beef. The beef checkoff is prohibited from funding research that reduces production costs.

inform the public what is being done to handle the problem. Managing public relations is one example of how the beef checkoff possesses the characteristics of a public good.

The pork industry enacted a checkoff program along side the beef checkoff, and five years later a mushroom checkoff was established. Initially, all three programs funded marketing campaigns by mandatory per unit fees on the sale of their respective commodities. The pork checkoff has been ruled unconstitutional by a U.S. district court (October 2002). The mushroom checkoff has received the same ruling by the U.S. Supreme Court (November 1999). The beef checkoff has recently received an unconstitutional judgment at the federal level (June 2002), and the case has been denied an appeal. The Supreme Court will hear the case but the precedent set in the mushroom case may lead to a similar ruling.

Considering the apparently widespread support for the mandatory checkoff and the increasing likelihood that the program will be halted, several states have taken steps to create replacement checkoffs. Oklahoma and Texas have established a framework for state-level voluntary programs where producers are assessed a per head fee, with a provision to allow producers to seek a full refund. These programs are to be enacted upon the cessation of the current beef checkoff. The Tennessee agriculture commissioner put a referendum before the states' cattle producers asking whether the state should institute a similar program. With a total of 1441 responses, the referendum passed with a 79% approval rate. Finally, the Nebraska beef council has charged itself with researching and creating a similar state program.

A voluntary state checkoff with the goal of increasing state-specific beef demand would surely not meet that goal. Consumers will be unable to differentiate beef by state

unless a state-of-origin program was enacted. In the event that such a program were enacted, it is unlikely that state allegiance to beef producers would cause the demand for beef from one state to change noticeably.

It may be in the interest of these states to collaborate on voluntary state checkoffs in order to maximize their benefits, especially if a large proportion of funds from these checkoffs were allocated to advertising. State beef councils under the current checkoff collude to allocate part of their state-level money beyond state lines. *The Federation of State Beef Councils* has ten seats on the national board and cooperatively allocates some state money.

The Florida Orange Juice program provides a model for state-level checkoffs. Lee and Fairchild found that non-Florida growers received a higher benefit from Florida orange juice advertising than in-state growers. Any state not implementing its own beef checkoff would free-ride on those states that did. Producers may be inclined not to participate because producers from other states would enjoy the same benefits at no cost.

The checkoffs currently under development are likely not to be the last, and a national voluntary checkoff could be created. It is likely, and in the case of Oklahoma, Texas and Tennessee already evident, that a replacement checkoff will be structured to maintain the Federation of State Beef Councils. By using a checkoff construct similar to that of the current program, administrators of a new program would be able to take advantage of existing infrastructure and established procedures. However, a voluntary replacement checkoff will have to include provisions that specify how producers may abstain from donating. Potentially the easiest way to establish a means of abstention is to collect money on all cattle sales, as is currently done, but offer producers a refund if they

request one. Oklahoma has used this method in legislation that establishes its voluntary beef checkoff. [2]

Another way that fees might be collected voluntarily is to ask producers to donate rather than require them to do so. This method is likely to generate less participation than a checkoff with mandatory collections and refunds on request. There is a documented relationship in the manner by which programs seek participation and the observed participation rate (Johnson and Goldstein). Consider organ donation. Many European countries have organ donation policies where all people are donors unless steps are taken to "opt out." Organ donation rates in these countries are frequently in excess of 90%. Other nations, including the U.S., have systems where donors must "opt in." Donors in these nations typically account for less than 30% of the population. A checkoff could expect higher participation if producers had to opt out.

Another consideration in encouraging participation is the use of a minimum participation rate. The establishment of a level of participation below which all money is returned is called a Provision Points Mechanism (PPM). By reducing uncertainty about the extent of free-riding, this method has been employed successfully in the laboratory and the field (see Poe et al.) to increase participation in the provision of voluntary public goods. Consider a recent experiment by Messer, Kaiser and Schulze, their experiment established a generic advertising program with repeated donations in a laboratory environment. By the eleventh round the program with the PPM experienced a participation rate 28.8% higher than the same program without a PPM

New checkoffs will also be faced with deciding how to allocate funds. Although any checkoff will likely include a marketing program, there are a number of ways in

[2] See House Bill 2620 from the 2004 legislative session.

which funds can be allocated to fund marketing activities. Advertising, research, education, foreign market expansion or any number of other activities may be beneficial at the state and/or federal level. Ultimately however, a checkoff will need to fund activities that are favored by producers. Producers have perceptions regarding the effectiveness of different activities and will be more likely to participate in a program that undertakes favorable activities.

It appears that a voluntary program will emerge in order to continue activities currently undertaken by the beef checkoff. However, an estimate of expected participation has not been conducted, and is needed by industry organizations, producers and state and federal government. This estimate is important as the beef industry considers whether a checkoff could be funded at a reasonable level. Since no market transactions are available to observe producer preferences for a checkoff, a hypothetical experiment is necessary to estimate willingness-to-donate to a checkoff. A number of techniques have been employed to this end including auctions, contingent valuation and choice experiments. A preliminary step will be identification of the most appropriate method for this issue. The result will be an estimated participation rate for a voluntary checkoff.

Support levels for the current checkoff have been frequently estimated and have consistently suggested majority support by producers. However, a voluntary checkoff is not the same program and little is known about producer attitudes towards such a program. Producers will choose to contribute to a checkoff based upon preferences for the per-head fee, the activities that the checkoff funds, and the level where the minimum participation rate (MPR) is set (if a MPR is used). Little is known about these attitudes

and how they could be expected to contribute to the choice to participate in a checkoff. Furthermore, no information is known about the difference in producer attitudes between a national and a statewide voluntary checkoff.

Objectives

Is a voluntary checkoff viable? Emerging checkoff(s) will not be expected to have 100% participation. Some people will be unwilling to donate under any circumstances. There may be types or groups of producers whose members, on average, are less likely to participate in a state or national checkoff. This study is focused on the question: is voluntary beef checkoff feasible? The question is approached from three fronts.

(1) Measure producer preferences for a voluntary checkoff

Fee per head sold, expenditure allocation, and minimum participation rate are three attributes that make up a voluntary beef checkoff. The levels at which these attributes are set will largely determine which producers choose to participate. A national voluntary checkoff is, in theory, a different good than a state voluntary checkoff. Research will begin with an examination of producer preferences for attributes of an Oklahoma and a national checkoff.

(2) Use preferences to identify a utility maximizing checkoff

Each producer will have different preferences for the attributes of a checkoff. However, should a checkoff emerge, administrators will have to choose a specific level for each attribute. The incorporation of producer preferences in checkoff design is important in order to encourage participation. How can the "best" level be determined? A hypothetical checkoff will be designed in the realm of a mail survey, through the use of a choice experiment. Analysis of the choice experiment employs conditional logit to

estimate a utility function for a checkoff. The utility function can then be used to design a utility maximizing checkoff.

(3) Evaluate the role of demographics and attitudes towards the propensity to participate in a voluntary checkoff

Taking into account the effects of demographics and attitudes may enhance the prediction power of survey results. The cattle industry consists of several types of production and many individuals, and there may be correlations between demographics and attitudes and preferences for a checkoff. Since the demographic makeup of survey respondents will not exactly correspond to that of all cattle producers, it is necessary to account for any trends in propensity to donate by group. Doing so allows survey respondents to be compared to population of cattle producers, making out of sample predictions more precise.

The next section provides a recap of past research regarding the mandatory beef checkoff, survey and analysis techniques and an overview of some theoretical issues with respect to a voluntary beef checkoff. Following that is a description of the survey with a look at each question asked on the survey. The development of the choice experiment, which employs random utility theory, will follow. Results are presented next, and concluding remarks are provided in closing.

LITERATURE REVIEW

Beef Checkoff Research

The United States Congress passed the Beef Promotion and Research Act in 1985, which created the Cattleman's Beef Promotion and Research Board (CBB). The primary role of CBB is administering the beef checkoff (hereafter, "checkoff"), which it has been doing since 1987. The checkoff is a marketing order that assesses cattle producers a per head fee in order to provide generic beef advertising and industry related research. The checkoff was established to promote beef demand through advertising, food safety and market research, export development, consumer education and other activities. Naturally, there have been multiple inquisitions as to whether or not these activities are effective in changing beef demand (Ward, Moon and Medina; Ward and Lambert; Kinnucan et al., Brester and Schroeder; Wohlgenant and others). The findings of these studies are as follows.

Ward, Moon and Medina sought to estimate demand changes in beef directly attributable to the checkoff. The 2002 study examined beef demand in three ways. Household consumption estimates were made using two different data sets. A third estimate was made regarding live cattle price change attributable to checkoff activities. The household studies suggested consumption has increased between five and six percent over the course of the checkoff. At the live-weight level, Ward, Moon and Medina found

a return of $ 5.67 for each advertising dollar. A previous study found similar results regarding the success of checkoff advertising activities (Ward and Lambert).

Other estimates of returns to advertising from the checkoff have been significantly lower than those found by Ward, Moon and Medina and by Ward and Lambert. Kinnucan et al. examined the effects of health information and advertising on beef demand, concluding that *" while we can be confidant that meat consumption patterns are influenced by relative prices, total meat expenditures, and health information, no such confidence can be placed in the effects of advertising."* [3] Brester and Schroeder, also estimated returns to advertising and found much lower estimates than either the Ward, and Lambert or the Ward, Moon and Medina studies. Coulibaly and Brorsen critique Ward and Lambert and Brester and Schroeder and provide a discussion of differences between the two studies. A data problem is proposed as being responsible for the high levels of advertising success concluded by Ward and Lambert. Problems were identified with both studies, but the stability of the results in Ward and Lambert deteriorated a great deal more than did those observed in Brester and Schroeder as a result of the problems.

Recall that the total collections for the checkoff in 2003 were $84.3 million, this is certainly a significant sum of money for marketing activities. However, consensus is generally found as to the importance of the size of the industry relative to the checkoff budget (Ward, Moon and Medina and Kinnucan et al.). The average beef animal weighs approximately 1,150 pounds at the time it is marketed; at early 2004 prices, that animal would be worth about $1000. Assume that, as in Hogan, a beef animal sells 2.74 times on average, thereby generating $2.74 for the checkoff. This amounts to amounts to three

[3] Note that some of the promotional activity was checkoff funded, but all of it was generic in nature.

tenths of a percent of the animals value going toward the checkoff. From an empirical standpoint, there may be statistical problems associated with estimation of returns from checkoff activities. The scale of activities is quite small given the size of the beef industry (Kinnucan et. al).

Research is the other checkoff-funded activity that has been evaluated in the literature, although to a lesser extent than advertising. The checkoff is constrained to fund marketing related research. An example of marketing research funded by checkoff dollars is the creation of new steaks such as the flatiron. This steak is made from cuts that were formerly of low value. The value of the carcass is enhanced, since a steak commands a higher price than a roast or ground beef.

The literature is mixed regarding the benefits of research and advertising. Wohlgenant suggests that producers may be best off by spending checkoff dollars on research aimed at farm-level cost reduction (if it were allowed), followed by advertising and lastly marketing research. Chung and Kaiser suggest advertising should be most preferred, noting that Wohlgenant's results are quite sensitive to an assumption about beef demand, one that may not be accurate. Actual benefits from checkoff expenditures may be highly correlated with the producer perceptions for expenditure allocation. Furthermore, the relative benefits from research and advertising are important as the beef industry considers the design of a future checkoff. However, in a voluntary checkoff, participation is determined by perceived benefits, regardless of correlation with actual benefits. As a result an accurate measurement of producer preferences for research and advertising is important to consider, and will be the objective of this study with regard to checkoff benefits.

What tools are available to study a voluntary checkoff? Since no market transactions are available for observation, some other method of demand estimation must be employed. The hypothetical construction of a checkoff for an experiment provides a way to estimate demand for a checkoff.

Willingness-to-pay

Although several state legislatures have taken steps to establish a checkoff, there are currently no such programs in action, providing no historical data. Therefore hypothetical checkoffs must be created to generate data. Demand estimation is not the same under hypothetical and observed conditions. Willingness-to-pay (WTP) is a term used to describe an inverse compensated or Hicksian demand (Lusk and Hudson). The WTP estimate provides the maximum amount that an individual would pay for something at a given level of consumption. Recall that a Hicksian demand is a function of prices given a level of utility. Thus, the researcher is faced with setting up a utility maximization problem. When there are no revealed preference data available from market transactions, the researcher needs to create a hypothetical study to assess probable actions. This is called a stated preference method, and has become a standard tool to analyze a variety of goods and policies (Carson, Flores and Meade).

WTP can be estimated in three ways: contingent valuation, experimental auctions and choice experiments (also "conjoint analysis"). There is an active debate within the literature to further the understanding of each method. Both laboratory experiments and field trials are employed in pursuit of the cause. The next three sections provide an overview of each method.

Contingent Valuation

Although not limited to environmental economics, this field is often faced with using stated preference methods, as few environmental goods can be valued using market data. For example, a study by Champ et al. looked at willingness-to-pay for road removal in the Grand Canyon. The study is attempting to assign value to a public good in the sense that people value a pristine, road-free wilderness area, but have no individual incentive to single-handedly undertake the task. Stated preference studies can also be used to value private goods. For example, Lusk looked at the difference in price people will pay for regular rice and genetically engineered golden rice (which has more iron than regular white rice). Both Lusk and Champ et al. used a survey to deliver the experiment.

In some instances of stated preference studies, subjects have an incentive to provide information that does not correspond with true preferences. For example, in the case of a checkoff without a minimum participation rate, people may have an incentive to indicate they would participate when in fact they intend to free-ride[4]. This course of action encourages the development of a checkoff but does not obligate action at a later time. A study design that gives participants reason to provide false information is said to have incentive compatibility problems, and the technique used to elicit data must be carefully considered to avoid the problem (Lusk and Hudson).

It is also possible that a subject could give inaccurate information without knowing they are doing so. Studies have shown that this often occurs because people say they are willing to pay more for something than they actually are. This is called hypothetical bias and is addressed in depth later.

[4] This is not to say that a MPR will change the degree of incentive compatibility, the MPR is included here to aid in defining an example of an incentive compatibility problem.

Many methods have been used to elicit willingness-to-pay; Lusk and Hudson provide a discussion of several popular methods. Contingent valuation (CV) has been the workhorse of many stated preference studies. This method typically presents a double or single bounded dichotomous choice (DC) question. In either case the respondent is asked to respond yes or no to a question asking if they would pay a certain amount for a particular item. A single bounded question stops here whereas a double bounded question does not. If the answer to the first question was no, then the next question presented is the same but offers a lower price, if the initial answer was yes a second question is presented at a higher price (Lusk and Hudson). Lusk used a double bounded DC question that read as follows.

> *…imagine you are in a grocery store and the price of a1 lb. bag of regular long-grain white rice is $X. Would you purchase a 1 lb bag of long-grain Golden Rice if it cost $Y?*

Depending on the response to this question, Lusk then presented the same question with a higher or lower price. Prices are randomly generated and varied in each question. WTP is estimated by repeatedly observing responses as the offer price varies.

A summary of the literature on DC questions is provided by Lusk and Hudson and summarized here. The single bounded question is often used because of the ease of estimation and the incentive compatibility that it offers. Double bounded estimates have the advantage of producing more statistically efficient results, but have a range of criticisms including starting point bias, possible lack of correlation between question one and two and incentive compatibility problems.

Auctions

Both in the laboratory and in the field, auctions are a relatively common tool in demand elicitation (Lusk and Hudson). Several variations on auctions have been successfully used to value a variety of goods. All auctions involve a group of bidders interested in a particular good jointly determining the price of that good. English auctions begin with an opening bid below the expected final price. Participants then publicly bid the price upwards until only the highest bid remains, at which point the good is sold to the highest bidder at the highest bid. Another type of auction is the Vickery or second price auction. Under this format, sealed bids are submitted and the highest bidder again gets to buy the item, but unlike an English auction, the winner of a Vickery auction pays the second highest price. The Becker-DeGroot-Marshak auction presents an interval of prices, and asks the bidder to indicate their maximum bid within this interval. The winner of the auction is determined by choosing a price at random, if the participant's bid is greater than or equal to this price, the participant wins the auction at their chosen price (Rustrom). Rustrom noted that prices determined by each of these three auction mechanisms were not equivalent.

Each auction has the potential to be incentive compatible, but there is no 'best' type of auction for all experiments. Since the behavior of subjects under different auction methods has not been shown to be consistent, consideration must be given to which method is most appropriate. Game theory devotes itself to researching strategies of subjects in experimental economics (see Hagel and Roth). Especially in repeated play settings – which auctions frequently are – participants develop strategies, which may or may not be detrimental to the precision of the estimates. This has obviously not been a

complete discussion of auction strategy and design, but the point is that buyers in an auction have different strategies in different experiments. Consideration must be paid both to auction selection, and the analysis of results.

Auctions provide a convenient way to value goods in a hypothetical setting. The auction allows the researcher the opportunity to observe people making decisions that require market transactions, and it is likely that the incentive to overbid may be effectively managed. However there are a few drawbacks to using auctions. Experimental auctions require a great deal of contact with each individual, and often are conducted multiple times for a single study. The rules must be clear to everyone involved, and people generally must be physically present to participate in an auction. Furthermore, participants must usually be given money to bid with, making the cost of the experiment high compared to other mechanisms, and the number of subjects relatively small. Finally, an auction cannot be used to value a public good. For example, consider the road-free Grand Canyon project studied by Champ et al. Assume that a researcher attempts to estimate consumer WTP for this project. The cost of this project is so high that no one individual could likely afford to fund the project single-handedly. Auctions are formatted such that there is always a 'winner,' however in this case, there are no individuals who could win the auction – fund the entire road removal project – thus, an auction for this project would have no bidders. Even if an individual did somehow win the auction for this road removal project, there are no property rights to accompany winning the auction - no one will likely ever own a deed to the Grand Canyon.

Several studies in the literature have used contingent valuation and auctions provide two methods that have been successfully used to estimate the demand for hypothetical goods. However, the particular problem in this study and a number of critiques of these methods suggests further research. Next, let us consider the choice experiment.

Choice Experiments

A choice experiment (also "conjoint analysis") is another method of eliciting willingness-to-pay (WTP), and has been used in marketing research, environmental economics and other situations where it is desirable to observe the effects of multiple attributes on the decision to purchase. This is a method that presents the subject with several hypothetical goods and asks them to select the most preferable. For example, consider a marketing study of WTP for airline tickets. A conjoint analysis would present subjects with multiple tickets, each of which differs by price, type of food served in flight and window or aisle seat. The subject is then asked which ticket contains the most desirable bundle of attributes. At the conclusion of the study the researcher will know more about how much the typical consumer will pay for a particular seat and type of meal. Lusk and Schroeder note that a choice experiment attains details about multiple attributes of a transaction in one shot, whereas the same level of detail in a CV study would require several repetitions.

Another advantage of this tool is that the choice mimics a shopping experience where the consumer must choose between differentiated products at fixed prices (Lusk and Hudson; Mackenzie; Lusk and Schroeder). This may have contributed to several studies showing willingness-to-pay estimates that approximate revealed preference data

from market transactions (Adamowicz et al.; Carlsson and Martinsson; Lusk and Hudson). In other words, these studies showed that using a choice experiment produced WTP estimates without hypothetical bias. There have been contrary findings where a hypothetical bias was present (Norwood 2005; Carlsson, Frykblom and Lagerkvist; Lusk and Schroeder), and hypothetical bias should not be ruled out in any hypothetical investigation.

Consider a study of WTP for quality-differentiated beef steaks. Even though hypothetical bias was present, Lusk and Schroeder found marginal WTP (the amount someone is willing to pay for one additional unit of a good) to be similar in hypothetical situations and real transactions, indicating that with the exception of overstating WTP, people tend to behave similarly in hypothetical and real situations. To explain the finding of hypothetical with their choice experiment (where others have found no bias), Lusk and Schroeder suggest a problem with excluding an option to choose no transaction. The lack of an option to choose none of the choices is inconsistent with a market decision, and may explain why previous studies found no hypothetical bias using conjoint analysis (Lusk and Schroeder).

After data are collected in a conjoint analysis, a random utility model is specified, where utility is a function of the price of the good and the good's attributes. Random utility theory was developed by Marschak, but an excellent discussion is provided by Train and discussed here.

Conjoint analysis allows the researcher to specify a random utility model consistent with Lancaster's theory of consumer demand (Lusk and Schroeder). Random utility theory models a decision as a function of the attributes of the hypothetical good in

question. Conjoint analysis presents several hypothetical goods, which are defined by a common set of attributes. The level that each attribute is set is allowed to vary, making each choice distinct. The decision maker is asked to indicate which good they most prefer. Each of these choices has a corresponding utility function, and since attribute levels are randomly varied, each choice will correspond with a different level of utility. Utility maximization dictates that the decision maker will select the utility maximizing option. Random utility theory will be developed in greater detail in a subsequent chapter. Multinomial logit is typically employed in conjoint analysis, but other methods may be used as well (see Lusk and Hudson for a discussion).

The advantages to a choice experiment are (1) the ability to measure preferences for multiple attributes in a single question and (2) a resemblance to the 'shopping' decision normally made by consumers (Lusk and Schroeder). However, as far as experimental economics is concerned, choice experiments are a new technique. One of the principle concerns of any hypothetical study is that of overstated WTP. Several methods are found in the literature to manage hypothetical bias, indeed in some studies it appears that simply using a choice experiment may be another technique toward this end.[5] Further confirmation of this finding would increase the attractiveness of this method for demand estimation in hypothetical situations. Another promising finding regarding choice experiments is the observation of similar marginal WTP in hypothetical and real transactions; again however, further confirmation is needed before this finding is assumed as consistent. Although choice experiments seem to be a promising technique, careful consideration should be given to construction and analysis of a choice experiment.

[5] These methods are discussed in the subsequent section.

Hypothetical Bias

Stated preference models often seek to value a good that does not yet exist. As a result, neither researcher nor subject knows for certain the actions that would be taken if the same good were actually offered. In this survey, we ask the potential participant in a checkoff to indicate whether or not she would donate to a program that does not yet exist. There is a well-documented tendency in hypothetical studies for respondents to indicate an unrealistically high level of willingness-to-pay (Norwood 2005; Champ et al.; Poe et al). People often indicate they will pay a certain amount for a good or participate in a program but when asked to follow through, they fail to do so. This overstatement is called hypothetical bias. Some studies propose self-uncertainty as an underlying cause of hypothetical bias (Norwood, Lusk and Boyer; Johannesson et al.). Self-uncertainty simply refers to the notion that people asked hypothetical questions often do not know how they would behave in real situations.

Hypothetical bias will enter stated preference methods differently depending on the issue. The voluntary checkoff we present, and likely any that actually emerges, will be an all-or-nothing program. Participants either donate one lump sum or none. As a result, the hypothetical bias we observe will come from people who indicate they will donate but do not actually do so, similar to the willingness-to-pay for green power study conducted by Champ and Bishop. This is somewhat of a contrast from the hypothetical bias observed in other studies where an individual indicates they are willing to pay one amount and then actually pay a different (usually lower) amount. In managing hypothetical bias then, our concern will be identifying non-participants as opposed to deflating monetary bids.

The preliminary method of dealing with hypothetical bias was proposed by the National Oceanic and Atmospheric Administration, and involved dividing willingness-to-pay estimates in half. This method suggests that people on average say they are willing to pay twice what they will actually pay for a good. List and Gallet attempt to refine this method. They compiled 29 studies in order to examine the difference between respondent actions and intentions. The studies used a variety of techniques to estimate hypothetical bias observed under varied research conditions and for a number of different goods.

Variation in the data procurement process and research topic should influence the degree of hypothetical bias. Indeed, List and Gallet suggest that hypothetical bias is not constant across all situations, observing a range of bias from less than 100% to over 1000%, and noting that public goods display a larger bias than private goods. The typical person does not often consciously assess their value for public goods and thus are prone to larger errors in doing so (List and Gallet).

A checkoff has elements of a public good. No one individual would or could undertake the level of activity needed to administer the program and the benefits are non-exclusive. The checkoff proposed by this survey and by several state legislatures further resembles a public good in that individuals may free-ride on the system, deriving benefits provided by the checkoff without paying. Therefore it is likely that we will encounter a hypothetical bias in this survey.

Calibration

The use of stated preferences has become a standard practice in valuing non-market goods (Carson, Flores and Meade). Results have been promising, but a

hypothetical bias should be expected when people are asked to value a good without having an obligation to pay. If left alone, a hypothetical bias will hinder efforts to obtain valid estimates of participation under a checkoff.

Recent research by Champ and Bishop; Norwood 2005; Lusk; Aadland and Caplan and others has revealed that several additions may be made to stated preference studies in order to help the researcher identify hypothetical bias. A certainty question asks subjects to indicate a level of certainty that stated actions would be the same as real actions, and treats uncertain answers as if the subject indicated they would not participate or pay anything. Cheap talk provides a description of hypothetical bias for the respondent and asks them to keep it in mind as they answer the survey. Each of these tools has been used successfully to mitigate hypothetical bias and both tools are aimed at encouraging respondents to assess their true intentions.

Certainty Question

A certainty question has been used by several recent studies (Poe et al., Champ et al.; Champ and Bishop 2001; Norwood 2005; Norwood, Lusk and Boyer). This tool asks the respondent to rate, on a scale of one to ten, how certain they are that stated actions would be identical to real actions. A ten is typically regarded as very certain and one is very uncertain. Answers below some threshold level of certainty are coded as unwilling to participate regardless of the answer given. Champ and Bishop found that a threshold of eight (where answers are recoded to "no" if less than eight) resulted in actual and stated donations being statistically indistinguishable. Note that using a certainty question does not eliminate hypothetical bias from survey responses. Rather, we look for

hypothetical bias after the fact and attempt to extract the hypothetical bias by data calibration.

The certainty question allows people who feel strongly about an issue a chance to be identified from those who are only lukewarm about it. Assuming that a survey respondent seriously assesses their intentions, the researcher should be justified in placing greater weight on responses from subjects who express higher certainty. Several pieces of research have supported this theory and demonstrated zero hypothetical bias in comparing split sample studies. In these studies, the construct was such that half the subjects received a certainty scale on a hypothetical question and half the subjects were asked for actual donations to match stated intentions (Champ and Bishop; Champ et al.). An example of a certainty question from Champ and Bishop is provided in Figure 1.

On a scale of one to ten, where 1 means "very uncertain" and 10 means "very certain," how certain are you that you would purchase the wind power offered in question one if you had the opportunity to actually purchase it?

1	2	3	4	5	6	7	8	9	10
Very Uncertain									*Very Certain*

Figure 1. Certainty Question from Champ and Bishop

These studies found that calibrating responses with a certainty question and an eight threshold resulted in equal estimates from stated and revealed preferences. However, Poe et al. and Norwood 2005 showed that using a certainty scale with a threshold of eight produced estimates that under-predicted true values. So what can certainty calibration contribute? Note that certainty calibration with a threshold of eight seems to either eliminate hypothetical bias or underestimate WTP. Since uncalibrated estimates likely overestimate WTP, using both uncalibrated and calibrated data creates an

interval that should contain true WTP (Norwood 2005). Next, consider cheap talk. This is another method that shows promise in reducing or eliminating hypothetical bias.

Cheap Talk

Cheap talk does not adjust survey responses; rather it seeks to obtain more realistic responses (Lusk). In employing cheap talk, the researcher introduces hypothetical bias prior to asking a subject to complete the research question. The script defines exactly what hypothetical bias is, and how prevalent the phenomenon has been in previous studies. Next, the respondent is asked to consider what they would actually do if the decision were real and involved giving up money.

Lusk; List; and Cummings and Taylor found that a good deal of detail was needed in a long cheap talk script in order to successfully reduce hypothetical bias. In fact, the cheap talk employed by Lusk was over a page long. This was a dichotomous choice study to estimate willingness-to-pay for golden rice. The script gave an example of hypothetical bias from a previous food study and even explained a suggested thought process to use in addressing the valuation question. The Lusk study showed that willingness-to-pay was reduced by cheap talk. However, because there is no way to observe actual willingness-to-pay for this food item it was not possible to see if the hypothetical bias was totally removed or just reduced.

Aadland and Caplan had split sample data that allowed them to research hypothetical bias in greater detail, and specifically addressed the ability of cheap talk to reduce hypothetical bias. They evaluated willingness-to-pay for curbside recycling in an area where some people currently participate in the program and others have not even heard of curbside recycling. This sample allowed them to look at both stated and

revealed preferences for the same good. Contrary to other studies Aadland and Caplan used a much shorter version of cheap talk; their script was worded as follows.

> *Studies have shown that many people say they are willing to pay more for curbside recycling than they actually will pay when (it/curbside recycling) becomes available in their community. For this reason, as I read the next two curbside recycling fees, please imagine your household actually paying them.*

Although shorter, this script did indeed reduce hypothetical bias. Also of interest, Aadland and Caplan jointly employed both cheap talk and certainty calibration, and found that the two methods jointly reduced hypothetical bias more than either method individually.

The length of a cheap talk script used can be important in reducing hypothetical bias (note the differences between Aadland and Caplan and Lusk). Another factor that contributes to the effects of cheap talk is respondent experience. Lusk and List suggest that some respondents are more likely to respond to cheap talk than others. This may be a similar phenomenon as that of the certainty question. Some respondents appear to be more prone to overestimate their willingness-to-pay. Respondents who are familiar with the topic being assessed are unresponsive to cheap talk (Lusk; List). Put another way, respondents knowledgeable with the survey topic appear to be more certain that they are making an accurate assessment of their value for the good in question.

The literature on both cheap talk and certainty questions suggests that not all survey respondents overstate willingness-to-pay at the same level. The challenge will be to determine which respondents are providing unrealistic responses. As Norwood, Lusk and Boyer point out, it is likely that even calibrated estimates will be biased, however

cheap talk and certainty scales have shown promise in reducing hypothetical bias and may nonetheless help improve forecasts of participation in a checkoff.

Calibration and cheap talk will be implemented in this study to mitigate the effects of hypothetical bias because, under a voluntary checkoff, some cattle producers will not participate. People who do not participate either believe that there are no benefits provided to anyone, or believe that they will receive benefits from a checkoff and do not feel obligated to donate. Whatever the reason, there are people who will free-ride on a checkoff. What does the literature say about free-riders, and is there any way to reduce the number of people that free-ride? The next section will review the literature on free-riding and discuss a mechanism which may reduce it.

Free Riders in Public Good Provision

The decision to participate in a checkoff will be based upon different factors for different cattle producers. One of the foremost things that will be considered by producers will be the determination of an expected participation rate (Isaac, Schmidtz and Walker). Public goods provide benefits to everyone within the scope of the good, regardless of participation. The benefits of a checkoff, while non-exclusive, are also positively correlated with the level of participation. In other words, if few people participate, the benefits will be small. An incentive is thus created for producers to know how many of their peers are participating, and how many are free-riding.

The mandatory checkoff meets most of the conditions of a public good. Under the current program, one dollar per head is collected each time an animal is sold. No matter the stage of production, one dollar per animal is not a considerable percentage of the value of a beef animal. Yet this dollar collected on all cattle sold in a year generates a

significant amount of money (e.g. $84.3 million in 2003). While the current checkoff has many characteristics of a public good, it does not allow for free-riding. The government compels participation and provides substantial civil penalties (large fines) for non-compliance.

The checkoffs under development at the state level (OK, TN, TX and NB) are similar to the current program in many ways, making them resemble public goods. Any public good where free-riding is possible should be expected to have free-riders (Poe et al.). Additionally if state-level programs are enacted, free-riding between states would become a likely possibility. The theory behind interstate free-riding is similar to the expectation of free-riding at the producer level. It would not be practical to differentiate beef by state and information obtained from research is generally non-exclusive, so other states could take advantage of advertising and research without implementing a program. Because free-riding is expected, and will reduce checkoff revenue, it is prudent to consider methods by which free-riding could be discouraged. Are there any techniques that can be used to accomplish this goal?

Provision Point Mechanism

Experimental economics has frequently used voluntary contributions methods (VCM) to study donations to public goods (Rondeau, Schulze and Poe; Hagel and Roth; Norwood 2005). Variations on VCM methods exist but, the overriding idea is that participants are given a certain amount of money with which they are to participate in the study. Participants are asked to use the money to donate to a public good constructed for the experiment. If enough people contribute then the group will receive a profit in excess of their original donation. Hagel and Roth provide a discussion of several experiments

that used a VCM to elicit a value estimate for a public good. While estimates of the magnitude of free-riding are varied, there is sufficient evidence to conclude that free-riding is a frequently occurring phenomenon. Poe et al. and Rondeau, Schulze and Poe both estimate that VCM experiments regularly under-value public goods by 40-60% (evidence of free-riding).

Many experiments concerning free-riders and public good valuation have been conducted in the controlled environment of the laboratory (Hagel and Roth). These studies are often able to approximate true demand for a public good after using repeated iterations with the same subjects. Many applied research projects (including this one) do not have the luxury of multiple attempts at demand revelation. In this case Poe et al. calls for the use of a "one shot" mechanism, and in an experimental setting used a provision point mechanism (PPM) to accomplish the task.

A PPM defines a population of potential contributors to a public good, and establishes a minimum participation rate for this population. If this participation target is not met, all money is returned. Messer, Kaiser, and Schulze implemented a PPM to control free-riding in a laboratory based advertising program and realized participation rates 20% higher than in a similar program, without a PPM. Isaac, Schmidtz and Walker discuss an "assurance problem" as the reason that a PPM is able to control free-riding. The theory is that potential participants in a public good understand the free-rider problem and see the benefits of a public good. The PPM provides a way for participants to assure themselves that they are not providing a good that is heavily free ridden on. True demand has been approximated using a PPM both in an experimental setting

(Rondeau, Schulze and Poe; Isaac, Schmidtz and Walker) and in an applied setting (Poe et al.).

A contrary finding on effective PPM use was reported by Stephen King (the suspense novelist). King conducted an online experiment with his readers. An announcement on King's website stated that a new novel would be provided online at the rate of one chapter per month as long as 75% of people paid one dollar per installment. Readers failed to meet the participation rate before the novel was concluded. Nonetheless, a PPM deserves a closer look for inclusion in a checkoff.

A provision point mechanism is of interest to us for its apparent ability to reduce free-riding under a voluntary checkoff. Both producers and administrators have an incentive to see a checkoff succeed, and the PPM seems to be one way to encourage higher participation rates. However, including the mechanism introduces the risk of triggering a complete refund. A prudent step in designing this survey then, is measuring the influence of a PPM on checkoff participation. Do the potential gains in participation outweigh the risk of a total refund?

Summary

A checkoff appears likely to emerge in several states, and could do so at a nationwide level as well. Since no market transactions are present, studying emerging checkoffs requires the construction of a hypothetical experiment. A survey allows access to a large number of potential respondents and, sent by mail, is not prohibitively expensive. A choice experiment may be presented on a mail survey and has the advantage of simulating a real market decision by presenting several hypothetical

options. While this tool is relatively new, it appears to be incentive compatible, and allows for the examination of multiple attributes simultaneously.

Attempts to value hypothetical public goods typically result in an overstatement of willingness-to-pay. Two tools have been implemented successfully in the literature to reduce this hypothetical bias. Using uncertainty as a means to calibrate answers lessens hypothetical bias by changing the answers of uncertain respondents from "*willing to participate"* to "*unwilling to participate*." Cheap talk informs research subjects that people typically over estimate their own WTP and has been shown to reduce the extent of overestimation. The expectation of a hypothetical bias implies that uncalibrated estimates will likely overestimate WTP. Jointly using calibration and cheap talk will likely produce WTP estimates that are either unbiased or underestimated. Thus, a reasonable approach is to present both types of estimates in a type of confidence interval (Norwood 2005).

Since any voluntary public good is subject to free-riding, the questions addressed by this research seek to understand and minimize free-riding. A provision points mechanism has been used to increase participation in public good provision. However, the implementation of this mechanism carries with it the risk of triggering a total refund and no information is currently available regarding beef producer preferences for a PPM.

The next section begins by developing the survey that will deliver the choice experiment. Later in the section, demographic and attitude questions are developed and presented. Demographics and attitudes are important because they may be correlated with preferences for a checkoff.

DATA AND SURVEY DESCRIPTION

Survey Design and Pretesting

Data for this research have been provided by Bailey Norwood, an Assistant Professor in the Department of Agricultural Economics at Oklahoma State University, from a survey that was mailed in January of 2004. The survey was administered on an 8.5″ by 11″ booklet, printed front and back (a total of four pages). Additionally, an informational insert about the mandatory checkoff was provided outlining both the program and the legal challenges that have been made against it. The first two pages of the survey presented the choice experiment for a national and state checkoff respectively. Pages three and four presented a series of demographic and attitude questions. The survey was printed on paper with Oklahoma State University insignia and a return envelope was enclosed to increase response rates.

Pretesting was conducted using three undergraduate classes at Oklahoma State University with the restriction that only self acknowledged cattle industry participants complete the survey. An animal nutrition class, a cow-calf production class and an econometrics course participated in the pretest. Students were told that their responses were being used for pretesting. In addition, they were informed that their responses were of interest, and instructed to respond as if they had just received the survey by mail. The students were given the survey with the informational page, just as producers would receive the survey in the mail.

A pretest response sheet was included, inviting students to highlight areas that were not clear, questions that did not make sense, omitted questions which needed to be included and the amount of time required to complete the survey. Appendix A provides this pretest form. Responses from pretesting were used to refine the survey format, correct confusing language, and seek perspectives similar to those of the survey sample population. Feedback from these sample subjects was constructive and prompted several minor changes. In addition, the second choice experiment was added after the pretest was used the same format as the first. [6]

Sample Population

The sample population was obtained through the Oklahoma office of the National Agricultural Statistics Service (NASS). A total of 2,950 respondents were chosen to obtain a stratified sample of the Oklahoma beef industry and 705 surveys were returned resulting in a response rate of 23.9%. The sample included the following sectors of the beef industry: weaned calf, feeder/stocker cattle, purebred bulls and heifers, fed cattle and veal calves.[7] Oklahoma has demographics different from that of the national average. Figure 2 displays some of the notable differences between Oklahoma and the national average in production of calves, feeder cattle, and cattle on feed.[8] Also note Figure 3, which shows the percentages of cattle by industry segment owned by producers who responded to the survey.

The largest representation of cattle producers was in the sector of feeder cattle. However, the important thing from a statistical efficiency perspective is that all segments

[6] The "second choice experiment" refers to the state-level checkoff question.
[7] A definition and explanation of each of these producer types is provided later.
[8] These are the types of cattle for which the most robust statistics are kept, and make up the typical commercial beef animal.

of the industry be surveyed, not that the true proportion be represented. Results are studied later to look for differences in propensity to donate due to demographics and attitudes. If there are indeed differences, results may be adjusted to more accurately reflect all producers by comparing survey results to known statistics such as those kept by NASS.

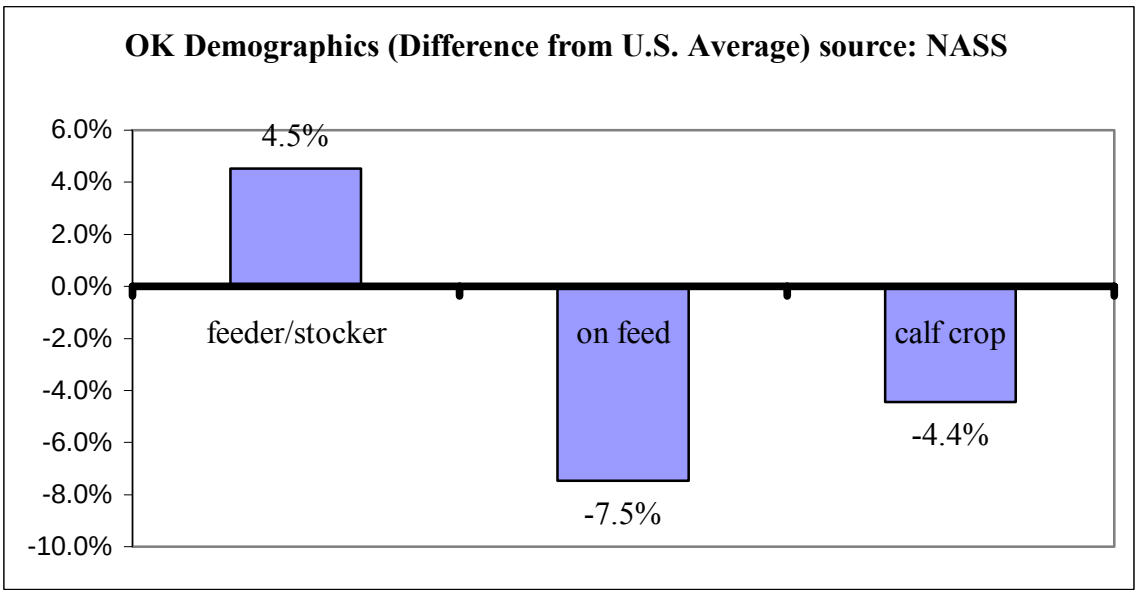

Figure 2 Oklahoma Demographics
Notes: ACTUAL OKLAHOMA STATISTICS: comparison of Oklahoma cattle production to nationwide cattle production for 2000-2003. 0 represents the national average (source: NASS).

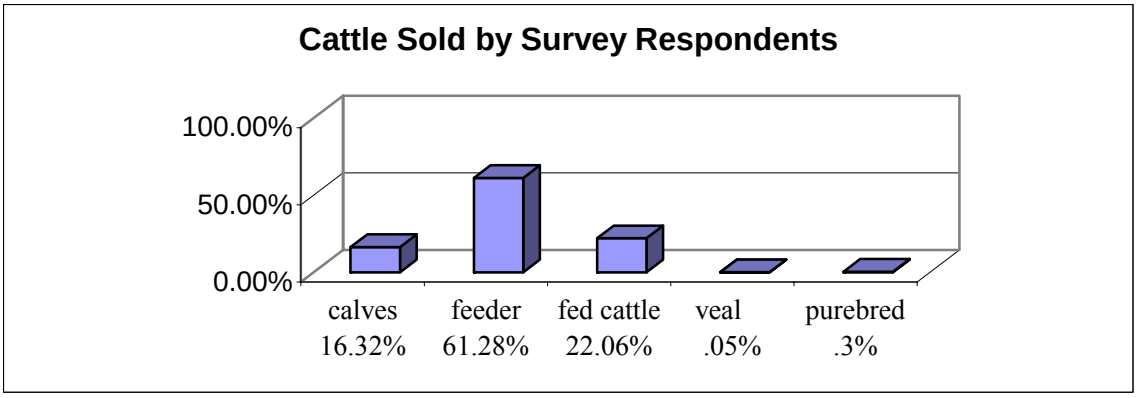

Figure 3. Survey Demographics
Notes: SURVEY STATISTICS (N=705): an estimate of the cattle population represented in the survey. Each category figured by: (*average number of cattle sold* times *number of producers who sold that type of cattle)* divided by *total number of cattle of all types.* All numbers based on midpoints of survey responses.

Choice Experiment Construction

To elicit preferences for a voluntary beef checkoff, survey respondents are presented with a choice between two checkoffs or none, at the national and state level. The attributes that make up each checkoff are varied across surveys by: the amount of the refundable fee; the spending allocation over research, advertising and other; and the level of the minimum participation rate (MPR).

Several constraints must be considered. One consideration important in designing this question is having the total funding allocation sum to one. Advertising, research and other are the only three options provided for budget allocation, as a result they should to sum to one hundred percent. Fee per head sold is another checkoff attribute. At some level of fee, no producers will participate. As a result the survey was constrained so that the fee was 'reasonable.' (e.g. not offering a fee of twenty dollars per head). The MPR is another attribute, and should not take values of 100% or 0% in the choice experiment, as

a MPR taking one of these extremes does not make any sense. Table 1 gives the range that these checkoff attributes took in the survey.

Table 1. Checkoff Attribute Ranges in the Choice Experiment

	Fee	MPR	Advertising	Research	Other
Maximum	$2.00	90%	85%	75%	80%
Minimum	$0.20	5%	0%	0%	5%

Notes: Values were randomly generated and changed in increments of $.05 and 5%

Respondents were presented a total of four hypothetical checkoffs (two nationwide programs and two Oklahoma programs) in two questions, with the possibility to select a refund at both levels. Each question is formatted identically and varies the same checkoff attributes. The primary difference between the state and national checkoff is that a national program already exists. In order to incorporate the status quo of the current national checkoff, the first of the two voluntary national checkoffs has the same expenditure allocation as the current program. Because there is no state program to compare to, the two state checkoffs have attributes that are randomly generated in the same manner as the second nationwide program.

One result of the lack of a status quo contrast may be preference estimates that reflect a greater level of uncertainty at the state-level. Respondents have seemingly less experience with a state checkoff and may be less certain about the value they place on it. Although each state retains a portion of the checkoff dollar, there are no state level checkoffs independent of the Beef Promotion and Research Act. Self-uncertainty (Norwood 2005) could explain the lower explanatory power of the predicted state checkoff. This phenomenon may be more significant in the case of a more novel hypothetical good (statewide voluntary relative to nationwide voluntary checkoff).

Checkoff Attribute	Option A	Option B	Option C
Checkoff Fee	$0.70 / head sold	$0.75 / head sold	Neither A nor B is preferred. If these were the only two options available, I would request my checkoff fees be refunded in full.
Minimum Participation Rate	55%	10%	
Percent of Funds Spent on Advertising and Promotion	53%	65%	
Percent of Funds Spent on Research	10%	15%	
Percent Spent on Other Activities*	37%	20%	
I would choose (please check **ONLY ONE OPTION**)	☐ I choose option A and would **not** request a refund	☐ I choose Option B and would **not** request a refund	☐ I choose neither A nor B. I **would** request a refund

Figure 4. Choice Experiment

Figure 4 presents the choice experiment for the national level checkoff as it was presented in the survey. The presentation of the state checkoff was identical, less the status quo expenditure allocation of option A.

The attributes in the choice experiment, the ranges of which were presented in Table 1, are generated at random to ensure that there are no statistical problems associated with attributes moving together within surveys. Because utility from a checkoff is specified as a function of checkoff attributes, it is necessary to ensure that attributes are independent of each other between the two checkoffs. Information is gained in a choice experiment by observing utility gain or loss from changing attributes, if two or more attributes move together, the utility change cannot be assigned to a

particular attribute. Table 2 provides the summary statistics for responses to the choice experiment.

Table 2. Selection of a Checkoff or a Refund (Choice Experiment)

	Responses (N=705)	
National Checkoff	***n***	%
Checkoff A	284	42.5
Checkoff B	152	22.7
Refund	233	34.8
State Checkoff		
Checkoff A	201	30.4
Checkoff B	192	29.0
Refund	268	40.5

Notes: Distribution of responses between one of two checkoffs or a refund. Recall national *checkoff A* was the status quo expenditure option. The n column is the number of respondents who selected the given option. The n columns do not sum to 705 because some respondents did not complete both or one of the choice experiments.

Cheap talk and calibration have not yet been incorporated. As we proceed to do so, note that in both a state and federal checkoff, a majority of producers prefer a checkoff over a refund.

Removing Hypothetical Bias

The first page on the survey booklet contains a short paragraph providing instructions for completion of the choice experiment. The last sentence in these instructions is the cheap talk script (see Figure 5 for exact wording). The instructions for the choice experiment are identical in both questions with the exception of the differentiation needed to communicate that one of the questions is in regards to an Oklahoma only checkoff while the other is nationwide.

Cheap talk scripts are generally fairly long (Lusk), however a much shorter script is used here. Consider the multiple hypothetical bias management techniques. The

choice experiment itself has demonstrated a mitigating effect on hypothetical bias (Carlsson and Martinsson). Further, the certainty question and the cheap talk script have demonstrated their ability to reduce the effects of overstated WTP in multiple studies (Lusk; Champ et al.). There are three mechanisms that are likely to reduce hypothetical bias estimates, thus it is not necessary to emphasize cheap talk by providing a long discussion. Studies that employed long scripts generally relied solely on cheap talk to manage hypothetical bias.

> *…These are hypothetical checkoffs, and studies have found that people overstate their willingness-to-participate in hypothetical situations. Before answering, please think hard about how you would choose if it entailed giving up real money.*

Figure 5. Cheap Talk

The certainty question does not require significant instruction. People are generally quite familiar and comfortable with rating something on a scale of one to ten; for example, many sporting events are judged on this scale. Recall that using this mechanism to mitigate hypothetical bias involves identifying uncertain answers in which a checkoff was chosen, and recoding the responses such that the uncertain "I would chose checkoff j" will be treated as if the response chosen was " I would choose a refund." The certainty question reads as follows:

> *On a scale of 1 to 10, where 1 means "very uncertain" and 10 means "very certain", how certain are you that you would voluntarily pay the checkoff fee for the option you chose?*

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
very uncertain									*very certain*

Figure 6. Certainty Question

The certainty question is used in both the state and national checkoff, and placed immediately following the choice experiment. The threshold where answers are recoded is set at eight, the same level used in several recent studies (Champ and Bishop; Poe et al.). However, calibration is still a young and somewhat unproven tool, and the level at which answers are recoded is by no means a proven constant. Norwood 2005 succinctly points out that the researcher could return to a data set (if reveled preference data are available) and recode at various levels until an unbiased result is obtained. Nonetheless, using a certainty level of eight seems to be somewhat of a benchmark at this time, and has generated approximately unbiased estimates on several occasions. Since it is expected that calibrated data may provide unbiased results or underestimated willingness-to-donate, uncalibrated results will be provided jointly with calibrated results as a 'confidence interval' (Norwood 2005).

This concludes the formal portion of the choice experiment. However, demographics and attitudes are important, and will later be incorporated into the results of the choice experiment. Let us now discuss some of the demographics and attitudes that may correlate with preferences for a checkoff.

Other Survey Questions

This section provides discussion and summary statistics for demographic and attitude questions. Formatting is as follows: a discussion of each question is presented; including the reason(s) each is asked. Next, the question is given, and finally summary statistics and comments on responses are provided. In addition to verification that the sample population was appropriately broad across all sectors of the Oklahoma beef

industry, these questions will reveal whether demographics and attitudes correlate with preferences for a checkoff.[9]

Demographic Questions

Cattle Operation Demographics

The beef cattle industry has multiple sectors, four of which are involved with the live animal and thus pay into the current checkoff (meat sellers do not pay). The first stage of the production process occurs when a calf is born. This stage is known as cow/calf production. Cow/calf producers typically have a large investment in breeding cows and the land and machinery required to feed, breed and house them. Similar to the cow/calf operator in investment and management, the seedstock producer raises purebred animals to sell to cow/calf producers as breeding animals. After the calf stage (birth-500 lbs.), the beef animal is often referred to as a feeder or a stocker. A feeder animal is about 500 pounds and has been weaned from its mother. Feeder cattle producers typically buy calves from cow/calf producers with the goal of feeding the young animals until they gain several hundred pounds. This stage of production may require ownership of little more than the animals themselves, as feed is typically the only requirement and is often obtained by renting pasture. The final stage in beef production (for the live animal) is the feedlot. The feedlot operator confines many animals and feeds them concentrated rations to bring them to a finished weight of about 1200 pounds. The feedlot operator has a high investment in facilities and machinery and a large requirement for capital to purchase feed and feeder cattle. Compared to pork and poultry, the beef industry has not

[9] The methodology of investigating these relationships is left for the next chapter.

been significantly vertically integrated. As a result an animal may be bought and sold three or four times with each sale being to a different owner.

Type of cattle raised may impact propensity to donate to a checkoff because of the rather significant cross section of capital requirements and goals at each stage of the beef industry. Number of cattle produced may be important because of the structure of a checkoff. For example, it is possible that a cattle feeder who turns over 100,000 head of fed cattle a year will have preferences for a checkoff than a cow-calf producer who sells 40 weaned calves per year. In order to research potential differences between different types of participants in the cattle industry, the following question was asked:

Question: *In the boxes below, please indicate the average number of cattle and calves you sold in the past year.*

Oklahoma is suited for some types of beef production better than others. The state is a leader in wheat production, since wheat is a feed source for feeder cattle, there are a large number of feeder cattle. Indeed, of the 705 producers who returned surveys, 475 sold some feeder cattle. Cow-calf producers often use range or improved pasture to raise their animals, of which there is a plentiful amount in Oklahoma. Some 548 survey respondents had sold weaned calves in the previous year. Cattle feeders buy cattle from feeder producers and directly from cow calf producers. Because cattle feeders pool the cattle of many producers together, there are by definition fewer feeders than other types of producers. In addition, Oklahoma is 6th in fed cattle production (NASS); surrounding states such as Kansas and Texas have higher concentrations of cattle feeders than Oklahoma. The survey had 195 respondents who indicated they typically sold fed cattle.

Finally, a total of 147 survey respondents indicated that they typically sold purebred bulls or heifers.

Respondents were asked to indicate how many of each type of cattle (calves, feeders, breeding stock and fed cattle) they sold in an average year. Although typically a by-product of the dairy industry, we also asked producers to indicate how many veal calves they sold. Veal calves are slaughtered when they are very young, and are typically the offspring of dairy animals. It is important to consider the veal animal because checkoff dollars are currently collected on all cattle that enter the food supply, regardless of whether the animal was raised on a dairy. There were 52 producers that indicated they sold veal calves. Consider the distribution of responses by cattle type and number sold, these data are in Table 3.

Table 3. Respondent Cattle Operation Summary

Weaned Calves		**Feeder Cattle**		**Fed Cattle**		**Veal Calves**		**Purebred Animals**	
Range	n	Range	n	Range	n	Range	n	Range	n
0	106	0	168	0	425	0	561	0	478
<50	170	<100	175	<500	132	<50	41	<50	114
50-99	156	100-499	133	500-999	33	50-99	6	50-99	18
100-199	71	500-999	85	1000-9999	21	100-199	3	100-199	13
200-499	89	1000-4999	70	10,000-19,999	2	200-499	2	200-499	2
≥ 500	63	≥ 5000	12	≥ 20,000	7	≥ 500	0	≥ 500	0

Notes: Responses to question regarding farm size and type. The range column is the interval offered as a potential response. The n column reflects how many producers indicated they sold a particular type and number of cattle. For example: 106 producers indicated they sold 0 weaned calves

The U.S. dairy industry creates beef as a byproduct from several avenues: the male calves born to milking cows, the excess heifers not grown to replace old milking cows and the cows that it retires from milking. Beef and dairy producers have different goals, management strategies and typically are in different locations, but ultimately, both contribute to the beef supply and some produce both beef and dairy breeds. Dairy breeds

are not excluded from the mandatory checkoff when they are sold, and would likely be treated much the same in any new checkoff. Producers of these different animals may have differing views on a voluntary beef checkoff. We next asked survey respondents this question.

Question: *Do you raise beef, dairy, or both cattle breeds?*

The capital allocation of a dairy is similar to that of a cattle feeder. Oklahoma is not heavily invested nor particularly well suited for dairy production. There were 19 survey respondents who sold some dairy cattle, while only four had exclusively dairy cattle. These few respondents will not allow for robust observation of the difference between dairyman and beef producers.

After providing a structure in which to estimate the production patterns of survey respondents, let us now consider group membership. Many different agricultural groups exist and have a variety of purposes and types of members. Some of these groups are more involved in the beef industry than others and a consistent position on a checkoff is generally lacking based upon formal position statements.

Group Affiliation

There are many agricultural organizations with an interest in the beef industry. Some of the groups are: breed organizations such as the American Angus Association, policy groups such as Farm Bureau, industry groups like the National Cattleman's Beef Association (NCBA) and segment groups like the Texas Cattle Feeders Association. Affiliation with a group may have some correlation with propensity to donate to a checkoff. Consider that one of the plaintiffs in the case against the current checkoff is an industry group (the Livestock Marketing Association). There are too many groups to

include in one survey question, and group affiliation is ultimately not the main objective of this study. However, careful selection of a few groups may reveal whether there is a tendency for group membership in general to change propensity to donate, and measure that impact for the specific groups chosen.

Question: *Please check any farm organizations in which you are a member.*

The groups included on the survey are: The Oklahoma Cattleman's Association (OCA), the National Cattleman's Beef Association (NCBA), Ranchers Cattlemans Legal Action Fund (R-CALF), National Farmers Union (NFU), Oklahoma Farm Bureau (OFBA) and the American Farm Bureau (AFBA). The position on and stake in a checkoff is varied significantly by this selection. The National Farmer's Union formerly opposes the mandatory checkoff but says that it favors a voluntary program. R-CALF maintains a formal position of neutrality. Contrast this with NCBA, a group that receives checkoff funds and favors the current program, and American Farm Bureau, which has signed a friend of the court brief in favor of keeping the mandatory checkoff.

Additionally, a blank line is provided to allow respondents to list other organizations. Keep in mind that the concern is not specific group membership. The reason for including a write in line is to prevent offense being taken by not listing a group. Inclusion of all groups is not possible, however, omitting a group may cause offense to be taken by producers who feel the exclusion of their group implies unimportance. An offended respondent may fail to respond or respond inaccurately in protest. The write in line allows a way to address this problem.

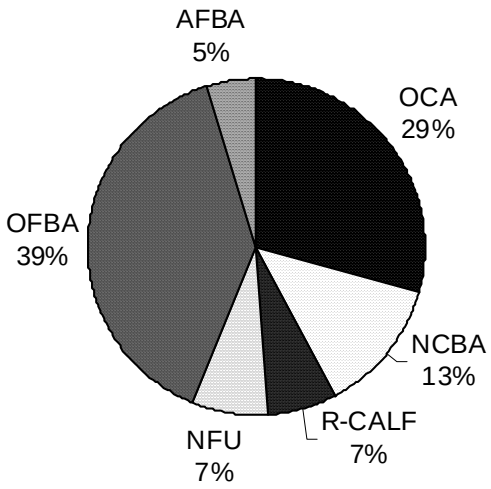

Figure 7. Group Affiliation
Notes: Although 508 people responded that they belonged to a group, some belong to more than one. This figure shows the sum of all groups, and the percentage that each represents of all group membership. Thus the interpretation for AFBA is: "5% of all group membership is with AFBA," *not* that 5% of respondents belong to AFBA and likewise for others.

Notice that four of the choices offer related/similar organizations at the state and federal level (e.g. Oklahoma Farm Bureau and American Farm Bureau and Oklahoma and National Cattleman's Associations). Respondents to the survey belonged to the state level organizations in higher proportion than corresponding national organizations. It should be noted that 197 of the 705 surveys returned did not select any of the options provided, these 197 individuals may belong to a group, but they did not indicate one of those offered on the survey. Next, consider household income. Income will vary across farms for a number of reasons, larger farms will generally have larger incomes, but some farms may not be self-sustaining enterprises.

Household Income

Propensity to donate to a checkoff may change by income. There are at least two matters to address in looking at respondent income, one of which is total household income. Producers may be more or less likely to donate to a checkoff based upon their income. Because of the fee-per-head structure that the current and proposed voluntary checkoff operates under, it does not appear that a checkoff would have a problem with producers believing a larger or smaller producer fails to pay "their fair share." Nonetheless, donating to a checkoff diverts money available for other purchases, thus producers with smaller incomes may be less likely to donate.

Income relative to farm size is another potential demographic that can be examined. Preferences may differ based upon how much income is generated by cattle production. People are in beef production for different reasons. Some are dependant upon their farms for a livelihood, while others buy a farm for a tax write-off. This relationship is not addressed in a single question, however, the inclusion of size questions previously discussed and the subsequent income question will allow for measurement of an interaction between the two. The income question read as follows.

Question: *As close as you can recall, please estimate your household's yearly income before taxes by checking the appropriate box. This question is used to ensure our sample is representative of all producers. Please remember that your responses will be held strictly confidential.*

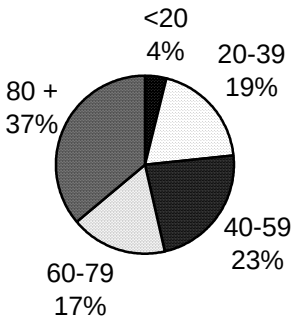

Figure 8. Producer Household Income
Notes: In thousands of dollars; average: $ 66,448. Average income is calculated by multiplying the midpoint of each income interval times the number of producers who indicated a particular income, and dividing by the total number of people who answered the question. On the open ends, values of $100,000 and $18,000 were selected.

Figure 8 deconstructs the income of the 665 survey respondents who answered the question regarding household income. Note that this question is addressing total household income as opposed to farm income. It will be useful to have an average income estimate for the survey responses. However, approximately 40 people did not respond to the question, this makes their income appear to be zero, which is obviously not the case. To counter this, average income is calculated by dropping all non-responses to the question. Survey respondents average income was $66,448. A comparison with other income statistics reveals that the income observed for survey respondents is larger than the Oklahoma non-farm household income, which averaged $35,500 in the period of 2000-2002 (U.S. Census). However, these same statistics show that U.S. farm income is substantially larger than non-farm income, thus a more accurate comparison for survey respondents is found elsewhere.

Our survey was only sent to cattle producers, a group that falls under farm income population statistics. Thus a more accurate comparison to the entire population of cattle producers is found in farm income statistics. Farm income projections for the year 2004 show that respondent income from this survey is close to the national average of $66,732 (NASS). It should be noted that survey average is calculated based upon respondents choosing between five ranges of incomes. Midpoints for the three closed intervals and the values of $18,000 on the low end and $100,000 on the high end are used in the calculation.[10] As a result, the income data represent all incomes over $80,000 the same, with the likely result being an underestimate of average income. [11]

This concludes the demographic questions asked on the survey. Demographics are important to consider because they may correlate with checkoff preferences. In addition, these questions reveal the composition of survey respondents, ensuring that an appropriately broad sample was obtained. Like demographics, attitudes are important to consider because they may correlate with preferences, and thus help explain producer utility for a checkoff.

Opinion Questions

Awareness of Court Proceedings

Other checkoffs have used transaction costs as a way to encourage participation. Consider the Oklahoma wheat checkoff, which requires that producers desiring a refund write the Wheat Board and formally request it. The transaction cost is the effort and time

[10] These estimates are the authors "best guess." See Figure 8 for the survey responses.
[11] $80,000 is the highest income that could be indicated in response to this question.

required to get the money back. Some producers will donate because the transaction costs outweigh the benefits of obtaining a refund.

The refund mechanisms already established in the Oklahoma and Texas legislation operate in a similar fashion, both to each other and to the wheat program previously described. It may be reasonable to expect that there will be beef producers who donate because their benefits do not exceed the transaction costs of the acquisition.[12] A level of awareness of industry issues may identify producers who fit this category. A producer who is unaware of current industry issues does not derive enough benefit from awareness to outweigh the transaction cost of acquiring information. If this relationship is true, a producer who does not follow beef industry news might be more likely not to seek a refund. A question to identify people who have a relatively low interest in following industry news is:

Question: *Were you aware of the recent litigation and court rulings on the beef checkoff before receiving this survey?*

The hypothesis that apathy may induce non-participation is not measurable in a hypothetical experiment. However, if this relationship does exist, the proportion of people who were unaware of checkoff litigation would be useful to know. In addition, there may be a correlation between awareness of litigation and willingness-to-donate. Responses to this question revealed that 36% of producers who received the survey were unaware of the case pending against the current program. What about a correlation between support of the current program and preferences for a voluntary checkoff? If producers who support the mandatory checkoff are more likely to participate in a future program, a substitute relationship emerges.

[12] Think of this as "donation by apathy."

Support for the Mandatory Checkoff

The Cattleman's Beef Board (CBB) has historically surveyed cattle producers semiannually to estimate support for the checkoff. Even though participation has been mandatory, administrators and benefactors have an incentive to keep producers happy. As evidenced by the suit against the checkoff, only a few are needed to bring a lawsuit.

The mandatory beef checkoff was initiated by a vote of producers, and was implemented with 79% of producers in favor of the program. The CBB survey is independently conducted to be representative of all beef and dairy producers, and the last three years have shown support levels in the range of 60 to 70 percent (NCBA). The most recent volume of this ongoing survey was conducted in January of 2004 (the same time this checkoff feasibility survey went out). The CBB survey found that about 70% of producers supported the mandatory checkoff.

Because of the similarities between any voluntary checkoff and the current mandatory program, it is prudent to investigate respondent support of the current program.

Question: *Which best describes your feelings toward the challenge to the mandatory beef checkoff?*

This question offers the alternatives of: *" I am in favor of keeping the mandatory checkoff"* or *" I am in favor of eliminating the mandatory checkoff."* Responses to this question indicated lower estimates of producer support than those obtained historically. Of the 684 respondents who answered this question, 57% were in favor of keeping the mandatory checkoff. One explanation for a lower support rate is that producers are now presented with an alternative. Producers may be less inclined to support a mandatory

checkoff if a voluntary program is seen emerging with the same agenda. A final note on this question is that 68% respondents who were aware of the checkoff litigation are also in favor of the mandatory checkoff's continued operation. Note that this is consistent with the recent nationally estimated support level.

Next, consider the operations of the current checkoff. How do producers perceive the benefits of the mandatory checkoff benefit them? Do the benefits return to the producer, or are they held by processors and retailers?

Perceived Benefit Allocation

Beef is the end product in cattle production. However, the beef checkoff does not assess a fee to meat sales, as a result meat processors and retailers do not contribute to the beef checkoff. Do the benefits of beef promotion and research return to producers? If producers are under the impression that the answer is no, they may be more likely to abstain from participating in a checkoff. To address opinions about the allocation of benefits to producers relative to processors and retailers, the following questions were asked.

Question: *Do you feel beef checkoff expenditures on advertising benefits cattle producers or beef processors and retailers more?*

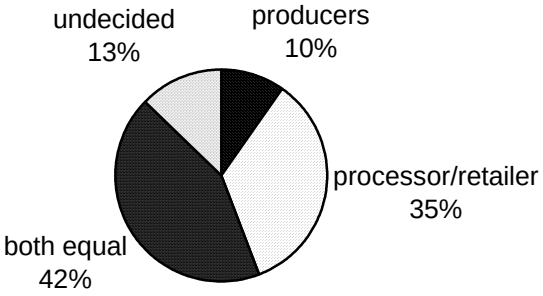

Figure 9. Perceived Advertising Benefits

Question: *Do you feel beef checkoff expenditures on research benefits cattle producers or beef processors and retailers more?*

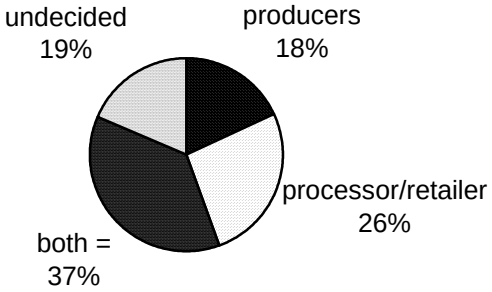

Figure 10. Perceived Research Benefits

If packers and retailers were able to exercise market power and have some influence over price, producers would have less incentive to promote an increase in the demand for beef by funding these activities. In both the research and advertising questions, over 50% of respondents indicated that producers benefited equally or less than packers. As previously mentioned, the beef industry is relatively less vertically

organized than other commodities. However, the meat packing industry has become quite concentrated, with the top four firms accounting for over 80% of all cattle slaughtered in 1999 (Field and Taylor). Results suggest that there may be perceptions that this four firm ratio is indicative of market power in the beef industry.

Similarly, how do producers believe benefits flow to foreign producers? If benefits are perceived to flow out of the country, producers would be less likely to participate in a checkoff.

Domestic vs. Foreign

The benefits of the beef checkoff in a global economy may not be exclusive to producers in the United States. Under the mandatory checkoff, imported cattle are assessed an exchange rate adjusted, one dollar fee in the same way as domestic producers. Additionally, there is a fee assessed on imported beef. Free-riding by imported beef is thus eliminated. Producers may or may not be aware of the fact that imported cattle are assessed the same fee as domestic animals. In either case, producers may perceive that foreign benefit from the current or any future checkoff is not a desirable trait. If the level of foreign benefit is perceived to be high, producers may react by showing a lower propensity to donate to a voluntary program.

Question: *How do you feel the beef checkoff funds benefit cattle and beef producers outside of the U.S.?*

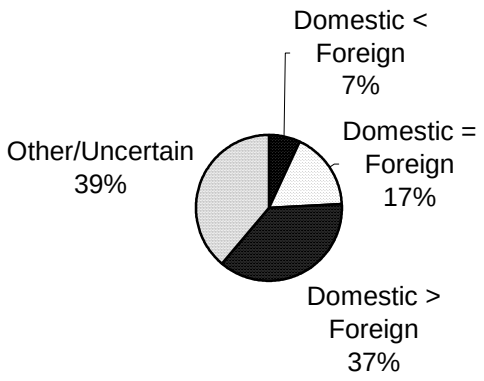

Figure 11. Allocation of Benefits Foreign vs. Domestic

Less than a quarter (24%) of respondents who answered this question felt domestic benefits were equal to or less than foreign benefits, and only 7% felt that foreign producers benefited to a larger extent than domestic producers. The results of this question suggest that producers are unsure of the benefit allocation between foreign and domestic cattle producers. Four of the ten demographic/attitude questions (this one included) had a choice to select "unsure" or "undecided." In the other three questions, uncertainty was indicated by 13-19 percent of producers. For this question more than double the number of producers were unsure, with 39 percent of producers selecting the option "other or unsure."

Summary

The goal of this paper is to examine checkoff preferences in survey responses to estimate the actions of other potential participants. A question has been designed under the framework of a choice experiment to measure checkoff preferences. Cheap talk and certainty scales are employed to reduce the expected hypothetical bias. In order to

increase the prediction power of survey responses, demographics and attitudes are sought.

The sample, chosen by NASS, was selected to include only cattle producers in Oklahoma. Feeder cattle comprised the largest number of cattle owned by producers who completed and returned surveys, followed closely by weaned calves. Producers of fed cattle, veal calves and purebred breeding animals were represented in smaller numbers. About seventy percent of respondents indicated that they belonged to one of the six agricultural groups, with state-level membership more common than national group membership. Household income averaged $66,448, which is consistent with average U.S. farm income.

Consistent with previous support estimates, returned surveys showed a majority in favor of the continuance of a mandatory checkoff. The perceived benefit allocation of the current beef checkoff suggests that producers perceive beef processors to have some degree of market power. Less than 20 percent of producers believe that the benefits of research and advertising are distributed to producers more than retailers and processors.

The random utility model that is developed next will allow measurement of preferences for checkoff attributes. Using this model, a utility maximizing checkoff can be designed, and estimates of participation can be made.

CONCEPTUAL DEVELOPMENT

The objective of this research is to measure preferences for a voluntary beef checkoff (hereafter "checkoff"). Specific goals include using preferences to design an optimal checkoff and measuring the correlation between producer demographics/attitudes and utility for a checkoff. Research is conducted through a choice experiment, which is designed to simulate the decision to donate to a checkoff. Random utility theory is used to model preferences, as described later in this chapter.

This section is organized as follows. We begin with a discussion of how the choice experiment provides a means to measure preferences. The random utility model for a checkoff is presented next. This model is estimated from the results of the choice experiment and is used to measure preferences, forecast participation and study how preferences are linked to demographics and attitudes.

Recall the structure of the choice experiment from chapter three. Consider one choice experiment, with two checkoffs and a refund. The attributes varied between checkoffs are: *fee*, expenditure allocation (*advertising, research* and *other*), and minimum participation rate (*MPR*). Respondents were asked to indicate whether they preferred one of the checkoffs or a refund. If a respondent decides he prefers a checkoff, he must decide which one is more preferred. Let us work through the decision-making process to determine how preferences will be measured, assuming that a checkoff is chosen, and looking at one attribute at a time.

The first attribute is fee, respondents must decide if they prefer the relatively higher fee or lower fee. The actual level of fee is randomly generated within an interval presumed to be reasonable. Information is obtained about *fee* preferences by observing all respondents choosing a fee. As more choices are observed within this interval, an estimate of the fee that is most preferred should be revealed.

In the same way, survey respondents must consider *MPR*. Observing respondents making a choice of a *MPR* reveals preferences for this attribute. Again, values for this attribute were randomly generated across surveys, and allow inference into optimal levels by observing repeated choices.

Now consider expenditure allocation. Imagine that the following allocations are presented (advertising, research and other).

A 53:10:37

B 20:30:50

Assume a hypothetical respondent; for clarity, call her Jane. It is unlikely that Jane favors one of the expenditure mixes exactly as presented. Nonetheless, she must assign importance to each attribute and choose an allocation. Imagine that Jane believes *research* is the most beneficial activity, followed by *advertising* and lastly, *other* activities. Expectations are that she will select option B. Even though this choice appears to signify that Jane prefers *other* activities to *advertising*, option B has the larger amount of *research*. Information has been gained through this choice by observing that Jane prefers funds be directed to *research* over *advertising* and *other*. As in *fee* and *MPR,* data on allocation preferences are obtained by observing the actions of all respondents making this same type of decision repeatedly.

Preferences are also measured with respect to the relative weight of each checkoff attribute in comparison to the others. As in the case of Jane choosing a budget allocation, respondents must decide the weight that they place on each checkoff attribute, and pick the bundle of attributes that best indicates preferences. Even though any given choice experiment may not be exactly what a producer favors, the repeated responses are sufficient to measure preferences.

The outcome of the choice experiment is a measurement of preference for individual checkoff characteristics and of relative preferences for each attribute over the others. Furthermore, by selecting attributes that match preferences, an optimal checkoff can be designed. Preferences are actually measured by specifying a utility function for a checkoff using random utility theory. This model is derived next as in Train.

Random Utility Model

Random utility theory allows for the deconstruction of a choice into the attributes of the choice. Under this theory, developed by Marschak in 1960, the utility from a choice is represented as a function of the attributes of that choice. Assuming utility maximization, the researcher knows that the choice selected has the highest level of utility. Let utility of respondent *i* for checkoff *j* be represented as U_{ij}.

Random utility theory recognizes that the researcher cannot know all contributions to utility. Let V_{ij} be the knowable portion of respondents *i's* utility for checkoff *j*, which is common across all individuals. Not all utility derived from a checkoff is known from the survey, as a result let ε_{ij} be a random error accounting for unknown utility.

(1) $$U_{ij} = V_{ij} + \varepsilon_{ij}$$

Since utility from a choice is a function of the attributes of the item chosen, V_{ij} may be written as a linear combination of checkoff attributes:

(2) $$V_{ij} = B_1(Fee_{ij}) + B_2(Adv_{ij}) + B_3(Rsrch_{ij}) + B_4(Other_{ij}) + B_5(MPR_{ij})$$

Where *Fee* is the voluntary fee per head sold, *Adv* is the percent of the budget spent on advertising, *Rscrh* is the percent of the budget spent on research, *Other* is the percent of the budget spent on other activities, and *MPR* is the minimum participation rate.

Note the absence of an intercept. It is assumed that the utility obtained from the attributes of the choice stems only from the level of those attributes. Additionally, the choice set design implies an expenditure allocation such that $Adv + Rsrch + Other = 1$. As a result an intercept would be a perfect linear combination of the budget allocation, thereby precluding its estimation.

Respondent utility for a checkoff may not be a linear function of checkoff attributes. Consider the *Fee* variable. Even if producers view this as an investment, a positive sign in a linear model implies an infinite fee. This is obviously not representative of true preferences. Now consider the expenditure allocation variables. If producers favor a mix of expenditure activities, the expenditure parameters must exhibit a diminishing marginal utility. Finally, as to *MPR*, a producer is expected to gain utility from knowing that his or her donation is not being extensively free-ridden upon. Intuition suggests that at some level of participation, an increase in MPR will lead to a higher probability of the MPR not being met, again suggesting non-linear utility change from attributes. For these reasons, it appears that optimal checkoff attributes may be

interior solutions, suggesting a quadratic model as more appropriate. Another specification of V_{ij} is:

$$(3) \quad V_{ij} = B_1(Fee_{ij}) + B_2(Adv_{ij}) + B_3(Rsrch_{ij}) + B_4(Other_{ij}) + B_5(MPR_{ij}) + B_6(Fee_{ij})^2 + B_7(Adv_{ij})^2 + B_8(Rsrch_{ij})^2 + B_9(Other_{ij})^2 + B_{10}(MPR_{ij})^2$$

Table 4 provides sign expectations as to the contribution of each variable to the level of utility for a checkoff.

Table 4. Expected Signs of Utility Parameters

Variable Name	Description	Expected Sign	Comment
Fee	Fee assessed per head of cattle sold	+	Fee is expected to have an optimal level, that if exceeded, reduces utility for a checkoff
Fee^2		-	
Adv	Percent of total budget spent on advertising and promotion	+	Expect that some, but not all, money is preferred to be spent on advertising
Adv^2		-	
Rsrch	Percent of total budget spent on Research	+	Expect that some, but not all, money is preferred to be spent on research
Rsrch^2		-	
Other	Percent of total budget spent on other marketing activities	+	Expect that some, but not all, money is preferred to be spent on other activities
Other^2		-	
MPR	The participation rate, that if not met, triggers a refund of all money	+	Higher participation means fewer free riders and a larger budget to carryout activities.
MPR^2		-	Expect diminishing marginal change as MPR approaches 1 (100%)

Let equation (3) be represented generically as $V_{ij} = \mathbf{X}_{ij}\mathbf{B}$. Respondent i's utility for checkoff j can now be represented as

(4) $$\mathbf{U_{ij} = X_{ij}B + \varepsilon_{ij}} \ .$$

The state and federal checkoffs will be studied as if they are different goods, thus implying that they have separate utility functions. However, both are presented in the survey by using the same five attributes presented in Table 4. Let the variable F_i be a dummy variable taking a value of one if a checkoff is a federal program and zero otherwise.

Rewriting equation (4) to incorporate this variable yields:

(5) $$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + X_{ij}^2B_3(1-F_i) + X_{ij}^2B_4(F_i) + \varepsilon_i$$

Where X_i is a matrix of checkoff attributes [Fee_{ij} Adv_{ij} $Rsrch_{ij}$ $Other_{ij}$ MPR_{ij}], $X_{ij}^{\ 2}$ is a matrix of checkoff attributes squared [Fee^2_{ij} Adv^2_{ij} $Rsrch^2_{ij}$ $Other^2_{ij}$ MPR^2_{ij}], and B_i is a conformable column vector for parameters. Now that a utility function has been designed, how do we estimate the model? The conditional logit approach is next employed to estimate the parameter vectors that represent respondent preferences from survey data.

Conditional Logit Model Development

Estimating the random utility model entails specifying a distribution for the stochastic component of utility, $\boldsymbol{\varepsilon_{ij}}$, and employing maximum likelihood estimation. Let $\boldsymbol{\varepsilon_{ij}}$ be distributed according to the extreme value distribution, which is a special case of the Gumbel distribution. The probability distribution function is as follows:

(6) $$f(\varepsilon) = e^{\varepsilon}e^{(-e^{\varepsilon})}$$

The extreme value distribution is bell-shaped with slightly fatter tails than the normal distribution. Its mean and variance are -0.577216 and 1.644934 respectively. The

distribution of the error allows for probability statements to be made based upon the assumption that respondents maximize utility in checkoff selection. Under this assumption, the utility of the choice made is higher than the utility of the other two choices. Utility is not on a cardinal scale, and even if it was, the researcher cannot know what value utility takes for a given subject. In fact, the researcher does not need to know such a value. The researcher is only concerned with the relative utility of each choice. Let U_{i0} represent the utility associated with selecting a refund[13]. When respondent *i* selects checkoff 1 over checkoff 2 and over a refund, it must be that:

$$U_{i1} > U_{i2} > U_{i0} \Rightarrow X_1 B + \varepsilon_{i1} > X_2 B + \varepsilon_{i2} > \varepsilon_{i0} \tag{7}$$

As Train shows, the probability of this choice is:

$$\Pr(j) = \Pr(\mathbf{X}_{ij}\mathbf{B} + \boldsymbol{\varepsilon}_{ij} > \mathbf{X}_{ik}\mathbf{B} + \boldsymbol{\varepsilon}_{ik}) \forall j \neq k \tag{8}$$

$$= \Pr(\varepsilon_{ij} > \varepsilon_{ik} + \left[\mathbf{X}_{ik} - \mathbf{X}_{ij}\right]\mathbf{B}) \forall j \neq k \tag{8.1}$$

Utility derived from seeking a refund equals $\boldsymbol{\varepsilon}_0$. Errors are distributed according to the extreme value distribution thus the probability of respondent i selecting choice one (a checkoff) is:

$$\Pr(1) = \frac{e^{\mathbf{X}_{i1}\mathbf{B}}}{e^{\mathbf{X}_{i1}\mathbf{B}} + e^{\mathbf{X}_{i2}\mathbf{B}} + e^{0}} \quad \text{(Train)} \tag{9}$$

Let y_{i1} be an indicator variable, which takes a value of one if respondent i chooses checkoff one, zero otherwise. In the same way let y_{i2} and y_{i0} take a value of one if checkoff two or a refund is chosen and zero otherwise. The joint probability, or likelihood function, for respondent i is:

[13] Utility from a refund is equivalent to setting X_{ik} for the refund option equal to a vector of zeros.

(10) $$LF_i = \left[\frac{e^{\mathbf{X}_{i1}\mathbf{B}}}{\sum_{j=1}^{3} e^{\mathbf{X}_{ij}\mathbf{B}}}\right]^{y_{i1}} \left[\frac{e^{\mathbf{X}_{i2}\mathbf{B}}}{\sum_{j=1}^{3} e^{\mathbf{X}_{ij}\mathbf{B}}}\right]^{y_{i2}} \left[\frac{e^{0}}{\sum_{j=1}^{3} e^{\mathbf{X}_{ij}\mathbf{B}}}\right]^{y_{i0}} \quad \text{for } i = 1,..,N$$

The likelihood function for all responses, is then given by the product of LF_i over all individuals. The utility parameters are selected by maximizing the natural logarithm of the likelihood function (Train).

(11) $$\ln(LF) = \ln \prod_{i=1}^{N} Lf_i$$

Equation (11) is maximized using the *fminunc* function in MATLAB. The parameters are unconstrained and reflect the relative marginal impact to utility as a result of each attribute. Nominal parameter values mean relatively little. Rather, the sign and relative magnitude are of interest in order to weigh attributes against each other and observe preferences. Let us now move towards checkoff design.

Checkoff Design

Once utility parameters are estimated, one can proceed towards identifying the type of checkoff that will maximize producer utility. Specifically, the Microsoft EXCEL Solver feature was used to select the checkoff attributes (*fee*, *adv*, *rsrch*, *other* and *MPR*) that maximize utility, subject to the relevant constraints.

Recall that the budget allocation was dissected into three parts. Advertising (*Adv*), research (*Rsrch*) and other activities (*Other*) make up the only possible ways to allocate checkoff proceeds. Each is a percent of spending, and thus the three must sum to 100% of expenditures for the hypothetical checkoff(s) that emerge from the survey results.

(12) $$Adv + Rsrch + Other = 1$$

The parameter estimates measure preferences and thus may have negative signs to indicate negative feelings towards an attribute in a checkoff. However, the attributes themselves must be non-negative.

(13) $$X_j > 0$$

A third constraint implicit to the checkoff is that MPR<Participation. Let us define participation under this model. Recall equation (9), which determines the probability of a choice in an individual survey. This decision had three possible outcomes. A real world program would not provide two checkoffs to choose between, and thus (9) is not valid for forecasting participation beyond the survey. The probability of a respondent donating to a checkoff is:

(14) $$\Pr(donate) = \frac{e^{\mathbf{X_i B}}}{1 + e^{\mathbf{X_i B}}} \text{ (Train)}$$

Note the difference between equations (9) and (14) is the number of choices. The exponential utility function for a second checkoff has been dropped from the denominator to reflect the fact that an actual participant will either select donation to a checkoff or a refund.

Participation rates calculated in this manner are estimates. A margin of error at twenty percent is sufficient to be confident of a true participation rate (Norwood 2004). Thus if the model predicts a participation rate of 50% the actual participation rate will be between 30% and 70%. However, checkoff administrators and participants are concerned only with under-participation. Constraining MPR to be less than participation by at least twenty percent will sufficiently incorporate the uncertainty of the method and allow for confidence in checkoff design. A third constraint for utility maximization is:

(15) $$\Pr(donate) \geq MPR + 20\%$$

The probability of donating is based upon behavior by the individual, but may also be interpreted as an expected participation rate for a population; assuming that preferences observed in the survey hold across the population. The sample size (responses = 705) and stratification across industry segments are assumed to be sufficient for this assumption. However, demographic and attitudinal data, which may have correlations by group to different levels of utility, are available on producers who responded to the survey. Determining if any of the demographics and attitudes observed in the survey do correlate with lower or higher utility for a checkoff and then adjusting participation estimates accordingly will allow for the most robust results available.

Demographics and Attitudes

If willingness-to-donate is indeed heterogeneous across any of these demographics and/or attitudes, checkoff design should consider the differences and adjust estimates accordingly before drawing conclusions at a more broad level. How can these data be incorporated into the utility model, as they are not attributes of a checkoff? Because of the correlation between some different level of utility and an attitude or characteristic, the data can be included by way of a dummy variable within the utility function to indicate fixed effects. Questions were answered in a multiple-choice format where a respondent indicated they had a characteristic or attitude by checking a box.

The clearest way to incorporate these responses into the utility model is through the use of dummy variables. For example, imagine that there is suspicion that members of the group R-CALF are less likely to participate in a checkoff than respondents who do not belong to the organization. A dummy variable taking a value of one if a respondent

belonged to the group, and zero otherwise, would be incorporated in the utility model. If the parameter estimate was found to be significant, and demonstrated a negative sign, then R-CALF members do indeed derive less utility for a checkoff and would be less likely to participate.

The same method may be applied to an attitude. For example consider the attitude that checkoff benefits return at a disproportionately high level to foreign producers. Producers who have this attitude should derive less utility from participation in a checkoff. Again, a dummy variable will capture this attitude, taking a value of one if a producer has this opinion and zero otherwise. What is accomplished in measuring the effect of attitudes on utility? Correlation between attitudes and utility may be useful in explaining why a producer chooses donation or abstention. Not truly a measure of causation, this information is nonetheless useful, and may aid in checkoff design by suggesting a need to address opinions that hinder participation.

Results are next, following approximately the same outline used in this chapter. The next chapter proceeds by: development of a model to measure preferences, expansion of that model to accommodate checkoff design, and finally incorporation of demographics and attitudes.

RESULTS

Return again for a moment to the research question: *Is a voluntary beef checkoff feasible?* As discussed previously, a thorough answer will address several issues:

- What checkoff design is most preferred by cattle producers?
- Under the optimal checkoff design, what percent of producers will participate?
- How do the demographics and attitudes of participants and non-participants differ?

This chapter will answer these questions based upon survey results of 705 Oklahoma beef producers. In analyzing the survey, which was constructed using a choice experiment, the starting point is identifying producer preferences for the attributes comprising a voluntary beef checkoff (hereafter "checkoff"). The attributes up for consideration in checkoff design are: expenditure allocation (*advertising*, *research* and *other*), *fee* and minimum participation rate (*MPR*)[14].

Checkoff Design

First, to succinctly summarize checkoff preferences, the survey responses are used to estimate a linear random utility model. But what data will be used? Recall that in an effort to reduce hypothetical bias, the certainty calibration technique was employed, thus uncalibrated and calibrated data are available from the same sample. Chapters two and three discuss this technique. Several studies have demonstrated that calibration provides

[14] For a discussion of these elements of a checkoff, refer to Chapter Four (page 60).

relatively unbiased estimates of true values (Champ and Bishop 2001; Champ et al.). However, both calibrated and uncalibrated data contain the effects of cheap talk, which has been shown to reduce hypothetical bias (Lusk; Aadland and Caplan). As a result, if estimates from calibrated data are biased, it is likely in the direction of underestimating willingness-to-donate. If uncalibrated data are biased it is likely in the direction of overestimation. For the purpose of checkoff design both, calibrated and uncalibrated models will be given, with the assumption that this provides something of a confidence interval for true estimates (as in Norwood 2005).

A further note on the data: some surveys contained mistakes or omissions that prevented them from being used. For example some producers did not indicate they sold cattle, this is a problem for a number of reasons. Since only beef producers contribute to the checkoff, we are interested only in their responses. Furthermore, we will investigate the link between type of cattle produced and preferences for a checkoff. Not knowing if or what type of cattle a producer sells does not accommodate either of these matters and observations with this or similar problems will be handled by omitting them from the sample. Finally, state and federal checkoffs are defined by the same five attributes and differentiated with a dummy variable, this means that data from both choice experiments are pooled. Sample size reports will be given in terms of total responses rather than number of surveys, and are not representative of the number of completed surveys divided by two, since some respondents complete one choice experiment and not the other.

Table 5. Linear Utility Model

	Uncalibrated Model	Calibrated Model		Uncalibrated Model	Calibrated Model
	Parameter Estimate (t-statistic)				
	Federal Checkoff			State-Level Checkoff	
Fee	-0.8520*** (-6.0663)	-0.7249*** (-4.7297)	Fee	-1.2510*** (-8.4625)	-0.9217*** (-5.6205)
Adv	1.5603*** (5.6289)	0.5611* (1.8501)	Adv	1.7201*** (5.9138)	0.4158 (1.3144)
Rsrch	-0.3195 (-0.9277)	-1.4933*** (-3.6854)	Rsrch	0.7448*** (2.5405)	-0.5244 (-1.5920)
Other	-0.5157 (-1.5317)	-1.2297 (-0.33304)	Other	-0.3047 (-1.1011)	-1.7891*** (-5.4571)
MPR	0.6972*** (2.5869)	0.6668** (2.2547)	MPR	0.4251 (1.5817)	0.7715*** (2.4829)

*, **,*** Indicate 10%, 5% and 1% significance.
Log likelihood function value; –1294.5 (uncalibrated) and -1,159.4 (calibrated).
Sample size: 1278 (uncalibrated) and 1259 (calibrated).
Notes: See page 59, equation (2) for explanation of these parameters.

Table 5 provides linear parameter estimates from a conditional logit model. From these parameters, preferences for checkoff attributes are revealed. Signs reveal whether an attribute is viewed positively or negatively, and magnitude reveals the importance placed on each attribute in comparison to other attributes.

In a national checkoff, at least over some range, *fee* is viewed as a cost, and any increase would, other things constant, reduce utility. The use of a *MPR* should increase participation in a federal checkoff. The MPR parameter is significant and positive in both calibrated and uncalibrated models. However, because the parameter is less than one, increasing MPR by one will increase expected participation by less than one. This

will push a checkoff closer to the threshold of its provision points mechanism (PPM), and the trigger of a refund.

Still discussing a national program, how are the expenditure allocation parameters to be interpreted? Because these three expenditure options are related such that $Adv + Rsrch + Other = 1$, the parameter estimates must be interpreted jointly. Advertising is clearly the most preferred activity. This parameter has the largest magnitude, achieves statistical significance and has positive signs in calibrated and uncalibrated models. The other activities are not significant and have negative signs. A limitation of the linear model is that it implies producers prefer exclusively advertising. This is likely not the case, and a quadratic model will begin to accommodate a mixture of activities, if that is indeed the preference. For the time being, simply note that advertising is preferred to research and other activities, as the linear model will not accommodate interpretation of the joint effects of all three expenditure categories.

In a state level utility function, the *fee* parameter is significant and the sign is again negative. The consistent sign between state and federal models indicates that *MPR* is also regarded similarly across state and federal checkoffs. Although the uncalibrated model does not have a significant *MPR* parameter at the presented confidence levels, it approaches 10% significance, and the calibrated parameter estimate does achieve significance. The implication for a state checkoff using a MPR is apparently similar to that of a federal program.

The expenditure mix for a state checkoff has similar implications to those drawn from the federal program. Advertising appears to be the most preferred activity. There is somewhat more evidence of a preference for an expenditure mix at the state level, with

higher statistical significance on *research* and *other* parameters. While these and previous preferences are similar for both checkoffs, are preferences for state and national level checkoffs statistically distinguishable? A likelihood ratio test will be used to investigate this.

Setting up the test requires restricting the state parameters to equal the federal parameters. The test statistic is distributed under the χ_k^2 distribution, where k is the number of restrictions. Under the null hypothesis, utility parameters are identical for state and national checkoffs. The test is run on a calibrated model, and in both cases, the hypothesis is confidently rejected ($p = .9622$),with this level of certainty, preferences for state and federal checkoffs will be presumed to be different from here on. [15]

Recall the hypothesis that respondents are more uncertain of their preferences for a state program, likely due to the fact that they have no experience with a state checkoff. The current checkoff has been in operation since 1987, giving producers time to develop preferences for a national program. Producers should have a higher level of uncertainty regarding their value for a novel good. Any voluntary checkoff has some degree of novelty, but a state program is more novel. Note that table 5 provides calibrated and uncalibrated results. The magnitude of the change in parameters moving from uncalibrated to calibrated parameter estimates should be larger if more producers indicate uncertainty.[16] Parameter estimates should change progressively more as an increasing number of responses are recoded. Indeed, a comparison of the parameter stability

[15] This is a p-value ($p = 1 - \alpha$). The likelihood ratio test is set up where the test statistic (LR) is a ratio of the value of the restricted and unrestricted log-likelihood functions respectively, with five restrictions (k). LR=-1,164.1/-1,159.4 The test statistic is distributed under the χ_k^2. Data are calibrated.

[16] Recall that uncertain responses were calibrated by recoding them as 'unwilling to participate' in a checkoff.

between parameter estimates in Table 5, moving from uncalibrated to calibrated data reveals an average difference at the state level almost twice that of the national program (.56 national, 1.06 state).

Quadratic terms will now be added to the model in order to allow for non-linear effects of checkoff attributes. All attributes will be retained, but before moving on, note that *fee*, percent of budget spent on *advertising* and *MPR* seem especially important in explaining willingness-to-donate.

Non-Linear Utility: A Quadratic Model

While a quadratic utility model is more difficult to interpret, its flexibility allows a more accurate depiction of preferences. Table 6 provides parameter estimates from a quadratic model.

Table 6. **Quadratic Model Conditional Logit Parameter Estimates**

	Uncalibrated Model	**Calibrated Model**		**Uncalibrated Model**	**Calibrated Model**
	Parameter Estimate (t-statistic)			*Parameter Estimate (t-statistic)*	
	Federal Checkoff			State Checkoff	
Fee	1.3447**	2.1299***	Fee	1.0423	2.1408**
	(1.9927)	(2.7993)		(1.5259)	(2.6038)
Fee^2	-1.1149***	-1.4567***	Fee^2	-1.55***	-1.5559***
	(-3.3453)	(-3.8187)		(-3.4323)	(-3.7407)
Adv	0.558	-1.0983	Adv	1.1612	-0.4975
	(0.3829)	(-0.6387)		(1.4062)	(-0.4935)
Adv^2	-1.9799	-1.7115	Adv^2	-1.3015	-0.966
	(-1.1074)	(-0.8263)		(-1.3298)	(-0.7846)
Rsrch	-0.4084	-3.0718*	Rsrch	-0.5634	-3.1036***
	(- .3760)	(-1.8447)		(-0.5892)	(-2.9289)
Rsrch^2	-2.8853*	-1.3762	Rsrch^2	-0.5967	1.1351
	(1.6889)	(-0.5432)		(-0.4657)	(0.8086)
Other	1.2632	0.9237	Other	0.9598	-0.1644
	(0.8776)	(0.5183)		(0.8897)	(-0.1526)
Other^2	-4.9057***	-5.9664***	Other^2	-3.5236***	-4.1592***
	(-2.6802)	(-2.6154)		(-2.5387)	(-3.0509)
MPR	2.5129**	3.3337***	MPR	1.1919	0.8782
	(2.3301)	(2.6294)		(1.3439)	(0.9565)
MPR^2	-1.8019*	-2.6518**	MPR^2	-0.8313	-0.1599
	(-1.6489)	(-2.0907)		(-0.9204)	(-0.1728)

*, **,*** Indicate 10%, 5% and 1% significance
Log likelihood function value; –1269.5 (uncalibrated) and -1,132.9 (calibrated).
Sample size: 1278 (uncalibrated) and 1259 (calibrated).
Notes: See page 61, equation (5) for an explanation of these parameters.

Fee and *MPR* across both models exhibit diminishing marginal utility. Utility increases, reaches a maximum and then decreases as a result of increasing these attributes. Note that the linear and quadratic term on a variable must be interpreted as a pair. For example, the linear term on fee has now changed from negative to positive, this

does not imply that producers now view fee as an investment rather than a cost (as in the linear model). Rather, the linear and quadratic term must be interpreted jointly, revealing that over some range of fee, producers view the checkoff as an investment, but above this level, marginal utility from a higher fee no longer exceeds the marginal benefit derived from giving up more money. Because utility in this model is not cardinal, signs have meaning, as do the differences in the magnitude between parameters; however, the parameters themselves do not have any real interpretation. The linear model demonstrated that these attributes are important in both a state and federal checkoff; the quadratic model reveals that the optimal level for these two attributes are interior solutions.

The budget allocation is difficult to interpret in a quadratic model. Advertising is known to be the top priority in either checkoff. The quadratic model can be used to interpret preferences for expenditure allocation, and more accurately reflects the fact that producers prefer some of each activity. However there is a problem in doing so because of the relationship between the three activities ($advertising+research+other = 1$). The quadratic utility model will accommodate this relationship but is not per se constrained to to do so, and so there is a need for further modeling, which the next section proceeds to do.

The utility functions presented have provided preference data. Parameters in these models reveal whether a checkoff attribute is viewed positively or negatively and how important each is relative to the other attributes. To obtain these parameter estimates, a log-likelihood function was maximized, resulting in the functions presented above. However, what the models yield are parameters, not optimal attribute levels. To

extrapolate optimal attribute levels for a checkoff, a utility maximization problem will be solved. Maximizing the utility function is accomplished by changing the levels of checkoff attributes subject to the relevant constraints.

Optimal Checkoffs

The utility maximizing checkoff is solved for using the EXCEL Solver program and the quadratic functional form shown above. Recall the three constraints needed to design a checkoff. (1) *Advertising*, *research* and *other* must sum to one; (2) The attributes of any checkoff must be non-negative and (3) MPR must be met, and should be exceeded by more than 20% to provide a margin of safety (Norwood 2004). The maximized utility function also provides an estimated participation rate. Table 7 gives optimal state and national checkoffs.

Table 7. Utility Maximizing Checkoff Design

	Nationwide Checkoff		
Uncalibrated		***Calibrated***	
Fee per head	$ 0.60	Fee per head	$ 0.73
% Budget Advertising	52.4%	% Budget Advertising	61.2%
% Budget Research	19.2%	% Budget Research	4.4%
% Budget Other	28.3%	% Budget Other	34.5%
MPR	47.2%	MPR	14.9%
Predicted Participation	*67.2%*	*Predicted Participation*	*34.9%*
	Oklahoma Checkoff		
Fee per head	$ 0.45	Fee per head	$ 0.69
% Budget Advertising	69.7%	% Budget Advertising	77.9%
% Budget Research	7.5%	% Budget Research	0.0%
% Budget Other	22.9%	% Budget Other	22.1%
MPR	48.7%	MPR	23.0%
Predicted Participation	*68.7%*	*Predicted Participation*	*43.0%*

The budget for a national program should be focused primarily towards advertising. Recall that in the national choice experiment, the budget allocation in one of the checkoffs was the same as the 2004 allocation. Note the similarity of the optimal national checkoff to the status-quo option presented in the choice experiment. The status quo option, with an expenditure allocation of 53:10:37, was selected in far higher frequency than the other options (284 times vs. 152 times).

Preferences at the state level are for an even larger percentage of the budget to be directed towards advertising. This is a surprising result that indicates producers do not perceive a free rider problem on advertising by out of state producers, or at least do not perceive advertising to be more susceptible than research and other activities. Producers may assume that other states would enact similar programs.

These checkoffs are utility and participation maximizing, based on the assumed producer preferences, however, there are other considerations and objectives that may be preferable to checkoff administrators. Consider the use of a MPR. Employing the MPR should increase participation, but the mechanism carries with it the risk of triggering a refund, even if the 20% margin of safety is incorporated in checkoff design.

Table 8. Participation in Checkoffs Where MPR = 0

	Participation (Uncalibrated / Calibrated)		
Nationwide Checkoff		**Oklahoma Checkoff**	
Optimal Design	*67% / 35%*	Optimal Design	*69% / 43%*
MPR=0	*48% / 26%*	MPR=0	*60% / 38%*

Notes: checkoffs designed where MPR is constrained to zero, using a quadratic utility function. The expenditure allocation and fees are not presented, as they do not differ from the utility maximizing solution.

There are clearly reductions in the expected participation rates for both checkoffs as a result of not using a MPR. However, the reduction is small and checkoff administrators may view the reduction as a small price to pay for a state checkoff.

Restricting MPR to zero decreases participation, but the objective remains maximizing producer utility, and thus participation in a checkoff. Maximizing participation is not the only objective that administrators may consider. The level at which fee is set has as much to do with total revenues as the number of individuals who donate, thus maximizing participation is not equivalent to maximizing revenue.

Beyond Utility Maximization

Let us now move into designing checkoffs that consider the risk associated with MPR and have the objective of maximizing revenue. This would be a checkoff administrator preferred objective. To incorporate not using a MPR, the utility function is constrained where MPR = 0, as before. Revenue maximization requires more manipulation of the model. Let the revenue generated by a checkoff be

$$revenue = \sum_{i=1}^{N} Fee * Q_i * P_i \tag{13}$$

where Q_i is the quantity of cattle sold by producer i and P_i is the probability of producer i participating in a checkoff.[17] Consider the relationship between P_i and Q_i. Assume $\text{cov}(P_i, Q_i) = 0$. This implies that $\frac{\partial Q_i}{\partial Fee} = 0$, or in words, that the probability of donation does not change as producer *i* sells more cattle; this assumption is justified in a subsequent section of this chapter. With this assumption, (13) is the same for any Q, so we can normalize Q_i to equal one.

[17] Participation is defined in Chapter Four (pages 62 and 64).

(14) $$revenue = \sum_{i=1}^{N} Fee * P_i$$

The programming problem used to solve for a revenue maximizing checkoff maximizes (14) under a quadratic utility model subject to relevant constraints that were previously developed. The EXCEL Solver feature was used to solve the model.

Table 9 provides revenue maximizing checkoffs which are also constrained where MPR = 0. These checkoffs would be preferred by checkoff administrators, but are not the most preferred option to producers.

Table 9. Revenue Maximizing Checkoffs

(Uncalibrated / Calibrated)			
Nationwide Checkoff		**Oklahoma Checkoff**	
Utility Maximization		Utility Maximization	
Participation	*67% / 35%*	*Participation*	*69% / 43%*
Fee	*$.60 / $.73*	*Fee*	*$.45 / $.69*
Revenue Maximization		Revenue Maximization	
Participation	*38% / 22%*	*Participation*	*46% / 32%*
Fee	*$1.21 / $1.12*	*Fee*	*$1.15 / $1.11*

Notes: checkoffs designed to reduce the risk associated with using the provision points mechanism (MPR=0), and to maximize revenue rather than utility. The expenditure allocations are not presented, as they do not differ from those presented under utility maximization.

A fee increase above the utility maximizing levels will clearly decrease participation. However, checkoff administrators may prefer more money to more individuals participating, making revenue maximization preferable to utility maximization.

The next section will incorporate demographics into these results in order to more accurately infer preferences for other producers across the state and nation, and explain some of the attitudes that correlate with willingness to donate.

Demographics

There may be differences in willingness-to-donate according to farm type or size, by membership in a certain group or by household income. Recall that the fixed effects of demographics may be measured using dummy variables. As an example, consider the inclusion of a dummy variable to examine the effect of being a veal producer. This variable would take a value of one if a respondent indicated they produced veal calves and zero otherwise. If the parameter is negative, veal producers experience less utility for a checkoff than their counterparts. If willingness-to-donate is heterogeneous by demographic group, conclusions about the behavior of the population must be adjusted to reflect differences before the 'best' result can be obtained.

A dummy variable indicates two things regarding utility for a checkoff. The sign indicates whether a given group derives higher or lower utility, and the magnitude indicates the extent of the difference relative to other factors.[18] Parameter estimates that are statistically indistinguishable from zero do not imply that the probability of participation for that group is zero. Rather, this result implies that the preferences do not differ from the survey average. Attitudinal data are incorporated using the same methodology. Although the implications of the two classes of data are different, both measure fixed effects, and are measured the same way.

This section investigates demographic data, while the following section is devoted to attitudinal data. In each case, the demographic or attitude is first described, and then the feature is inserted into the linear utility function shown in Chapter Four (equation (2),

[18] Other factors could be checkoff attributes, attitudinal effects or additional demographic categories.

page 59) using dummy variables.[19] Note that in measuring the effects of demographics and attitudes, the best that we can reliably count on is measuring correlation with utility. Causation of utility for a checkoff is not a knowable function using the methods of this study. Because the objective is correlation, demographics and attitudes were isolated and studied individually. For example in studying farm size, relevant farm size dummy variables were defined and specified in a linear utility function. To study a different category of dummy variables, say income, the size dummy variables were dropped, and the linear utility function respecified using only the income dummy variables and the linear attribute variables from Table 5. In the same way, remaining demographics and attitudes were studied. In each case, results are presented without attribute parameters (*fee*, *adv*, *rsrch*, *other* and *MPR*), although they were included in the estimation. Although the attribute parameters are not constant in each case, the results proved to be robust in each specification and the implications of the attribute parameters did not change as different dummy variable groups were included in the utility function. Finally, all data in the next two sections were calibrated and some surveys have been dropped from the sample to handle missing data. Table 10 presents descriptions of all demographic dummy variables that will be covered in this section.

[19] Also see Table 5, page 69.

Table 10. Demographic Dummy Variables

Survey Question	Variable Name	Description
Please indicate the average number of cattle and calves you sell each year	Veal Calves	1 if veal calves are produced, 0 otherwise
	Calf, Feeder, Purebred	1 if weaned calves, feeder cattle or purebred cattle are produced, 0 otherwise
	Small	1 if producer sells 50 or fewer weaned calves or purebred cattle, 0 otherwise
	Large	1 if producer sells more than the non-zero survey average number of fed cattle, weaned calves or stockers, 0 otherwise
	Small Farm Large Income	1 if a producer is small (as above) and has an income greater than $80,000, 0 otherwise
Please check any farm organizations in which you are a member	Cattleman's Association	1 if a producer is a member of the National or Oklahoma Cattleman's Association, 0 otherwise
	R-CALF	1 if a producer is a member of R-CALF, 0 otherwise
	NFU	1 if a producer is a member of National Farmers Union, 0 otherwise
	OK Farm Bureau	1 if a producer is a member of OK Farm Bureau, 0 otherwise
	National Farm Bureau	1 if a producer is a member of the National Farm Bureau, 0 otherwise
Please estimate your household's yearly income before taxes…	$20,000-$39,999	1 if a producer has an income in this range, 0 otherwise
	$40,000-$59,999	1 if a producer has an income in this range, 0 otherwise
	$60,000-$79,999	1 if a producer has an income in this range, 0 otherwise
	$80,000+	1 if a producer has an income in this range, 0 otherwise

Type of Cattle Raised

The first demographic question asked producers to indicate how many and what type of cattle they sold in a typical year. Recall the distribution of cattle ownership presented previously in Chapter Two and again here for emphasis on the differences encountered in the survey across farm type and size.

Table 11. Survey Cattle Ownership by Type and Size

Weaned Calves		Feeder Cattle		Fed Cattle		Veal Calves		Purebred Animals	
Range	n	Range	n	Range	n	Range	n	Range	n
0	106	0	168	0	425	0	561	0	478
<50	170	<100	175	<500	132	<50	41	<50	114
50-99	156	100-499	133	500-999	33	50-99	6	50-99	18
100-199	71	500-999	85	1000-9999	21	100-199	3	100-199	13
200-499	89	1000-4999	70	10,000-19,999	2	200-499	2	200-499	2
≥ 500	63	≥ 5000	12	≥ 20,000	7	≥ 500	0	≥ 500	0

Notes: Responses to question regarding farm size and type. The range column is the interval offered as a potential response. The n column reflects how many producers indicated they sold a particular type and number of cattle. For example: 106 producers indicated they sold 0 Weaned Calves.

Also recall that there are differences in capital allocation and production goals between producer types. There is reason to suspect that these differences may change the propensity to donate by type of cattle produced. Some types of producers may tend to feel that their segment of the industry does or does not benefit from checkoff activities, creating a need to have individual representation in the model because of the differences in utility for a checkoff by group. However, in some cases producers may be involved with more than one type of production causing problems identifying and isolating groups of producers.

So what is the most appropriate way to group cattle producers? Purebred cattle, feeder cattle and weaned calf producers are the most likely groups to be under single

ownership. As a result these three producer types are grouped together as one. The three cattle type groups are: fed cattle producers, veal producers; and calf, stocker and feeder cattle producers jointly. Recall that surveys were only sent to Oklahoma cattle producers. Assuming that all respondents did in fact produce cattle in at least one of the classes presented, including all three farm type categories would result in a perfect linear combination. Dropping one class of cattle from the utility function creates a reference group and solves the problem. Fed cattle will be the group that is dropped. Remaining parameter estimates indicate the difference in utility that a given group experiences as compared to fed cattle producers.

Table 12. Cattle Type Sold

Parameter Estimates for Cattle Type Sold *Linear Model (t-statistic)*	
Veal Calves	Calf, Feeder, Purebred [a]
-0.7382***	-0.339
(-3.003)	(-0.7655)

*, **, *** Denotes significance at 10%, 5% and 1%
Log likelihood function value; –1,154.2; sample size = 1259.
Notes: These parameter estimates were obtained from the linear utility function presented in Table 5. The model was specified as follows
$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + VealCalves_i + Calf, Feeder, Purebred_i + \varepsilon_i$
The checkoff attribute parameters have been omitted from this table for ease of presentation. While attribute parameters change slightly, the model is still robust in this specification, and the implications for checkoff design remain the same. The reference group is *fed cattle*
[a] Specification of a parameter for each of these cattle types individually produced no individually significant parameters.

While the *calf, feeder, purebred* group appears similar to fed cattle producers with respect to preferences for a checkoff, these results do not definitively imply that the *calf, feeder, purebred* group is distinct from the *veal calves* producer group. Nonetheless, as far as difference from fed cattle producers, in veal producers, the first and only notable difference by producer type is encountered. Veal producers are less likely to donate to a

checkoff than fed cattle producers. Perhaps veal producers perceive that their product is dissimilar enough to beef as to not enjoy the benefits of the marketing activities undertaken by a checkoff. In states that have more dairies there may be different preferences due to the fact that veal is typically a by-product of dairy production. The beef checkoff clearly does not promote dairy consumption. However, an insufficient response was received to draw any conclusions about this possibility, as only four respondents produced strictly dairy animals. What about farm size, do large producers experience some different level of utility than small producers?

Size

Since respondents were asked what type and how many of each cattle type they sold, the same question used to address farm type will be used to address farm size. There are two issues of interest to administrators regarding farm size. Does farm size correlate with different willingness-to-donate? Do the joint effects of farm size and income effect willingness-to-donate?

Small producers will be defined as having indicated that they sold the number of cattle in the smallest range of cattle. There is again a potential problem with producers who sell more than one type of cattle. For example, a producer could sell 500 weaned calves in a year, while retaining ownership on 25 of them as feeders. This producer would appear to be a small feeder calf producer but would actually be more correctly described as a large weaned calf producer. How is the effect of being a small producer to be measured?

To answer this question, consider again the beef industry. Finishing cattle involves large cattle numbers of cattle. Large commercial feedlots (defined by NASS as

having capacity over 1000 head) commonly have tens of thousands of cattle at any given time. The entire state of Oklahoma has 24 commercial feedlots (Bloyd).[20] As a result measuring the effect of being a small cattle feeder based upon this survey response is not feasible, since there are not a sufficient number of large feedlots to compare. Feeder cattle are typically found in rather large groups (recall the average number sold by survey respondents is 696) and will not be used to measure small producer effects. Veal producers have already been shown to have different preferences for a checkoff and the collinear effects of *size* and *type* could not be separated based on available data. Small producers then will be defined as producers who sell less than 50 weaned calves or purebred animals.

Let us now define a large producer. Note that a large producer can be involved in more than one type of production without creating the definitional problems encountered in the same scenario for a small producer. For example, a cattle feeder who sells 75,000 head of cattle may also sell 30 weaned calves in a year. The fact that he sells 30 weaned calves does not make him a small producer, and his behavior would likely be more similar to peers who are in the type of production in which he is a large producer. A large producer is to be identified as producing more than the survey average number of fed cattle, weaned calves or stockers. Veal will be excluded because only 11 veal producers meet the criteria to be large, and again because of multicollinearity problems.

[20] Note that there were 30 producers who indicated that they typically sold more than 1000 head of fed cattle. All cattle producers pay checkoff fees, but this exemplifies a definitional problem with independently modeling the effect of being a fed cattle producer. Some producers produce weaned calves or stocker animals and then pay a feedlot to finish the animals rather than selling them to the feedlot. These people may indicate that they sell fed cattle, but are more accurately described as weaned calf or stocker producers since they do not undertake any feeding activities.

Purebred producers will be excluded as well because this type of producer is generally smaller on average.

What are the average numbers of cattle produced by survey respondents? A method to estimate averages was presented in Chapter Three.[21] Those figures were calculated by incorporating into the average, those producers who did not produce any of a certain type of cattle. For the purpose of identifying and comparing producers within a certain group, it is more accurate to take an average number of cattle sold based only upon producers who actually produce that type of cattle. Table 13 presents both averages.

Table 13. Non-Zero Cattle Averages

	Calves	Feeder	Fed	Veal	Purebred
Including producers with zero values of cattle types	160	696	610	5	11
Not including producers with zero values of cattle types	191	942	1940	59	47

Notes: Average number of cattle sold in each of the five possible types. Results presented for two methods of calculating producer averages (1) including producers who indicate a zero value for a cattle type, and (2) by excluding producers who indicate a zero value for a cattle type.

One question remains relative to farm size: What of the relationship between income and farm size? Recall the diversity of people in beef production highlighted earlier. Some producers may enter the beef industry for enjoyment rather than for profit. These people likely have a majority of their household revenue generated off the farm, and may only be mildly concerned with profit. A producer of this kind would seem likely to have a smaller farm than other producers who must produce positive returns and

[21] See page 33, Figure 3.

support a family. This phenomenon will be tested on weaned calf producers and feeder calf producers (the same way small producers were defined earlier). A dummy variable that takes a value of one if a "small" producer in either of these categories has an income in the largest bracket ($80,000 +) and zero otherwise is created. Theory does not firmly establish a sign expectation for this variable, and either is acceptable and explainable.

Table 14. Farm Size Effects

Parameter Estimates for Size *Linear Model (t-statistic)*		
Small Producer (n=300)	Large Producer (n=266)	Small Farm Large Income (n=76)
-0.2331	0.0307	0.0877
(-1.6192)	(0.2306)	(0.3862)

*, **, *** Denotes significance at 10%, 5% and 1%
Log-likelihood function value; -1,157.6, sample size = 1259.
Notes: These parameter estimates were obtained from the linear utility function presented in Table 5. The model was specified as follows

$$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + SmallProducer_i + LargeProducer_i + \ldots$$
$$SmallFarmLargeIncome_i + \varepsilon_i$$

The checkoff attribute parameters have been omitted from this table for ease of presentation. While attribute parameters change slightly, the model is still robust in this specification, and the implications for checkoff design remain the same. No reference group is needed, as the variables are not exhaustive.

Small producers do not seem to have preferences that differ from their larger peers. The sign is negative on *small producer* and consistent with the hypothesis that small producers may derive less benefit because of their smaller stake in the industry. However, the level of significance is not above 10% and does not lend to a strong endorsement of this theory. There is no significant change in propensity to donate as a result of being a large producer either. Consider the implication of a significant *large* or *small producer* parameter. The checkoff functions on a per head fee, thus if large producers were more likely to donate, a checkoff could expect a higher level of funding than if an equal likelihood among small producers were observed. In other words, size is

important because larger producers have a more significant effect on revenue than small producers.

As with the other size variables, the *small producer large income* variable does not achieve statistical significance different than zero. Thus far, none of the size or farm type variables, excepting *veal calf* producers, have proven to correlate with preferences for a checkoff. However, two demographic categories remain to be investigated. Membership in farm groups and the effects of different household incomes will be presented the next two sections.

Group Membership

Recall the varied official positions of the groups that were presented on the survey. Do individuals follow the position of the groups in which they claim membership? Evidence will be examined by observing propensity to donate to a checkoff, and comparing this to the formal position adopted by each group. All groups were examined individually with the exception of the Oklahoma Cattleman's Association (OCA) and the National Cattleman's Association (NCBA). These two groups are closely tied, with similar positions on many issues.

In the case of cattle type sold it was necessary to drop one category in order to avoid creating a series of variables that were a perfect linear combination. Should the same be done for group membership? The answer is no for the reason that an exhaustive set of groups was not included in the choice set. Recall that a write-in option was provided to allow respondents to indicate membership in other groups. There were 197 people who either wrote in a group or indicated no group; this is a sufficient number of respondents to create a reference group. Interpretation of remaining parameters is the

difference in utility experienced by members of a group from write-ins or non-group members.

If a matrix containing all group variables exhibits full rank, then all group dummy variables may be used. In order for data to have full rank, each variable should be linearly independent of the others. The *rank* function in MATLAB confirms that all five group dummy variables are linearly independent of each other.[22]

Table 15. Group Membership Effects

Parameter Estimates for Group Membership

Linear Model (t-statistic)

Cattleman's Association (OK and National)	R-CALF	National Farmers Union	OK Farm Bureau	National Farm Bureau
0.3916***	0.3492	-0.0438	0.0238	0.5079**
(3.2577)	(1.0334)	(-0.2194)	(0.1977)	(2.0212)

*, **, *** Denotes significance at 10%, 5% and 1%
Log-likelihood function value; –1,149.6, sample size = 1259.
Notes: These parameter estimates were obtained from the linear utility function presented in Table 5. The model was specified as follows
$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + Cattlemans_i + RCALF_i + NFU_i + OFBA_i + NFB_i + \varepsilon_i$
The checkoff attribute parameters have been omitted from this table for ease of presentation. While attribute parameters change slightly, the model is still robust in this specification, and the implications for checkoff design remain the same. A reference group is not required as the write-in category, allows other groups to be represented. There were 197 of 705 respondents who either did not indicate group affiliation or wrote in another group.

Consider the interpretation of these group parameters. If a group parameter is significant, then members of that group would be more or less likely to donate to according to a positive or negative sign respectively. Some groups are much larger than others, NCBA has over 200,000 members and R-CALF has about 10,000 (NCBA; R-CALF), and thus the impact of group membership on revenues varies broadly. Finally,

[22] There are actually six groups in the survey but OCA and NCBA were grouped together as described previously.

note that insignificant parameters reveal that members in a group have preferences equal to the survey average, not that they prefer a refund

The official position of NFU is one in favor of a voluntary checkoff. Membership in NFU does not increase the likelihood that a producer favors a checkoff. R-CALF takes no official position in the checkoff debate, and the model implies no difference in propensity to donate. Membership in Oklahoma Farm Bureau (OFB) was the largest of all six groups with half of all respondents indicating membership. OFB member's propensity to donate to a checkoff does not depart from the average. Consider the position of OFB, a farm group not specific to the beef industry, which states "We support a $.50 / head Oklahoma Beef Checkoff in the event that a national checkoff is defeated." It seems as though the position of OFB is consistent with the results of the survey. Somewhere between 43% and 69% of producers favor a state checkoff with the utility maximizing fee in the range of $.45 - $.69.

What of the groups who derive a statistically different level of utility? Consider again OCA and NCBA, groups whose specific focus is the beef industry, taking note of the positive and significant result in Table 15. The formal position taken by these groups is one in favor of the current program. Further, NCBA receives funding from the checkoff and their interest in the continuation of the mandatory checkoff is not surprising. One would expect that a voluntary checkoff would be a second choice to the mandatory version, but preferred over nothing. Producers in the cattleman's associations do indeed seem to favor a checkoff. A positive and significant parameter reveals that members of these two groups prefer a checkoff to a greater extent than their non-member peers,

suggesting greater participation from members of the Oklahoma Cattleman's and National Cattleman's Beef Association.

NFB opposes the elimination of the checkoff and based on results, favors the development of a voluntary checkoff as a replacement. There were 43 producers who indicated membership with NFB and a significant and positive parameter estimate demonstrates a higher than average willingness-to-donate for members of the National Farm Bureau.

Of the groups that were studied, none were found to derive less utility from a checkoff than the survey average. These data may be used to aid program administrators in targeting a checkoff, either trying to motivate those groups already more likely to participate or by appealing to those who are not as likely to do so, in an attempt to win additional support. Let us now consider the effect of income on checkoff preferences.

Household Income

The final demographic to be considered is income. There are several ways to look at income given how the question was delivered on the survey. Raw numbers could be used, as was the case with checkoff attributes. Because data on income are in five ranges, using raw numbers requires the use of midpoints for the three closed intervals and a guess for the open intervals at the extremes of the question. Especially at the highest level of income, this is not a particularly accurate representation.

Another way to represent income is with categorical variables. Under this option, a number is assigned to represent an income interval. For example, if a producer indicated their income was "less than $20,000," a categorical variable taking a value of one would be assigned. If the next producer indicated their income was in the range of

$20,000-$39,000, a categorical variable with a value of two would be assigned. There were five income intervals, and thus the same trend would continue for categorical variables taking values of three, four and five for the next ranges of incomes. This approach, like the raw income method above, has the advantage of not giving up degrees of freedom by having multiple dummy variables. The use of a quadratic term on this variable will also allow for non-linearity of income effects.

Yet another method would be use of a series of dummy variables. These dummy variables would take a value of one for responses indicating a particular income range and zero otherwise. Both the categorical variable and a dummy variable series were implemented, but in the end the dummy series is preferred. A dummy variable series has the advantage of being a theoretically more robust result, because it accurately represents the method in which data were collected from the survey.

Recall that an intercept is not incorporated into the model. This should allow for all income dummy variables to be included in the model. However, interpretation of a regression with all dummy variables becomes somewhat problematic. All producers have an income. Given that all but 40 respondents chose to provide their income, the entire set of dummies will essentially reflect willingness-to-participate as a result of having an income. If an income category is omitted, the result is the creation of a reference group with a difference in willingness-to-participate equal to the survey average. What of a statistical test for this hypothesis? A likelihood ratio test of the restriction that *income <$20,000* (the lowest income dummy variable) is equal to zero cannot be rejected

at any standard level of significance ($p = .3162$).[23] The interpretation of the remaining parameter estimates is the difference in willingness-to-donate attributable to changing levels of income relative, to the lowest level.

Table 16. Income Effects

Parameter Estimates for Household Income			
Linear Model (t-statistic)			
$ 20,000 - 39,000	$ 40,000 - 49,000	$ 50,000 - 79,000	$ 80,000 +
0.8441***	1.4458***	1.2161***	1.3098***
(2.9958)	(5.2623)	(4.2991)	(4.9453)

*, **, *** Denotes significance at 10%, 5% and 1%
Log-likelihood function value; –1140.9, sample size = 1259.
Notes: The ranges of incomes are given here, as on the survey question asking respondents to indicate their household income. These parameter estimates were obtained from the linear utility function presented in Table 5. The model was specified as follows

$$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + 20to39k_i + 40to49k_i + 50to79k_i + 80k\_plus_i + \varepsilon_i$$

The checkoff attribute parameters have been omitted from this table for ease of presentation. While attribute parameters change slightly, the model is still robust in this specification, and the implications for checkoff design remain the same. The reference group is income *<$20,000.*

Notice that willingness-to-donate increases and then plateaus. Somewhere in the range of $40,000 to $49,000, willingness-to-donate becomes approximately constant. The average farm income in the U.S. is approximately $67,000. This implies that checkoff design need not be particularly concerned with targeting the program towards any particular income demographic. Those producers that derive relatively less utility from a checkoff are well below the average farm income. It seems probable that, other things constant, larger income implies larger farms (more cattle) and thus higher potential

[23] This is a p-value ($p = 1-\alpha$). The likelihood ratio test is set up where the test statistic (LR) is a ratio of the value of the restricted and unrestricted log-likelihood function values respectively, with one restriction (k) LR=-1,140.9/-1,135.5 . The test statistic is distributed under the χ^2_k . Data are calibrated.

donations to a checkoff. The categorical variable approach was also used, however results are not presented.[24]

Estimates of participation for several checkoff designs have been given. It is further shown that several demographic segments have different propensities to donate. Next, let us now address the effects of attitude on willingness-to-donate.

Attitudes

Producers were asked to answer questions regarding their feelings toward the current checkoff. These questions allow for comparison of the current checkoff to a replacement program. For example, if a voluntary program is treated as a substitute for a mandatory checkoff, producers who favor the current program should be more likely to participate in a voluntary program. Another type of attitude question addresses perceived benefit allocation to producers from checkoff activities, and may aid checkoff administrators in allocating funds. Consider an attitude that research from the checkoff benefits producers more than processors and retailers (not an actual result). Checkoff administrators would have good reason to consider the inclusion of at least some research in a checkoff. This section considers these and other attitudes. First, take note of Table 17, which describes the construction of each variable in this section.

[24] Incorporating the categorical variables *income* and $income^2$ rather than a series of dummy variables imposes a continuous structure on income as would be more realistic. The result of this approach points to a similar point at which utility reaches a maximum. However, further interpretation of the categorical income variable will not allow for the plateau effect that is observed in the dummy variable series, implying that producers at even higher levels of income would experience increasingly lower utility. This is problematic and unlikely. Especially given the relatively low maximum income level of $80,000, the survey question simply does not contain enough information to accept this implication.

Table 17. Attitudinal Dummy Variables

Survey Question	Variable Name	Description
Were you aware of the recent litigation and court rulings on the beef checkoff before receiving this survey?	Aware	1 if the respondent was aware of the litigation, 0 otherwise
Which best describes your feelings toward the challenge to the mandatory beef checkoff?	Eliminate	1 if the respondent indicated they were in favor of eliminating the checkoff, 0 otherwise
How much do you feel the beef checkoff funds benefit cattle and beef producers outside of the U.S.?	Foreign	1 if the respondent indicated that foreign producers benefited equally or more than domestic producers, 0 otherwise
Who, in your opinion receives the greatest benefit from checkoff funds spent on advertising?	Advertisingatt	1 if the respondent indicated that processors and retailers benefited equally or more than producers from advertising, 0 otherwise
Who, in your opinion receives the greatest benefit from checkoff funds spent on research?	Researchatt	1 if the respondent indicated that processors and retailers benefited equally or more than producers from research, 0 otherwise

Litigation Awareness and Mandatory Checkoff Support

A court order has allowed the continued operation of the mandatory checkoff until a final verdict is reached. It is likely that opinions regarding the current checkoff will correlate with preferences for a voluntary checkoff. Specifically, consider awareness of the litigation surrounding the issue, and the opinion that the current program should be

eliminated. Because these attitudes are both rooted in the current checkoff, the variables are grouped together and specified in a utility function as before. Note that in each of these two variables, the converse opinion is not included in the utility function, as having one of these opinions necessarily implies not having the other. For example, regarding the *Aware* parameter, the condition of respondents being *unaware* of checkoff litigation is not incorporated into the utility function. Table 18 gives parameter estimates for dummy variables on these attitudes.

Table 18. Mandatory Checkoff Opinion Correlations

Parameter Estimates for Mandatory Checkoff Opinions
Linear Model (t-statistic)

Aware	Eliminate
0.5271***	-2.8926***
(3.934)	(-13.0131)

*, **, *** Denotes significance at 10%, 5% and 1%
Log-likelihood function value; –1,006.1, sample size = 1259.
Notes: *Aware* is a variable which measures the effect of being aware of the litigation against the checkoff. *Eliminate* is a variable to measure the effect of being in favor of elimination of the checkoff. These parameter estimates were obtained from the linear utility function presented in Table 5. The model was specified as follows
$U_{ij} = X_{ij}B_1(1-F_i) + X_{ij}B_2(F_i) + Aware_i + Eliminate_i + \varepsilon_i$
The checkoff attribute parameters have been omitted from this table for ease of presentation. While attribute parameters change slightly, the model is still robust in this specification, and the implications for checkoff design remain the same

Some producers who took the survey were not aware of the litigation against the program. The producers who were aware, gained more utility from participation than those who were not. Notice the positive and significant sign on *Aware* (Table 18). It is likely that producers who are aware of the checkoff litigation, are also more active in obtaining other checkoff news. Given the generally positive news delivered by the beef industry to its participants about checkoff effectiveness, this result is not surprising.

Consider the question regarding elimination of the mandatory checkoff. It seems that a voluntary and mandatory checkoff are viewed as substitutes for each other. The high and negative magnitude and strong significance of the *Eliminate* parameter indicates that people who favor eliminating the mandatory checkoff are less likely to participate in the hypothetical voluntary checkoff of the choice experiment. Conversely, producers who favor keeping the checkoff are more likely to participate in a voluntary replacement. How much does supporting the mandatory checkoff increase the likelihood of donation?

Still using calibrated data, but now under a quadratic functional form, let the dummy variable *Support* be the mirror image of *Eliminate*, taking a value of one if a producer indicated they supported the current checkoff, zero otherwise. This parameter takes a value of 2.6302 (t=17.564). Incorporating the parameter into the utility function as a binary variable reveals that having this attitude increases the likelihood of donation by about 44%. The probability of participation, holding everything else constant, for individuals who favor the current checkoff (note these are calibrated data, on the federal checkoff) is 92.8%. This result implies that producers who favor keeping the mandatory checkoff are significantly more likely to participate in a voluntary program. While not a surprising result, this is nonetheless useful, considering the availability of support estimates from NCBA.

Perceived Benefit Allocation

There have been several studies regarding the actual benefits of the mandatory checkoff. Actual benefits of checkoff activities will have little bearing on the success or failure of a voluntary checkoff. The program(s) will realize participation only if producers *perceive* that a checkoff is successful at creating benefits, there may indeed be

a high correlation between actual and perceived benefits, here we examine only the perceived benefits of research and advertising expenditures.

Allocation of the budget is the means by which a checkoff may change its focus. Two questions dealt with the most well-known and studied allocations, those being research and advertising. What is the best way to make use of these questions?

Perhaps the most communicative results in answering these questions have already been observed. Recall the summary statistics regarding these two questions. More than half of producers felt that processors and retailers benefited equally or more than producers as a result of expenditures on both research and advertising. This hints at market power perceptions (since processors and retailers are perceived to have the ability to retain the benefits from these activities). Although this result alone is interesting, there may be correlations between these attitudes and checkoff preferences.

Does it make sense to measure the effects of these attitudes using the method that has been implemented thus far? Perceived benefit allocation should enter the utility function in attribute selection during the choice experiment. Thus, careful consideration suggests a need for a new method to study these attitudes due to an expected high correlation with respective checkoff attributes.

Consider a new method to measure these attitudes' effect on producer utility. Specification of another utility function will accommodate analysis of the variables *Researchatt* and *Advertisingatt.* Let the dummy variables *Researchatt* and *Advertisingatt* take values of one if a producer feels that retailers and processors benefit at least as much as producers as a result of the respective activity, zero otherwise.

Let the utility for respondent *i*, derived from a national checkoff be represented by the following.

(15) $$U_i = B_1(fee_i) + B_2(Rsrch_i) + B_3(Other_i) + B_4(MPR_i) + B_5(Advertisingatt_i) + \varepsilon_i$$

Where *Advertisingatt* is a dummy variable as defined in Table 17, and remaining variables are checkoff attributes in a federal checkoff. This model recognizes the relationship between the attitude measured by *Advertisingatt* and the parameter measuring preference for advertising by omitting the parameter *adv*. Any lingering effect of preference for advertising will be deposited in ε_i. Equation (15) can be used to estimate a participation rate for producers who have the attitude that processors and retailers receive at least the same level of benefits from advertising as producers (*Advertisingatt* = 1). Where *Advertisingatt* = 0, respondent i does not have this attitude. Since this question relates to perceptions about the national checkoff the model was specified using national data.

Table 19. Advertising Benefits

Parameter Estimates for Perceived Benefits of Advertising
Linear Model (t-statistic)

Fee	Rsrch	Other	MPR	Advertisingatt
-0.4585	-1.3948	-0.668	1.214	-0.7566
(-3.2852)***	(-3.6617)***	(-1.8369)*	(4.5737)***	(-9.4204)***

*,**,*** Denotes significance at 10%, 5% and 1%
Log-likelihood-function value -1255, sample size = 1259.
Notes: National level calibrated data were used to specify this model, which measures the effect of the attitude that processors and retailers benefit equally or more than beef producers as a result of advertising. *Advertisingatt* is a dummy variable taking a value of one if producers have this belief and zero otherwise.

Advertisingatt has a negative sign, which implies that producers who have this belief would be less likely to participate in a checkoff. Participation is expected by 23 % of producers who believe the benefits of advertising accrue to processors and retailers

equally or more than producers, while 39% of producers who do not have this attitude are expected to participate. These participation rates are quite low, this is likely an indication of the degree to which *Advertisingatt* and *adv* are correlated. While the two variables do seem to be related, it appears that there is a good deal more to preferences for advertising as an attribute (*adv*) than just the degree to which benefits accrue to producers (*Advertisinatt*). Utility maximizing checkoff attributes for *fee*, *rsrch*, *other* and *MPR* were used to calculate these participation rates as defined in Chapter Four.[25]

The same method may be applied to measure the effect of the attitude that the benefits of research accrue to processors and retailers at the same or greater level than they accrue to producers. Recall that *Researchatt* is a dummy variable taking a value of one if producers have this attitude, and zero otherwise. The utility function specified to measure this attitude follows.

(16) $$U_i = B_1(fee_i) + B_2(Adv_i) + B_3(Other_i) + B_4(MPR_i) + B_5(Researchatt_i) + \varepsilon_i$$

Specification of this model follows the same theory and method as that for equation (15) and Table 19.

Table 20. Research Benefits

Parameter Estimates for Perceived Benefits of Research
Linear Model (t-statistic)

Fee	Adv	Other	MPR	Researchatt
-0.8491	1.3417	-0.6722	0.3631	-0.8316
(-5.8674)***	(4.6367)***	(-1.7963)*	(1.3241)	(-9.6957)***

*,**,*** Denotes significance at 10%, 5% and 1%
Log-likelihood-function value –1257.8, sample size = 1259.
Notes: National level calibrated data were used to specify this model, which measures the effect of the attitude that processors and retailers benefit equally or more than beef producers as a result of research. *Researchatt* is a dummy variable taking a value of one if producers have this belief and zero otherwise.

[25] See pages 62 and 64.

Researchatt displays a negative sign, indicating that producers who maintain the belief that processors and retailers benefit equally or more that producers as a result of research are less likely to participate in a checkoff. Of the producers who subscribe to this belief (*Researchatt=1*), 31% are expected to participate, for producers who do not, 51% would likely participate.

The perception that the benefits of advertising go to processors and retailers equally or more than producers decreases participation in a checkoff by 16%, whereas the same belief regarding research reduces participation by 20%. Note that in both models calibrated data were used. Calibrated estimates are regarded as a lower bound on all estimates thus far and the same interpretation applies here. A similar question addresses perceptions that the benefits received by foreign producers are greater than or equal to those received by domestic producers.

How do you feel the beef checkoff funds benefit cattle and beef producers outside of the U.S.? This is the final attitudinal question, and the associated attitude was modeled individually as there are no comparable attitudes to group with. Do producers feel that domestic or foreign cattle producers receive a higher level of benefit from the checkoff? Producers who perceive the benefits accrue more to foreign producers would have a lesser incentive to participate in a checkoff. A dummy variable for producers who have this perception should capture this effect and have a negative sign. The parameter on the variable *foreign* takes a value of -0.4354 and is significant at the 1% level (t=-3.1382). However, recall that of the 24% producers possess this attitude, only 7% feel that the benefits received by foreigners are greater than those of domestic producers

Summary

This chapter has presented three results. Preferences have been measured and used to suggest a utility maximizing checkoff along with several alternative designs. In addition, demographics and attitudes have been examined for their effect on willingness-to-donate to a checkoff. It should be noted again that demographics and attitudes were studied through the use of small, related groups of dummy variables. Appendix B provides a table with parameter estimates from a regression including all these dummy variables in one inclusive model. The next and final section will summarize what has been accomplished, and offer comment on selected results.

SUMMARY AND CONCLUSIONS

Tensions continue to run high on both sides of the fight to preserve the mandatory beef checkoff. The U.S. Supreme Court will hear an appeal to keep the program alive in early 2005. Several major hurdles have already been set before the case is heard. One federal appeal has been lost, and a precedent has been set in the Mushroom Checkoff case. The likelihood of a ruling in favor of a continued mandatory beef checkoff appears small.

Aside from the litigation, the picture is not so dim. There seems to be evidence that the checkoff provides benefits to the industry. Several states feel the current checkoff is successful enough to pursue legislation establishing a voluntary beef checkoff if the mandatory program is halted. As recently as January of 2004, a majority of producers nationally have indicated support for the mandatory checkoff. A similar majority is found in a question on this survey seeking support estimates. This research attempts to shed light on the question: is a voluntary beef checkoff feasible? The problem was addressed using a mail survey with three objectives: (1) *Measure producer preferences for a voluntary checkoff,* (2) *Use preferences to identify a utility maximizing checkoff* and (3) *Evaluate the impact of demographics and attitudes on preferences for a checkoff.*

All three objectives were accomplished through modeling founded in random utility theory. Utility for a checkoff was assumed to be a function of checkoff attributes.

The specification of a utility function allows the measurement of preferences in order to realize objective one. Preference for fee, minimum participation rate (MPR) and spending on advertising are the most significant contributors to utility for a checkoff. While preferences for these attributes are similar in a state and federal program, they are not identical. Preferences for budget allocation reveal that advertising is the most preferred activity, especially in a state checkoff. It seems that producers do not perceive a problem with out-of-state free-riding. Given the apparent likelihood that state checkoffs would be the method of choice to replace the mandatory checkoff and the high probability that free-riding would occur, this is a finding that deserves more research.

Cheap talk and certainty calibration were employed to manage hypothetical bias. The effects of cheap talk are incorporated in all responses whereas certainty calibration may be used at the researcher's discretion. Due to hypothetical bias, uncalibrated data will likely overestimate willingness to donate, whereas calibrated data will likely provide unbiased or underestimated estimates. This implies that true preferences should lie between calibrated and uncalibrated estimates, thus most results were presented as a range, specified with calibrated and uncalibrated data.

A utility maximizing checkoff is also participation maximizing. Under this design scheme, participation would is expected to be between 67% and 35% in a federal program and 69% and 43% in an Oklahoma checkoff (uncalibrated/calibrated estimates). These models included a MPR where all money is refunded if the participation target is not met. Since this method risks triggering a total refund, a significant margin of safety should be included. This was accomplished by constraining the model where the minimum participation rate must be exceeded by 20%. Even with this constraint,

implementing a MPR carries a higher risk than not doing so. Producers do not gain enough utility from a MPR to warrant this increased risk, at some point gains in participation from having the mechanism are offset by the increased requirement for participation.

Utility maximization is but one objective that checkoff administrators might take, with another objective being revenue maximization. The level at which fee is set is another way in which checkoff administrators have control of objectives. The optimal fee in both checkoffs, and in both calibrated and uncalibrated models is below that of the current dollar ($.60/$.73 national; $.45/$.69 state; uncalibrated / calibrated). Raising the fee to revenue maximizing levels, $1.21/$1.12 (federal) and $1.15/$1.11 (state), and not implementing a MPR reduces participation rates to somewhere between 22% - 38% and 32% - 46% respectively.

Significant attention was paid to objective three, as demographics and attitudes theoretically play a role in utility for a checkoff. The demographics studied were: cattle type sold, farm size, group membership and household income. Cattle type and farm size have no noticeable effect on propensity to donate, with the exception of veal producers who are less likely to donate than their peers. The fact that this is the only instance of homogeneity by farm type and size is simplifying for checkoff administration, especially given the small size of veal sales as a total of beef industry revenues. If noticeable differences were found by farm demographics, a checkoff would need to be targeted towards those producers who were most likely to donate.

Membership in several of the farm groups changes willingness to donate (American Farm Bureau, Oklahoma Cattleman's Association and National Cattleman's

Association). All three groups in which a different propensity to donate is observed, are more likely to donate than the survey average. It seems preferable to be surprised in the direction of underestimating participation, and it is thus recommended that group membership be assumed as not affecting utility for a checkoff.

Income was dissected into five ranges and measured for effects on propensity to donate. As income increases, so does the likelihood that a producer will donate. This phenomenon plateaus in the range of $40,000-$49,000 (annual household income). Average survey income was approximately equal to the U.S. farm income average of $66,732. Given that willingness to donate plateaus below average farm income, checkoff administrators need not worry about checkoff design specific to any particular income level.

Like demographics, attitudes and opinions correlate with producer's propensity to donate. A significant and negative correlation exists between producers who feel that foreign producers receive benefits from checkoff activities that are greater than or equal to those of domestic producers. Another notable result, one that may be of particular interest to any future checkoff designers, is the positive correlation between support of the current program and the observed propensity to donate. This result suggests that most producers view a voluntary checkoff as a substitute for the current program. To an extent higher than any other demographic or attitude, producers who support the current program are more likely to participate in a future voluntary program.

What has this paper sought to accomplish? In a sentence, it could be said that the paper sought to estimate and explain free-riding under voluntary beef checkoffs. Expected participation was presented as a range generated by calibrated and uncalibrated

survey data. For a national program, under a variety of checkoff designs a 22%-67% participation rate is expected. Under similar designs, an Oklahoma checkoff could expect to see 32-69% participation. While the cynic could easily claim that a range of 45% is wide enough to accommodate any participation rate, this range covers all the checkoffs designed in the paper and allows the reader to make adjustments in interpretation if she does not agree with the presentation. For example, if the reader believes that the calibrated estimates do indeed underestimate willingness to donate, she could accept the uncalibrated data as the most accurate. Furthermore, information has been gained through measuring preferences, measuring the expected impact of checkoff design and looking preferences that are heterogeneous by demographics.

Any checkoff is a public good and will be subject to free-riding. Designing optimal checkoffs, proposing alternative checkoffs and explaining the behaviors of various groups of people towards the programs are all attempts to estimate or explain how many people will choose to free-ride on the system. The level of free-riding does not appear so significant as to make a checkoff infeasible, although administrators should carefully heed producer preferences. One factor, which a hypothetical experiment cannot replicate, is apathy-induced participation. Some producers will participate because the benefit derived from receiving a refund does not outweigh the transaction cost of requesting it. Consider the voluntary Oklahoma wheat checkoff, a similar program to that which would likely emerge in the beef industry. This program typically receives donations by about 80% of producers. Ultimately however, moving to a voluntary program means that participation will be a result of producer perceptions. Checkoff

administrators must design a checkoff with producer preferences in mind or sell their version of a checkoff in an attempt to change preferences.

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APPENDIX A Pretest Form

DEPARTMENT OF AGRICULTURAL ECONOMICS
513 Ag. Hall, Oklahoma State University
Stillwater, OK 74078-0488
Phone: 405-744-9821
Fax: 405-744-8210
e-mail: ceward@okstate.edu

September 22, 2003

Dear :

The enclosed is a **pretest questionnaire only**. We would like you to complete it as if your name was drawn in the survey sample. Then we would like to know from you what needs to be deleted, added, clarified, etc. Write your comments on the attached sheet and return them to us in the return envelope.

At a later time, your name might be drawn in the random sample of persons to receive the survey. If so, please complete it as though you had not received this pretest mailing. As always, thanks for your help and support of OSU.

Sincerely,

Bailey Norwood
Assistant Professor

Clement Ward
Professor and Extension Economist

Beef Checkoff Survey: Pretest Comments

How long did the survey take to complete? _____ minutes

Was the cover letter clear and understandable? Yes No
If no, how could it be improved? _____

Were there questions that were not clear or understandable? Yes No
If yes, how could each be improved? Question # _____ Suggestion to improve _____

Question # _____ Suggestion to improve _____

Question # _____ Suggestion to improve _____

Question # _____ Suggestion to improve _____

Are there questions that you think should be added to improve what we learn from this survey? Yes No
If yes, please indicate your suggested question. _____

If yes, please indicate your suggested question. _____

If yes, please indicate your suggested question. _____

Thanks for your help. Please return this sheet and the completed questionnaire in the return envelope.

APPENDIX B Inclusive Linear Utility Model

Table 21. Utility Model with all Fixed Effects Included Jointly

Parameter Estimates From a Linear Utility
Parameter (t-statistic)

Variable Name	*Uncalibrated*	*Calibrated*	Variable Name (continued)	*Uncalibrated*	*Calibrated*
Fee Federal	-0.852 (-5.5909)***	-0.6875 (-4.2095)***	Small Farm Large Income	-0.519 (-1.4656)	-0.5189 (-1.6569)*
Adv Federal	1.5809 (2.2430)**	0.6341 (1.0378)	Cattleman's Association	0.3196 (1.7184)*	0.074 (0.5011)
Res Federal	-0.3795 (-0.5230)	-1.492 (-2.2167)**	R-CALF	-0.1573 (-0.1916)	0.3953 (1.0282)
Other Federal	-0.8337 (-1.1564)	-1.4532 (-2.2310)**	NFU	-0.2418 (-0.9556)	-0.0123 (-0.0541)
MPR Federal	0.6678 (2.2822)**	0.5877 (1.8414)*	OK Farm Bureau	0.1381 (0.8855)	0.0352 (0.2589)
Fee State	-1.4585 (-8.9910)***	-1.0215 (-5.9240)***	National Farm Bureau	0.6115 (1.5493)	0.631 (2.1105)**
Adv State	1.6897 (2.3488)**	0.4375 (0.7351)	$20,000-$39,999	0.4036 (1.2374)	0.7002 (2.1912)**
Res State	0.6027 (0.8303)	-0.6383 (-1.0228)	$40,000-$59,999	0.8017 (2.4346)**	1.2103 (3.8355)***
Other State	-0.5312 (-0.7428)	-1.9413 (-3.0314)***	$60,000-$79,999	0.4452 (1.3350)	0.7134 (2.2128)**
MPR State	0.4877 (1.6415)	0.8247 (2.5609)***	$80,000+	0.694 (2.1010)**	1.147 (3.5266)***
Calves, Feeder, Purebred	0.2824 (0.4918)	-0.5134 (-1.0753)	Aware	0.3872 (2.2187)**	0.4203 (2.9349)***
Veal Calves	-1.0074 (-3.4959)***	-0.8863 (-3.2166)***	Eliminate	-3.3715 (-19.4908)***	-2.8852 (-12.6641)***
Large	-0.3909 (-2.1056)**	-0.247 (-1.5430)	Foreign	0.208 (1.1355)	-0.0738 (-0.4518)
Small	0.2189 (1.0666)	0.1457 (0.8149)			

*,**,*** denotes significance at 10%,5%and 1% Sample Size 1259-calibrated, 1278-uncalibrated.
Log-likelihood function value –987.4-calibrated, -1,027-uncalibrated
Notes: Parameter estimates from a linear utility model including all demographic and attitudinal data used in the paper, see chapters five and three for demographic/attitudinal and attribute variable descriptions.

APPENDIX C Survey

This survey asks your opinion on a hypothetical voluntary beef checkoff. We are interested in your input. Please read the following information before answering the following questions. We would like you to consider a hypothetical voluntary checkoff. This a potential checkoff that might emerge if the current checkoff is eliminated. The voluntary checkoff would be implemented as follows.

- Checkoff funds would be collected as a fee per head sold—just as they are now
- Any producer may request for their checkoff fees to be refunded in full
- Collections remaining after refunds would then be spent on checkoff programs (e.g. generic advertising and promotion, beef safety research, etc.)
- However, if a minimum participation rate (defined as the percent of producers who **do not** request a refund) is **not** met, all funds will be returned—regardless of whether it was requested.

Below are three options. Options A and B represent different voluntary checkoffs you could participate in by not requesting your refund. If you would request a refund instead of participating in Options A or B, please choose Option C.

1) Please check the ONE option you prefer the most if this were a <u>nationwide</u> voluntary beef checkoff, assuming these are the only options available. These are hypothetical checkoffs, and studies have found that people overstate their willingness to participate in hypothetical situations. Before answering, please think hard about how you would choose if it entailed giving up real money.

Checkoff Attribute	Option A	Option B	Option C
Checkoff Fee	$0.70 / head sold	$0.75 / head sold	Neither A nor B is preferred. If these were the only two options available, I would request my checkoff fees be refunded in full.
Minimum Participation Rate	55%	10%	
Percent of Funds Spent on Advertising and Promotion	53%	65%	
Percent of Funds Spent on Research	10%	15%	
Percent Spent on Other Activities*	37%	20%	
I would choose (please check **ONLY ONE OPTION**)	☐ I choose option A and would **not** request a refund	☐ I choose Option B and would **not** request a refund	☐ I choose neither A nor B. I **would** request a refund

*Other activities includes foreign marketing, industry information, consumer education and personal communications.

If you chose Options A or B in Question 1, please answer the following question.

2) On a scale of 1 to 10, where 1 means "very uncertain" and 10 means "very certain", how certain are you that you would voluntarily pay the checkoff fee for the option you chose? (CIRCLE ONE NUMBER)

1	2	3	4	5	6	7	8	9	10
very uncertain									**very certain**

3) Please check the ONE option you prefer the most if this were a <u>statewide</u> voluntary beef checkoff, assuming these are the only options available.

Checkoff Attribute	Option A	Option B	Option C
Checkoff Fee	1.40	1.15	Neither A nor B is preferred. If these were the only two options available, I would request my checkoff fees be refunded in full.
Minimum Participation Rate	70%	15%	
Percent of Funds Spent on Advertising and Promotion	15%	61%	
Percent of Funds Spent on Research	43%	0%	
Percent Spent on Other Activities*	42%	39%	
I would choose (please check **ONLY ONE OPTION**)	☐ I choose option A and would **not** request a refund	☐ I choose Option B and would **not** request a refund	☐ I choose neither A nor B. I **would** request a refund

*Other activities includes foreign marketing, industry information, consumer education and personal communications.

If you chose Options A or B in Question 3, please answer the following question.

4) On a scale of 1 to 10, where 1 means "very uncertain" and 10 means "very certain", how certain are you that you would voluntarily pay the checkoff fee for the option you chose? (CIRCLE ONE NUMBER)

1	2	3	4	5	6	7	8	9	10
very uncertain									**very certain**

Now, please describe your cattle operation and views on the beef checkoff by answering the following questions.

5) In the boxes below, please indicate the average number of cattle and calves you sold in the past year.

Average number of weaned calves sold per year

☐ none ☐ less than 50 ☐ 50-99 ☐ 100-199 ☐ 200-499 ☐ 500 or greater

Average number of feeder cattle sold per year

☐ none ☐ less than 100 ☐ 100-499 ☐ 500-999 ☐ 1,000-5,000 ☐ 5,000 or greater

Average number of fed cattle sold per year

☐ none ☐ less than 500 ☐ 500-1,000 ☐ 1,000-10,000 ☐ 10,000-20,000 ☐ 20,000 or greater

Average number of veal calves sold per year

☐ none ☐ less than 50 ☐ 50-99 ☐ 100-199 ☐ 200-499 ☐ 500 or greater

Average number of purebred heifers and bulls sold per year

☐ none ☐ less than 50 ☐ 50-99 ☐ 100-199 ☐ 200-499 ☐ 500 or greater

6) Do you raise beef, dairy, or both cattle breeds?

☐ beef breeds only ☐ dairy breeds only ☐ both beef and dairy breeds

7) Please check any farm organizations in which you are a member.

☐ National or State Cattleman's Beef Associations ☐ R-Calf USA ☐ National Farmers Union ☐ American Farm Bureau Association

other (please list) _____

8) Were you aware of the recent litigation and court rulings on the beef checkoff before receiving this survey?

☐ yes ☐ no

9) Which best describes your feelings toward the challenge to the mandatory beef checkoff?

☐ I am in favor of *eliminating* the mandatory beef checkoff ☐ I am in favor of *keeping* the mandatory beef checkoff ☐ Undecided

10) Do you feel beef checkoff expenditures on **advertising** benefits cattle producers or beef processors and retailers more?

☐ Benefits cattle producers more ☐ Benefits beef processors and retailers more ☐ Benefits both equally ☐ Undecided

11) Do you feel beef checkoff expenditures on **research** benefits cattle producers or beef processors and retailers more?

☐ Benefits cattle producers more ☐ Benefits beef processors and retailers more ☐ Benefits both equally ☐ Undecided

12) How do you feel the beef checkoff funds benefit cattle and beef producers outside of the U.S.?

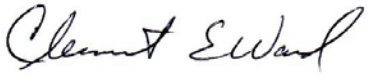
☐ More than U.S. producers ☐ Equal to U.S. producers ☐ Less than U.S. producers ☐ Other or not sure

13) As close as you can recall, please estimate your household's yearly income before taxes by checking the appropriate box. This question is used to ensure our sample is representative of all producers. Please remember that your responses will be held strictly confidential.

☐ less than $20,000 ☐ $20,000-$39,999 ☐ $40,000-$59,999 ☐ $60,000-$79,999 ☐ $80,000 or greater

14) Do you have any comments you would like to add? If so, please list them below.

On behalf of Oklahoma State University, we thank you for your time!



Clem Ward,
College of Agriculture Sciences and Natural Resources
Oklahoma State University

VITA

Christopher David Winn

Candidate for the Degree of

Master of Science

Thesis: SURVEYING THE FEASIBILITY OF A VOLUNTARY BEEF CHEKOFF: DO DEMOGRAPHICS AND ATTITUDES MATTER?

Major Field: Agricultural Economics

Biographical

Personal Data: Born in Key West, Florida on October 31, 1980. The son of David W. Winn II and Lois C.S. Winn.

Education: Graduated from Liberty High School, Colorado Springs, Colorado in May 1999; Received Bachelors of Science Degree in Agribusiness and Second Bachelors of Science Degree in Animal Science from Colorado State University. Completed the requirements for the Master of Science degree with a Major in Agricultural Economics at Oklahoma State University in December, 2004.

Organizations: American Agricultural Economics Association; Agricultural Economics Graduate Student Association, Oklahoma State University

Experience: Graduate Research Assistant, Department of Agricultural Economics, Oklahoma State University, August 2003 to December 2004; Tutor for the following undergraduate classes: Microeconomics, Elementary Statistics for Business & Economics, Introduction To Agricultural Economics, Introductory Biology, and Elementary Statistics, January, 2003 to December, 2003

Name: Christopher David Winn Date of Degree: December, 2004

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: SURVEYING THE FEASIBILITY OF A VOLUNTARY BEEF CHEKOFF: DO DEMOGRAPHICS AND ATTITUDES MATTER?

Pages in Study: 123 Candidate for the Degree of Masters of Science

Scope and Method of Study: The beef checkoff, a generic marketing program, funded through producer assessments, may soon be been ruled unconstitutional. Several states have proceeded toward voluntary checkoffs to replace the broadly supported mandatory program. These factors raise the question: Is a voluntary beef checkoff feasible? A choice experiment, employing cheap talk and certainty calibration is conducted on a mail survey to 2,950 Oklahoma cattle producers.

Findings and Conclusions: Several checkoff designs are examined, and participation in either a state or federal checkoff appears sufficient to initiate a checkoff. Producers prefer checkoff expenditure to be heavy in advertising, favor a per-head fee less than one dollar and are not strongly influenced by a minimum participation rate. Several demographics correlate with checkoff preferences including: higher household income, membership in certain farm groups and veal production. Attitudes regarding the current checkoff correlate strongly with preferences for a voluntary program.

Advisors Approval F. Bailey Norwood