

Measuring the value to the public of pig welfare improvements: a contingent valuation approach

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Abstract

The welfare of farm animals is a policy area that has increased greatly in importance in recent years. When deciding whether a proposed policy should be implemented, it can be useful for policymakers to compare the costs of the proposed improvement with the perceived benefits. The costs are relatively straightforward to calculate but little is known about the benefits. The Contingent Valuation Method (CVM), a direct survey-based method, can be used to shed some light on this. This approach elicits the willingness-to-pay (WTP) for the provision of some public good or service. This paper reports the results of a contingent valuation study of the value of welfare improvements for growing pigs. Attitudes and opinions with regard to farm animal welfare are explored and WTP elicited for various pig welfare improvements including increases in space allowance, environmental enrichment and research into improved pig housing design. The results reveal a positive WTP for these improvements. However, it is also noteworthy that a significant proportion of the general public is willing to pay nothing for these improvements. Overall, the study illustrates the usefulness of the CVM approach as a tool for policymakers in assessing the merits of possible policy initiatives affecting the welfare of animals.

Keywords: animal welfare, contingent valuation, pigs, spike models, substitution effects, willingness-to-pay

Introduction

An increasing amount of attention in recent years has focused on animal welfare issues, especially in light of the intensive nature of farming today. Growing affluence has led to a greater desire for quality with more emphasis on the 'image' of meat and the ensuing development of welfare-based premium-priced goods. There has also been extensive media coverage of poor welfare conditions arising from modern 'factory farming', putting animal welfare in the spotlight. Proof of the strength of feeling that exists lies in the fact that Members of Parliament receive more letters about animal welfare than about any other issue with the exception of housing (Hills 2001).

The government, not only at the national level but also at the EU level, has responded to this by introducing legislation to improve the minimum welfare standards of farm animals within their jurisdiction. This has created a greater role for policymakers as they decide on the feasibility of the changes proposed. As with all changes to public policy, it can be useful to carry out a Cost Benefit Analysis. The costs of such improvements have always been straightforward to calculate but very little has been known about the benefits accruing to society from such changes.

One means of shedding light on the benefit side is through use of the Contingent Valuation Method (CVM). CVM, a stated preference technique, is a hypothetical direct approach to valuing non-market goods. It is based on the

assumption that a respondent's stated hypothetical behaviour would mirror his real behaviour in an actual market. CVM is survey-based and elicits a respondent's willingness to pay (WTP) for changes in the quantity or quality of a non-market good or service (Mitchell & Carson 1989). In recent years it has become a well-established and widely used valuation technique, particularly within the environment, health and safety, and transport fields. Its prominence has increased considerably in the United States in recent years where it is now used in litigation cases, most notably in environmental damage assessment.

The potentially important role of CVM is in estimating the perceived benefits of public policy, specifically because the technique can be used to measure non-use values as well as use values. In the case of farm animal welfare, use value is the benefit derived from actual consumption of the good. For example, a consumer of premium-priced, welfare-friendly produce may perceive that his food tastes better or is healthier because of higher welfare standards. Non-use value, on the other hand, is simply the satisfaction of knowing that farm animals are kept according to acceptable standards of welfare. Thus, vegans derive no use benefits from improved animal welfare but may derive substantial non-use benefits. Non-use values, in particular, need to be taken into account by policymakers in formulating animal welfare policies because these values are not adequately (if at all) reflected by the market mechanism.

Pioneering research on the application of contingent valuation to farm animal welfare has been undertaken by Bennett (1994, 1996, 1998) and Bennett and Larson (1996), who used it to value the perceived benefits of farm animal welfare legislation. Some useful discussion on the subject of farm animal welfare valuation may also be found in the proceedings of a workshop 'Valuing Farm Animal Welfare'; see Bennett 1994. In our study, the focus was on valuing welfare improvements for growing pigs in intensive production systems. Willingness to pay was sought for increases in the space allowance for growing pigs, environmental enrichment to encourage the expression of natural behaviour in intensive pig systems, and research into improved housing design for pigs.

Increasing the space allowance for growing pigs reduces persistent nosing of pen-mates and tail-biting, both key stress indicators associated with poor animal welfare (Hurnik & Lewis 1991). There is evidence that a small space allowance leads to increased agonistic behaviour (Ewbank & Bryant 1972; Meunier-Salaun *et al* 1987) and increases the incidence of cannibalism and tail biting (Jensen 1971; Randolph *et al* 1981).

Environmental enrichment for pigs can be achieved by the addition of straw, peat or other bedding/rooting materials in the growing environment. This provides a means of reducing aggression and harmful pig behaviour, and it has the advantage of a potentially much lower cost than increases in space allowance (Beattie *et al* 1995, 1996; Sneddon & Beattie 1995).

Finally, further research is necessary to develop improved housing systems. A key issue is alternative forms of flooring to the widely used slatted systems which may result in diminished movement and lead to locomotory problems (Ruiterkamp 1987). This differs from the both space increase and environmental enrichment because it is not a welfare improvement *per se*. It is interesting to see what value respondents place on research since despite its intangible and uncertain nature, it may lead to positive future welfare improvements.

Methods

Important considerations

Three questions must be settled before carrying out a contingent valuation study: What is the good? What market shall we use? What elicitation method is best? Respondents in a CV survey are often presented with a great deal of new and sometimes difficult information. This requires painstaking pilot work and pre-testing to ensure that respondents understand the scenarios described and provide accurate responses to the questions asked. This involves not only providing a thorough description of the good being valued but also a very careful choice of payment vehicle and elicitation method.

The payment vehicle is the means of financing the proposed good or service. Its choice is governed by three considerations: appropriateness, credibility and acceptability. Is it

appropriate for the elicitation of use and/or non-use values? Does it have a plausible connection with the good being valued? Do respondents view it as a satisfactory means of extracting payment? Examples of payment vehicles include higher taxes, entrance fees, donations to charities, trust funds and higher prices.

Higher taxes in a referendum format is now the payment method most commonly employed by CV practitioners and has been endorsed by the National Oceanic and Atmospheric Administration (NOAA) panel convened to critically evaluate the method (Arrow *et al* 1993). This is where the respondent is faced with a one-time choice of voting yes or no to a predetermined policy change which would involve payment through higher taxes. Here the behaviour to be predicted by a CV study is how informed voters would actually vote if a proposition to provide the good or service were in fact on the ballot. This method is considered superior because it helps to minimise both strategic and hypothetical bias. Strategic bias arises where it may be in a respondent's best interests to pretend to have less interest in the good than he actually does. For example, with voluntary payment methods such as donations or trust funds, the respondent may 'free-ride' on the payments of others. However, the more hypothetical the question in a survey, the less the incentive for strategic behaviour. This is because the respondent does not view the scenario as realistic which in turn reduces the incentive for accurate responses and may lead to inflated WTP values. The advantage of the referendum format is that it ensures both. The respondent neither views the exercise as hypothetical nor has the incentive to act strategically since he knows that his vote may be decisive. Thus, WTP is neither understated nor overstated: stated WTP equals true WTP (Hoehn & Randall 1987).

Another serious problem with voluntary mechanisms is the "warm glow of giving" where values elicited reflect the willingness to pay for the moral satisfaction of giving to a "good cause" rather than the economic value of the good itself (Kahneman & Knetsch 1992). Also, entry charges or higher prices define a narrower context and can measure use value quite well but not non-use value.

The elicitation method is the questioning technique used to obtain the respondent's WTP and may include open-ended, discrete choice or bidding games. If open-ended questioning worked, it would obviously be an ideal elicitation method as a point estimate of WTP is immediately given. However, there are at least two reasons why open-ended questions are unlikely to provide the most reliable valuations. First, the scenario lacks realism. Respondents are rarely asked or required in the course of their everyday lives to place a financial value on a particular public good. Respondents find it very difficult to pick a figure out of the air, especially when the good in question is unfamiliar. As a consequence, the open-ended format tends to yield an unacceptably large number of non-responses. Second, an open-ended request for willingness to pay invites strategic behaviour resulting in understatement and

Box 1

Your opinion is sought on three possible schemes to improve pig welfare. These schemes would be paid for through a small percentage levy (special tax) on all food items so that everyone's general food bill each week would increase by the amount of the levy.

If you were asked, would you be prepared to support such a levy?
(Please circle number)

- 1 NO We are still interested to hear about your views.
Please indicate the reason for your answer below
and then proceed to page 14 and answer all
questions from there to the end.
- I don't agree with this method of payment
I cannot afford to pay anything
I have more important priorities
- Other reason _____
- 2 YES Please turn to the next page and answer all
questions from there to the end.

sometimes overstatement of willingness to pay. Bidding games are sometimes used but may be problematic because the starting bid tends to imply a value for the good and so an anchoring effect is produced. Discrete choice is now generally favoured for several reasons. First, it resembles the decision making that individuals face in everyday market transactions. It is also cognitively easier to respond to, and the incentive compatibility problems inherent in open-ended questions are avoided. Also, the referendum framework discussed above necessitates a discrete choice format.

Discrete choice with follow-up, also known as double-bounded dichotomous choice, is where the individual is asked to pay a specified amount B_L and, if this is accepted, he is asked to pay a higher amount, B_H , but if it is rejected, a lower amount, B_L . In this way, two bounds are created. This is to be preferred over a single-bounded choice as the latter reveals little about the individual's willingness-to-pay and therefore requires relatively large sample sizes to precisely characterise a population's WTP.

The contingent valuation survey: content and design

Our CVM questionnaire was developed and carefully piloted in three stages: preliminary face-to-face interviews and focus group discussions; a face-to-face pilot study of draft versions of the CVM questionnaire; and finally, a postal pre-test of the questionnaire to the general public. Three hundred questionnaires were sent to a random sample of Northern Irish residents drawn from the electoral register, of whom almost 50% responded.

The final survey questionnaire contained the following elements:

- An opening section asking respondents to rank improvements in animal welfare alongside other important government priorities — this encourages them to give adequate consideration to other priorities.
- A brief description of the welfare problems facing growing pigs in intensive production systems and possible programmes that could be implemented to combat these.
- A description of the proposed payment method. This involved a small percentage general food levy. A credible alternative may have been higher prices. However, this would have excluded non-consumers of pig products including vegetarians. The wording used follows the referendum format and so helps to reduce both hypothetical and strategic bias.
- An invitation to opt in or out of such a scheme (see Box 1). It is extremely important that respondents who place no value on the improvement programmes be given the opportunity to exit the market. Our initial opt-in/opt-out question allows the initial partitioning to be made between the positive, zero and protest bidders. Those saying yes outright are positive bidders, those saying no because they could not afford to make a payment or had more important priorities are zero bidders and those not agreeing with the payment vehicle are protest bidders. The protest bidders were excluded from the analysis but information from the positive and zero bidders was analysed using a mixture model, as discussed below.

Box 2**50% INCREASE IN SPACE**

The space allowance for all pigs would be increased to 5 feet by 2 feet per pig.

How effective in improving pig welfare do you think this scheme would be? (Circle number)

1 = very effective

2 = moderately effective

3 = not at all effective

4 = don't know/no opinion

Would you be willing to pay £1 on top of your weekly food bill to ensure the improvement outlined above takes place if it was the ONLY scheme you were asked to pay for?

YES NO

IF YES → Would you pay £1.50? YES NO

IF NO → Would you pay £0.50? YES NO

- For those who opt in principle for the scheme, the discrete choice method is used to elicit WTP values. Payment (bid) amounts are presented to the respondents. In the example given (see Box 2), if the respondent's WTP is greater than or equal to £1, he will say yes; otherwise, he will say no. These bid amounts are varied across respondents in order to determine a WTP distribution. Our study, like those of Bennett (1996, 1998) and Bennett and Larson (1996), used an additional follow-up question to improve the statistical efficiency of the estimates (Hanemann *et al* 1991). Below, if a respondent answers yes to the first bid of £1, he is presented with a higher second bid of £1.50, or if he answers no, with a lower second bid of 50p.

- A section asking a host of questions of possible relevance. These included the following: knowledge of animal welfare issues, response to media coverage of animal welfare issues, awareness of animal welfare at point of purchase, consumption patterns and vegetarianism. Respondents were asked if they were from a farming background or lived in an urban/rural area. They were also asked if they were a member of, or donated money to, any animal welfare or related groups, or whether they would consider themselves animal lovers. This information was entered into the model to determine its possible relationship to the WTP values obtained.

- Socio-economic data including gender, age, education, employment status and income were also sought. Again, this was entered into the model to explain WTP patterns.

Two further features were used to improve the reliability of the estimates:

1) Programmes were valued in various combinations to allow for the examination of substitution effects.

2) The probability of zero WTP was incorporated via what is known as a 'spike model'.

Multiple programme valuation

There is a concern in CVM studies about what is known as an 'embedding effect'. This is where the WTP for a set of policies is considerably higher when these are valued separately and summed than when they are valued together within an agenda. It has been argued (Hoehn & Loomis 1993) that this phenomenon arises because of an inadequate consideration by the respondent of goods that are substitutes for the good in question. In order to obtain an unbiased estimate of the good, therefore, it should be valued alongside programmes that can act as substitutes. The programmes valued in our study were as follows:

- 50% Space Increase (SI_50)
- 100% Space Increase (SI_100)
- Rooting Materials (RM)
- Rooting Materials and Straw Bedding (RMSB)
- Research into Pig Housing (RPH)

The programme agenda were first valued on their own. Since the 100% space increase is an extension of the 50% increase, a higher WTP would be expected for the former. Similarly, the addition of straw for extra comfort on top of basic environment enrichment should also yield a higher WTP. The programmes are then valued in various combinations. In total, there were five single-programme agenda, eight two-programme agenda and four three-programme agenda giving a total of seventeen programme agenda. All respondents were asked to value all five single-programme agenda. However, to reduce cognitive effort (and hence

increase item response rate), each respondent was presented with just three out of the eight two-programme combinations and just two out of the four three-programme combinations, so each respondent had a total of ten valuation questions to answer.

The data from the seventeen programmes were then pooled and stacked. The presence of a programme within an agenda was denoted with a zero–one dummy variable in the agenda vector. Hence, each of the seventeen agenda was described by a five-element vector of elements that took on values of either zero or one. For example, the two-programme agenda RM + RPH was denoted in the model as 00101 while the three-programme package RPH + SI_100 + RMSB was denoted as 01011. This allows immediate identification of each programme in the model. The coefficient of the dummy can be interpreted as the mean WTP for the particular programme to which the dummy variable refers. The summation of these means yields an overall estimate of value for the entire agenda proposed to improve pig welfare; that is, it looks at WTP across all seventeen programmes.

Because each of the separate programmes enters the function as a covariate, the presence or absence of each adds or subtracts from the overall mean value of the entire agenda. Estimates for the various complementarity or substitution effects between programmes can be calculated quite simply by means of the interaction terms. For example, to obtain the value of SI_100 + RMSB + RPH, one adds the separate estimates of the core programmes, SI_100 and RMSB and RPH, to the four interaction effects. Three of these are two-way effects (SI_100 × RMSB, SI_100 × RPH, RMSB × RPH) while the other is a three-way effect (SI_100 × RMSB × RPH) (see footnote text).

The incorporation of zero willingness-to-pay

In contingent valuation, it is often assumed that all respondents have a positive WTP for the good. This is a mistake since zero WTP is not uncommon in CVM studies. It may well be the case that the respondent places no value on the specified improvement, and during the survey the respondents must be presented with a clear opportunity to exit the market. However, such a group may form a significant proportion of the sample and should not be excluded from the formal analysis when the objective is to describe the distribution of values of the entire population. This paper examines to what extent this is true for improvements in farm animal welfare. The model used is known as a ‘spike model’ (Kriström 1997) because there is a spiking or clustering of values at a zero WTP. It is also referred to as a ‘mixture model’ (An & Ayala 1996) implying that the population of interest can be considered to be composed of two sub-populations. One sub-population is willing to pay and has a continuous WTP distribution, while the other

sub-population is simply not willing to pay at all for the good in question.

The final questionnaire was sent to a random sample of 2000 residents of Northern Ireland whose names were obtained from the electoral register. Following Dillman’s ‘Total Design Method’ (1978) for mail surveys, each person in our sample received the questionnaire followed by a reminder postcard one week later. Two further mailings (with replacement questionnaires included) were dispatched to non-respondents after three and seven weeks.

Results

Survey response rate

The sampling frame for the extraction of the random sample was the most recently available electoral register free of charge to the public — ie the 1997 register. Of the 2000 Northern Ireland electors randomly included in the sample survey, 935 returned completed questionnaires in a usable format. The sample was reduced from 2000 to 1876 because of undeliverables, those who had moved and the deceased, yielding an overall response rate of 50%. Of these, 20% returned them after the first mailing, 34% after the reminder postcard, 35% after the first replacement questionnaire and 11% after the second replacement questionnaire. The response rate is possibly higher on the effective sample, which excludes those who are no longer reachable via their 1997 address. More up-to-date sample frames were available, but too costly. Of the 50% non-respondents, 4% were too ill or infirm to complete the survey while 2% returned the questionnaire incomplete. The remaining 44% were complete non-respondents.

Given our rigorous pursuit of non-respondents through four separate mailings, we did not consider it prudent to attempt to gather socio-economic details from this latter group. However, a test was conducted to establish whether there was a difference in the WTP for pig welfare improvements between those who returned their questionnaires immediately and those who returned them at other stages in the survey process (ie after the reminder postcard or one of the replacement questionnaires). The results indicated that no significant differences in WTP existed between those who returned their questionnaires immediately and those who returned them in the final mailing or at any other stage in the process. If only two mailings (initial questionnaire and reminder postcard) had been carried out, non-response would have been greater, but evidently average WTP would not have been affected. These results are encouraging for users of mail surveys as they imply that much of survey non-response occurs because of general reasons rather than survey-specific reasons. This confirms the findings of other studies (Stinchcombe *et al* 1981; Smith 1983; Fredman 1994; Mattsson & Li 1994).

Importance of improving farm animal welfare

At the outset of the questionnaire, the respondent was asked to rate the importance of improving farm animal welfare standards as a government goal alongside some very real substitutes such as hospital beds and environmental

This is analogous to obtaining the probability for the union of three sets which is given by the expression

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C).$$

This can be easily represented by a Venn diagram and illustrates that the contributions from the intersection of pairs of sets are subtracted, while the contribution from the intersection of all three sets is added.

Table 1 Double bounded maximum likelihood estimates.

Programmes	Coefficient estimate	Standard error	Value in pence
50% Space increase (SI_50)	2.3754***	0.1008	121
100% Space increase (SI_100)	2.7264***	0.1053	139
Rooting materials (RM)	2.6834***	0.1047	137
Rooting materials + Straw bedding (RMSB)	2.8550***	0.1035	145
Research into pig housing (RPH)	2.6955***	0.1038	137
SI_50 × RM	-2.1595***	0.2130	-110
SI_50 × RMSB	-2.3366***	0.2112	-119
SI_100 × RPH	-2.5045***	0.1819	-128
RM × RPH	-2.5459***	0.2125	-130
RMSB × RPH	-2.4295***	0.2139	-124
RM × SI_100	-2.1660***	0.2135	-110
RPH × SI_50	-2.1401***	0.2184	-109
SI_100 × RMSB	-2.7740***	0.2147	-141
SI_50 × RM × RPH	2.0983***	0.3677	107
RMSB × RPH × SI_50	2.3350***	0.3672	119
RPH × SI_100 × RM	2.4275***	0.3672	124
SI_100 × RMSB × RPH	3.1082***	0.3237	158
Spike parameter ρ	0.31		
Scale parameter σ	134		
SE of scale parameter σ	2.452		
Log-likelihood	-9,300		
Sample size	7,180		

*** Significant at the 1% level.

pollution. This encouraged the respondent to consider his alternatives for expenditure. Unsurprisingly, providing more hospital beds was rated most highly. Eighty-four per cent and 12% considered it a very important/moderately important goal, respectively. Reducing pollution to rivers and lakes was considered a very important government goal by 72% of respondents and a moderately important goal by 22% of the respondents. A higher teacher:pupil ratio in primary schools was rated very important by 56% of respondents and moderately important by one-third of respondents. Providing job schemes for the unemployed was a very important goal for 55% and a moderately important goal for one-third of respondents. Improving farm animal welfare was ranked least amongst the government priorities. However, these alternatives were deliberately chosen as very strong substitutes and yet still over three-quarters of respondents (76%) consider improving animal welfare to be a very (39%) or moderately important (37%) government goal.

Knowledge of farm animal welfare

When asked about their knowledge of the current state of farm animal welfare, 32% of respondents stated that they had some knowledge.

Response to media exposure

Over half of respondents (56%) stated that they had not been exposed to farm animal welfare issues in the media, which perhaps explains low levels of knowledge of animal

welfare issues. However, for those who had read about or viewed documentaries about farm animal welfare issues, it affected the purchasing decisions or attitudes to farm animals of almost two-fifths (39%) of them. The positive impact of such media coverage included buying free-range eggs, switching to white meat only and, in a couple of cases, becoming vegetarian.

Consumption of pig products

Consumption levels in our sample were high. Almost two-thirds (65%) of respondents consumed pig meat at least twice per week. Respondents were also asked whether they tended to consider animal welfare when they purchased meat. Over two-thirds (67%) answered that it was not an issue for them at point of purchase.

Perceived effectiveness of the proposed programmes

The 50% space increase was considered to be very (moderately) effective by 30% (47%) of respondents but not very effective by 16% of respondents. The 100% space increase was deemed more effective overall, as expected, with 48% (39%) stating very (moderately) effective and only 6% of respondents considering it ineffective. Rooting Materials were also considered worthwhile with 38% (51%) answering very (moderately) effective and only 4% answering not very effective. Rooting Materials together with Straw Bedding was considered very (moderately) effective by 48% (41%) of respondents and not very effective by 4%. Finally,

Table 2 Joint and independent values for two- and three-programme agenda.

	Joint valuation (pence)	Independent valuation (pence)	% difference	Wald Test
Two-programme agenda				
SI_50 + RM	148	258	74	Reject***
SI_50 + RMSB	147	266	81	Reject***
SI_100 + RPH	149	276	86	Reject***
RM + RPH	144	274	90	Reject***
RMSB + RPH	159	283	78	Reject***
RM + SI_100	165	276	67	Reject***
RPH + SI_50	149	258	73	Reject***
SI_100 + RMSB	143	284	99	Reject***
Three-programme agenda				
SI_50 + RM + RPH	153	395	158	Reject***
RMSB + RPH + SI_50	171	404	136	Reject***
RPH + SI_100 + RM	169	413	144	Reject***
RPH + SI_100 + RMSB	187	422	125	Reject***

*** Significant at the 1% level

research, although intangible and uncertain in its benefits, was considered very (moderately) effective by 38% (48%) of respondents and ineffective by 6%.

WTP estimates

The variation function Maximum Likelihood (ML) parameter estimates are reported in Table 1. The first five rows provide the estimated values for each of the single programme agenda and are all significant at 1%. Willingness-to-pay is shown to vary between £1.21 per household per week for a 50% Space Increase to £1.45 for Rooting Materials and Straw Bedding.

Rows 6 to 13 report the ML estimates for the two-way programme interactions. All eight estimated substitution parameters are negative and all are significantly different from zero at the 1% level. These results offer strong evidence of a substitution effect between the different programmes.

Finally, rows 14 to 17 report the ML estimates for the three-way programme interactions. Each of these is positive and significant at the 1% level. These values can all be interpreted as showing net complementarity effects and will offset the two-way substitution effects. The spike parameter ρ indicates that 31% of the sample had a zero WTP for the improvements. Had this positive probability of zero WTP not been incorporated into the model, a serious overstatement of value would have resulted.

Table 2 shows the joint and independent values for the two and three-programme agenda. The value of a two-programme agenda is obtained by adding their separate valuations and deducting the relevant interaction term (for SI_50 + RM this is $121 + 137 - 110 = 148$), while the value

of the three-programme agenda must take into account three substitution effects with offsetting complementary effects (eg for SI_50 + RM + RPH, this is $121 + 137 + 137 - 110 - 109 - 130 + 107 = 153$).

With joint valuation, the values for the two-programme agenda range between £1.43 and £1.65 whilst the values for the three-programme agenda range between £1.53 and £1.87. It can be seen that the conventional independent valuation estimates, where separate individual estimates are added together, overstate the valuation of two-programme agendas by amounts ranging from 67% to 99% for the two-programme agenda and by amounts ranging from 125% to 158% for the three-programme agenda. The significance of the differences between joint and independent valuation were tested using the Wald statistic and found to be significant at the 1% level in all cases.

This finding strengthens the claim (Hoehn & Loomis 1993) that a valid CVM design is one that requires that subjects value a complete policy agenda, thus reflecting the real world where “a typical policy change is not simply to provide more or less of a single environmental characteristic, but a decision as to what package or set of characteristics (emphasis added) to provide”.

Effect of covariates on WTP

Several variables were found to be significant at the 10% level and were correlated with a higher WTP. These were CHA — change in purchasing decisions or attitudes towards farm animals following media exposure; AWA — awareness of animal welfare issues at time of purchase; CON — consumption of pig products; DON — donations to

animal welfare or related groups; VEG — vegetarians; and PINC/HINC — personal and household income. Those with higher incomes were more likely to express a positive willingness to pay whereas those with low income/education were very likely to be zero bidders.

Conclusions

The study reveals a positive willingness-to-pay by the Northern Ireland general public for a variety of pig welfare improvements. On the average weekly UK household food bill of £40 (ONS 2004), this represents an increase in expenditure of 3.6–4.7%. However, the relatively small difference in WTP between the most basic agenda and the fullest one indicates the extent of substitution reflecting the need for respondents to value a complete policy agenda in CVM. The substantial difference in estimates associated with an independent valuation approach leads to ‘too many proposals passing the benefit cost test’ (Hoehn & Randall 1989). This kind of scenario can be avoided by including goods in the proposed agenda that act as substitutes. The multi-programme contingent valuation approach used here has scope for wide application in policy analysis where decisions are often made about the provision of some package of policy attributes as opposed to one single policy attribute. A conclusion of importance is that, although a significant proportion of the population holds a positive WTP for pig welfare improvements, considerable numbers are willing to pay nothing for these improvements.

Animal welfare implications

Contingent Valuation, when carried out in a rigorous and well-designed manner, can be used to help provide answers to a host of questions of relevance to animal welfare. For example, what are the attitudes and views of the general public regarding farm animal welfare? Are these changing over time? How do people rate animal welfare alongside other important government priorities? What gaps exist in people’s knowledge? Are there any common misconceptions? What values do people place on specific welfare improvement programmes? How do these programmes rate alongside each other? For example, our findings indicate a public WTP for non-orthodox welfare solutions such as environmental enrichment using rooting materials and straw bedding. This WTP is not significantly different from that elicited for a 100% space increase which would require massive capital investment. This well-established method of social research can endorse environmental enrichment as an equally acceptable solution to the general public achievable at a substantially lower cost. The added perspective and insights gained using this approach help inform policymakers as they assess proposals, leading to superior policy decisions.

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