



Viewpoint

Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies



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ABSTRACT

The sustainable intensification of animal production systems is increasing as a consequence of increased demand for foods originating from animals. Production diseases are particularly endemic in intensive production systems, and can negatively impact upon farm animal welfare. There is an increasing need to develop policies regarding animal production diseases, sustainable intensification, and animal welfare which incorporate consumer priorities as well as technical assessments of farm animal welfare. Consumers and/or citizens may have concerns about intensive production systems, and whether animal production disease represent a barrier to consumer acceptance of their increased use. There is a considerable body of research focused on consumer willingness-to-pay (WTP) for improved animal welfare. It is not clear how this relates specifically to a preference for reduced animal production disease incidence in animal production systems. A systematic review and meta-analysis were conducted to establish the public's WTP for farm animal welfare, with a focus on production diseases which arise in intensive systems. Systematic review methodology combined with data synthesis was applied to integrate existing knowledge regarding consumer WTP for animal welfare, and reduced incidence of animal production diseases. Multiple databases were searched to identify relevant studies. A screening process, using a set of pre-determined inclusion criteria, identified 54 studies, with the strength of evidence and uncertainty for each study being assessed. A random effects meta-analysis was used to explore heterogeneity in relation to a number of factors, with a cumulative meta-analysis conducted to establish changes in WTP over time. The results indicated a small, positive WTP (0.63 standard deviations) for farm animal welfare varying in relation to a number of factors including animal type and region. Socio-demographic characteristics explained the most variation in the data. An evidence gap was highlighted in relation to reduced WTP for specific production diseases associated with the intensification of production, with only 4 of the 54 studies identified being related to this. A combination of market and government based policy solutions appears to be the best solution for improving farm animal welfare standards in the future, enabling the diverse public preferences to be taken into consideration.

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1. Introduction

The sustainable intensification of animal production represents a potential policy response required to increase the availability of foods in relation to growing concerns about food security, and increasing consumer demand for foods derived from animals (Foresight, 2011). However, there is evidence that consumers have very little or no understanding of modern agrifood production systems (Bennett et al., 2012). This includes the impact that production diseases can potentially have on animal health and subsequently farm animal welfare (FAW), and the prevalence and

nature of occurrence of such diseases in intensive production systems. There is, however, evidence to suggest that FAW is of increasing ethical concern to the European public, with the resulting expectation that foods derived from animals must take due account of welfare issues arising in the production process (Veissier et al., 2008; Frewer et al., 2005). Public perceptions of animal health represent an important component within FAW, and represent a potentially important driver of consumption behaviours of European consumers (European Commission, 2007).

The public are an important stakeholder with interests in the food chain, and drive demand for specific foods and commodities (Jensen, 2006). Consideration of their views, needs and preferences regarding the design and operationalisation of animal production systems in FAW policies is essential if they are to be acceptable,

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and regulatory options reflect public priorities, expectations and requirements. (Farm Animal Welfare Council, 2014; Bennett et al., 2012), and a number of aspect of FAW policy have been updated to reflect public concerns (de Jonge and van Trijp, 2014). A number of approaches can be taken by stakeholders to improve FAW (Ingenbleek et al., 2012). Government based solutions, in the form of legislation, have traditionally been the main method for ensuring or improving welfare (Bennett, 1997). However, animal production systems which promote higher standards of animal welfare are believed to lead to higher environmental and financial costs (Leinonen et al., 2012; World Bank, 2011), which will ultimately be passed onto the consumer unless subsidies or tax breaks are put in place for producers (Bennett, 1997, 1995). In addition, due to the subjective evaluation of animal welfare, individuals may have different opinions as to what counts as a minimally acceptable standard (McInerney, 2004). It is thus difficult to establish a baseline level of animal welfare in production systems that will satisfy all individuals, and which can be used as the initial point for subsequent policy development.

Market based approaches offer an alternative to aligning different approaches to FAW, as different public needs can potentially be met, assuming ethically acceptable *de minimis* welfare standards are applied. They also ensure that producers and consumers are not priced out of the market should any additional costs be passed down the supply chain (McInerney, 2004). Market based solutions are reflected through the increased numbers of private standards being introduced with many businesses adopting welfare friendly stances, including the incorporation of welfare into corporate social responsibility schemes or the adoption of FAW labelling schemes (Marks and Spencer, 2015; McDonalds, 2014). As FAW standards are demand driven, it is important to establish the market potential for these. One approach is to assess consumer/citizen willingness-to-pay (WTP) for FAW. WTP has also been used as a proxy for attitude (Ryan and Spash, 2011) and as an indication of public preferences (Harvey and Hubbard, 2013), and so can be used to assess the acceptability of different FAW practices, to consumers. This evidence can then subsequently be utilised in policy development.

WTP is a measure of value of goods or services to an individual (Hanley et al., 2001), and is defined as the price premium or maximum price an individual is willing to sacrifice to obtain a certain benefit or to avoid undesirable characteristics (Bredert et al., 2006; Hanley et al., 2001). Typically, WTP studies have tried to quantify concerns in relation to the value placed on animal lives, their welfare conditions (Lagerkvist and Hess, 2011) and the higher expected benefits associated with them, including product quality that consumers tend to associate with improved welfare (Verbeke, 2009; European Commission, 2007).

Although previous reviews of the WTP literature have been conducted, these have either not used meta-analysis (Bennett et al., 2012), or have not comprehensively explored the grey literature as part of rigorous systematic review methodology combined with meta-analysis (Lagerkvist and Hess, 2011). Furthermore, the issue of consumer WTP for reduced *animal production diseases* has not been a focus of these reviews. Combining systematic review with meta-analysis improves outcome precision and acts to minimise bias in relation to both selection and reporting, taking a comprehensive approach to obtaining and extracting data to ensure that the totality of evidence is considered (Koricheva et al., 2013). This will provide more robust evidence on which to base policies. In addition, the increase in intensive production systems in Europe (and indeed internationally) has resulted in attitudes and opinions being potentially influenced by changes in agricultural practices, more intense media reporting of FAW issues, and increased societal discussion of FAW. Precise understanding of consumer attitudes and WTP for FAW interventions specifically designed to

address production diseases in intensive systems is required if policy development is to take due account of consumer concerns and priorities.

Both previous reviews have acknowledged the large amount of heterogeneity (variability) in WTP for FAW, for which a number of moderators have had varying explanatory effects. These include different aspects of welfare (Napolitano et al., 2008), socio-demographic variables (Bernard and Bernard, 2009; Bennett, 1996) and socio-economic characteristics (Carlsson et al., 2007). There is also evidence that WTP for FAW differs between animal types (Cicia and Colantuoni, 2010; Carlsson et al., 2007), which may have implications for both producers and FAW policies. In addition, the previous meta-analyses failed to distinguish between consumers of animal products and general citizens. This potential disparity in opinions and attitudes between citizens and consumers is acknowledged in the wider FAW literature (Grunert, 2006; Harper and Henson, 2001), with both known to have favourable attitudes towards higher FAW systems and concerns over more modern or intensive production systems (Blandford et al., 2002). However, whereas consumers are able to express these attitudes through the purchasing of animal based products from higher welfare systems such as free range, citizens, including vegetarians and vegans, may not purchase animal products regardless of welfare standards, yet still have an interest in the issues surrounding the implementation of and production of these products (Grunert, 2006). In addition, individuals may behave differently in their dual roles as citizens and consumers, expressing preferences for higher welfare systems when asked (Vanhonacker et al., 2007), yet not taking these into consideration when in purchasing situations due to other product attributes taking priority (Blandford et al., 2002), or due to a number of perceived barriers to purchasing higher welfare products (Clark et al., 2016; Harper and Henson, 2001) These differences are potentially important when developing FAW policies which align with the preferences and priorities of all societal stakeholders.

In light of the increase in published work regarding WTP for FAW since 2011, and in the absence of a review on WTP for reduced animal production diseases specifically, this systematic review and meta-analysis seeks to extend the work by Lagerkvist and Hess (2011) and aims to establish; (1) what the public are willing-to-pay for FAW, and (2) what the public are willing-to-pay for interventions to reduce production diseases. In addition, heterogeneity within the data will be explored to examine whether certain factors explain the variability in the public's WTP. This will be conducted in relation to; (3) animal type, (4) socio-demographic or socio-economic characteristics, (5) being vegetarian and (6) whether there is a difference in WTP between citizens and consumers.

2. Materials and methods

2.1. Literature search

The search strategy and meta-analysis protocol were published online prior to starting the review to provide transparency and to enable feedback on the planned research (Clark et al., 2014). Relevant publications were identified through searching Scopus, ISI Web of Knowledge, AgEcon Search and Google Scholar using a combination of keywords outlined in Table 1, the latter 2 databases enabling the identification of "grey" literature. Search terms were refined after several trial searches to ensure the most effective search terms were used. Both the trialled and final search terms can be obtained by contacting the corresponding author. Face validity of the searches was addressed by checking returned searches for key authors and articles included in both the

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