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Market and Institutional Limits in Supplying Animal Welfare: some Conceptual Thoughts for Future Agricultural Economic Research

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ABSTRACT

Abstract

Providing adequate levels of farm animal welfare is a challenge in today's societies. Economic research indicates that neither market valuation for credence attributes in opaque markets, nor transparency improved market valuation with labelling schemes, nor non-market valuation in hypothetical markets to consider non-use values, nor non-monetary valuation in an ethical context are suitable to capture the value dimensions of farm animal welfare adequately. Monetary and non-monetary valuation problems stem from the complex concept of farm animal welfare and ethical challenges in utilitarian and anthropocentric approaches. Animal centred valuation of farm animal welfare is suggested as one future venue of economic research conditioned on overcoming speciesism.

***Keywords**: farm animal welfare; public good; transaction costs; hypothetical bias; animal centred valuation.*

1 Introduction

Persistent and deep-rooted criticism of intensive animal husbandry systems (Deemer et al. 2011; Fraser 1997; Grandin 2014) indicates that the provision of farm animal welfare (FAW) might suffer from different forms of market and institutional failures (Carlson et al. 2007; Harvey et al 2013; Lagerkvist et al. 2003; Lusk et al. 2011). Thus, FAW is provided at suboptimal levels from a societal welfare perspective (e.g. Grethe 2017; Harvey et al. 2013). In the absence of reliable information about FAW, as a credence attribute, in existing markets for animal products mechanisms of adverse selection (cf. Akerlof 1978) might lead to suboptimal FAW provision. Within market-based approaches assuming the availability of better information, labelling programs are discussed and have been implemented widely to solve the adverse selection problem. Still these programs' successes remain limited indicated by generally low market shares (Heerwagen et al. 2015; Busch et al. 2020). Also, traditional government interventions are hardly able to provide a level of FAW that seems optimal within societies as high FAW standards might cause welfare losses for consumers who are not interested in FAW (e.g. Bennett 1997). At the same time institutional innovations are developed by market actors: In Germany an alliance of retailers and farmer organizations innovated an institutional setting (Schulze-Geisthövel 2018; Winkel et al. 2018). Within this system, farmers are financially compensated from a retailer fed fund when implementing higher FAW standards. Until 2018, the system worked without product segregation and without labelling products at the point-of-sale – thus introducing a quasi *private tax-and-subsidy-system* in the market. From these diverse perspectives, it is worthwhile to look at different institutional settings from an economic perspective in order to gain a better understanding of possible shortcomings of hitherto existing approaches and derive possible research needs.

In the following, a general literature review of basic economic considerations will be discussed with respect to the provision of FAW in agricultural animal husbandry. Due to different perspectives and experiences in the provision and valuation of animal welfare, it is worthwhile to consider different institutional frameworks from an economic perspective. The overall aim of this paper is to better understand possible deficits of previous FAW valuation studies constituting the basis for different institutional approaches. We aim to point out perspectives for new approaches and to derive possible research needs based on open research questions.

2 Asymmetric information and FAW as public good

Labelling of FAW has been suggested as an instrument to increase FAW at farm level by improving market transparency and allowing better informed purchase decisions for consumers (Sullivan 2012). This approach holds as long as FAW can be considered as a private good which is tradable on markets. FAW as private good holds as long as rivalry and excludability in consumption is given. This applies for FAW that is completely coupled to a physical animal food product in a defined proportion and where the FAW-aspect cannot become aware to other persons than those consuming the physical product. However, this last assumption might be contested as individual consumers buying FAW labelled products contribute to the provision of FAW which can not be hidden from the general public and thus FAW gets public good character, i.e. all people knowing about animals kept in FAW improved labelling programs can enjoy this knowledge of improved FAW. Public goods' general characteristics are non-rivalry and non-excludability, i.e. as FAW is provided in a society no one can be excluded from enjoying this increased FAW and enjoying this increased FAW does not reduce consumption possibilities for others (Cowen 2006). Thus, if FAW is understood as a public good, its provision would be expected to suffer from free rider effects. Circumventing the free rider problem is attempted by market differentiation and creating *club goods* within private approaches. Implemented as private or public labelling, these approaches implicitly assume that for the public good FAW excludability can be created thus attempting to create a private good. However, Uehleke et al. (2018) show that stated demand for FAW in an individual situation is lower than in a collective situation indicating the difficulty to create excludability. These results challenge private as well as public labelling approaches for FAW and suggest to treat FAW as a public good. When Enneking (2019) finds low willingness-to-pay (WTP) for FAW in a real market experiment the public good character of FAW is neglected. The private vs. collective decision framework of Uehleke et al. (2018) could partly explain these low revealed WTP for FAW in a market experiment and low market shares of labelling programs (Busch et al. 2020).

3 Transaction costs, economies of scale and network externalities in a market context

Low provision of FAW can also be understood as a network externality linked to supply- and demand-side economies of scale. Some authors also term this as the 'infant industry' argument (e.g. Hartmann et al. 2015).

Within nascent and marginal FAW labelling programs transaction costs are high and economies of scale cannot be realized yet.

Shelf prices of FAW products indicate pagatoric costs for consumers in terms of financial means required to purchase a product. Yet, additional calculatory costs might be linked to the purchase process of FAW products. For consumers, shelf prices of FAW products neglect high *transaction costs*, like information, search and transportation costs, as long as FAW products are not readily available in standard retail formats. In most cases, transportation costs would be pagatoric costs, as might be the case with some information costs if information has to be paid for. Larger shares of transaction costs might be rather calculatory costs for time spend by consumers for searching and transporting FAW products available in few and possibly distant retail formats. Valued at time's opportunity cost, no monetary flows of financial means are linked to these transaction costs while still being real, as time spend for searching and transporting might be considered utility-reducing. Through online-shopping and mail delivery, search costs might be reduced and transportation costs would be transformed into pagatoric logistic costs. Increasing possibilities to shop FAW products online give evidence of this.

Additional transaction costs stem from dispersed demand for FAW products. Pooling of FAW demand by consumers could accelerate development of supply of FAW products. Yet this pooling of demand requires collective action. Establishment of collective action is also linked with transaction costs. No single potential consumer of FAW products has incentives strong enough for pooling demand with other potential consumers. However, once this pooling would have been organized, all FAW-interested consumers would benefit. This illustrates a typical prisoner dilemma due to network externalities in demand. As soon as market shares of FAW increase and products become readily available in standard retail format, transaction costs for consumers will decrease. Thus, high transactions costs linked to dispersed demand and small supply quantities indicate economies of scale in demand and network externalities in pooling of demand.

On the supply side, actual demand linked to higher prices for farmers and supply-chain-actors would incentivise the provision of more FAW. Due to underdeveloped markets and a lack of observable market prices, stakeholders are dependent on WTP estimates. Single private actors with no market power lack incentives to invest in market developments. This partly linked to WTP studies that are said to suffer from hypothetical bias (see discussion below) and as calculatory consumer prices in nascent programs are prohibitive for growth (see discussion above). In addition, investments in the reputation and trustworthiness of a label program are only feasible if large product quantities can be included in the label program. Otherwise the per unit cost of building-up a label becomes prohibitive. Also processing, logistics and trade of FAW labelled products require large quantities to be produced and sold in order to realize economies of scale.

It can be concluded that multi-actor private initiatives are caught in lock-ins of a prisoner dilemma as no single market actor has incentives to invest in establishing label programs. If transaction costs for forming multi-actor-initiatives decrease or if market actors with considerable market shares and market power take the initiative and if opportunity costs of neglecting labelling programs increase, market actors – especially those with market power or a number of smaller actors supported by government initiatives – will have more incentives to ally themselves for the establishment of labelling programs (cf. Grethe 2017).

4 Informational dilemmata and new governance structures

Standard economic reasoning suggests government interventions including minimum standards, bans, subsidies and taxes (cf. Grethe 2017; Ingenbleek et al. 2012). Recent behavioural economic research and political economy considerations challenge such classical approaches (Carlsson et al. 2007; Harvey et al. 2013). This also applies to publicly funded and promoted classical information and education approaches that might not lead to better-informed consumer decisions due to information overload and possible information misconceptions of the complex FAW concept (cf. Buerke 2016; Fitzpatrick et al. 2016; Hoogland et al. 2007; Hotaling et al. 2015; Köcher et al. 2016). More information does not necessarily mean better information and more labels on food products might decrease willingness-to-pay (WTP) (e.g. Monier-Dilhan 2018). New governance structures for wider stakeholder participation, like deliberative polls or citizen assemblies, are discussed to allow better-informed decision-making regarding FAW (cf. Grethe 2017; Rovers et al. 2017; Schulze-Walgern et al. 2018) as they have been proposed and implemented in the valuation of complex dimensions of ecosystem-services considering divergent views of multiple stakeholders (Chee 2004; Kosoy et al. 2010; Lopes et al. 2018; Proctor et al. 2002; Wilson et al. 2002). As different segments of societies have different educational background and different levels of interest in forming future policies of FAW careful selection of participants and preparation for processes would be required.

5 Monetary valuation of FAW at societal level

The provision of FAW is necessarily coupled with producing physical animal products indicating a conceptualization as positive external effect in production (Carlsson et al. 2007). On the consumption side, consumers' perceptions that certain aspects of livestock production give rise to low FAW are a potential source of disutility. This disutility may be associated with consumers' individual consumption of livestock products but also with other persons' consumption, e.g. if vegans feel ethically and emotionally offended by others in society eating animal products. The latter is a negative externality of consumption in society (Harvey et al. 2013), resulting in indirect costs associated with livestock production. In a societal transformation curve, the optimal level of providing animal products and FAW would be determined by the negative inverse relationship of the respective prices. While market prices of animal products are readily available, there is no market providing monetary price information on FAW. Price estimates for FAW would be required to determine a society's optimal production point. Yet, economic analyses of FAW suffer from a dearth of price information on FAW. Yet, several approaches have been employed or could be employed to derive prices for FAW independent of physical production (Yang et al. 2019).

WTP studies have been a common approach to give FAW a 'price'. A high number of WTP studies for FAW are available based on stated preferences. Yet most of them are said to suffer from different forms of hypothetical biases defined as the difference between stated and revealed WTP (Hensher 2010; Lagerkvist et al. 2010; Clark et al. 2017). In some other contexts, differences between stated and revealed preferences are also termed as citizen-consumer-duality or consumer-citizen-gap (e.g. Grethe 2017; Hartmann et al. 2015). These terms emphasize the difference between a private good character of animal products with certain FAW attributes for which *consumers* would show WTP in a market context and a public good character of FAW for which *citizens* would show WTP in a non-market context through supporting minimum standards and accepting the resulting higher market prices or through supporting a tax-and-subsidy system. From a more psychological perspective, the difference between stated and revealed WTP is referred to as attitude-behaviour-gap (e.g. Harvey et al. 2013; Hartmann et al. 2015). Several hypotheses have been brought forward to explain hypothetical bias in general and more specifically to FAW (cf. Hartmann et al. 2015):

Hypothetical bias in revealed vs. stated WTP studies might be linked to low vs. high involvement purchase decision situations linked to the basic concept of dual process model of thought. According to this model, one process is fast, intuitive and reliant on short cuts and heuristics (system 1), and one is controlled, analytic, slow, deliberate, and easily fatigued (system 2) (cf. Kahneman 2002 & 2011). In this context, WTP studies working with survey methods activate system 2 of analytic, deliberate and slow thinking as respondents are confronted with a previously unknown decision scenario. In these survey situations complex dimensions of FAW might rather lead to high WTP estimates compared to low involvement situations in daily shopping. In low involvement situations, participants in observational studies might rather remain in system 1 of fast thinking neglecting the complexities of FAW. Thus, remaining in system 1 might lead to purchase decisions revealing low WTP for FAW. In this context, Hartmann et al. (2015) refer to the 'meat antagonism' as one reason for hypothetical bias in WTP studies for FAW. Consumers feel empathetic about farm animals in survey situations. In these situations they are faced with the dilemma that animals have to be raised in confined systems and slaughtered for being able to enjoy meat, milk, eggs or any other animal product. Stated WTP for FAW could then be interpreted as the WTP for solving this dilemma also termed as cognitive dissonance in a high involvement survey situation where system 2 is active. Low involvement, routine purchase situations with low revealed WTP for FAW would indicate the psychological capability of humans within system 1 to suppress the meat antagonism dilemma. In such situations consumers use heuristics to delegate responsibility of solving the meat antagonism to supply chain actors to allow them quick and easy purchase decisions leading to low levels of revealed WTP for FAW.

In addition, strategic response behaviour to incentivise a broader and more diverse future supply of FAW products and to create future consumption options might lead to over-stating WTP (Bergeron et al. 2019; Lusk et al. 2007). Over-stating WTP for FAW sends strong signals to potential providers of FAW to invest in the built-up of necessary structures and networks. This might potentially cover high transaction costs in the formation of collective action as described above. Strategic response behaviour in overstating WTP for FAW might be considered as a short-cut of leaving the prisoner dilemma faced in dispersed demand for FAW on the side of consumers.

Due to a dominance of WTP studies based on stated preferences with potential hypothetical bias, more observational studies based on revealed preferences for FAW would be required (e.g. Enneking 2019; Olesen et al. 2010). Hedonic price analyses would be a possible solution to value FAW in real market settings. This approach assumes that the price of a good can be decomposed into prices of the attributes that make up that

good (Lancaster 1966) therefore being able to de-couple physical product attributes and FAW as a process quality attribute. Despite more but still limited numbers of FAW labelled products are on the market, few WTP studies based on hedonic price analyses are available (exceptions include Chang et al. 2010; Karipidis et al. 2005). Already Bennett (1995) concisely discusses the limitations associated with hedonic price analyses in the context of FAW:

> "First, there is only a very limited number of livestock products on the market which have clear animal welfare friendly attributes in the eyes of consumers. Second, estimates of consumers' valuations of these attributes from purchasing behaviour still fail to capture public good and non-user aspects. Third, any analysis of existing animal welfare friendly production practices is necessarily ex-post and may be of little help with ex-ante analysis of possible legislation or codes of practice, except by analogy. Arguably, ex-ante analysis is of more use to policy makers."

While the number of animal products that have clear animal welfare characteristics in the eyes of the consumers might be considerably higher than in 1995 and thus would allow hedonic price analyses, the latter two aspects mentioned by Bennet (1995) are still true.

Non-monetary price trade-offs that could be transformed into monetary values would be an additional alternative to estimate WTP for FAW, e.g. time invested for caring for animals to improve FAW or time for lobbying FAW valued by the opportunity costs of time of the referred persons. The literature is characterized by a paucity of studies taking such approaches with respect to FAW but provides examples in other fields (Adamowicz et al. 1991; Matumoto 2014).

FAW credits – similar to CO2-credits – have been proposed as a market based approach in economics in an attempt to decouple markets for animal food products and FAW and deriving values for FAW (Lusk & Norwood 2011). Within such an innovative scheme, farmers (or any other animal care-giver) would be given property rights on the provision of FAW independent of physical production of animal food products. Such FAW credits could be traded independently from physical product flows and prices would be determined by supply and demand on a stock exchange similar institution. Credits could be bought by FAW concerned consumers directly irrespective of their dietary preferences for animal products or by any consumer representatives such as retailers in order to create larger demand and thus supply for FAW. The above described German 'Initiative for animal welfare' (Initiative Tierwohl) has had some of these components in its non-segregation design until 2018 – only that the price for the FAW measures were determined administratively and not based on system of supply and demand. In addition, donations to animal protection organizations working to improve FAW could be interpreted as a first proxy of such FAW credits (De Backer 2015; Haynes et al. 2004). So far, there is a lack of empirical research putting these monetary flows into relation with specific efforts to improve FAW, which would allow deriving monetary values for more specific FAW measures.

6 FAW as a complex good

A comprehensive concept of FAW might be ambiguous and too complex for utility based WTP studies (cf. Serpell 2004; Mathews et al. 2007) whereby use and non-use values are typically considered. This might be similar to what has been discussed within ecological economics in the valuation of biodiversity (e.g. Bartkowski et al. 2015). Thus, a high complexity in defining what is meant by biodiversity might have similarities to defining FAW (e.g. Farnsworth et al. 2015). Some authors argue for valuing biodiversity like other abstract goods for instance 'justice' (Meinard et al. 2011), which give further indication of the challenges linked to the monetary valuation of FAW. Additionally, it is argued that aesthetic considerations lead to difficulties in monetary valuation (e.g. Martín-López et al. 2007 & 2008).

Similar to biodiversity, FAW is embedded in philosophical, religious and ethical contexts posing particular challenges to the monetary valuation of FAW (Potthast 2014; Spash 2009). Valuation studies in environmental economics indicate 'commodification' as violating people's moral standards leading to a crowding-out effect (Koysoy et al. 2010; Neuteleers et al. 2014). In general, crowding-out refers to the process of external incentives diminishing intrinsic motivation. Valuation studies of FAW might suffer from similar caveats (Bennett et al. 2002) leading to possible biased WTP estimates through protest answers to WTP-questions in a survey. Protest answers can lead to outliers in monetary WTP studies, which remain hidden in the calculation of mean values and lead to biased WTP for FAW (cf. Frey et al. 2018). Thus, moral goods would in principle elude monetary valuation because they are not accessible to exchange considerations within trade relations in a market nor in a non-market setting ('money for goods/products/services'). There is growing evidence of a

strong foundation of FAW in complex animal ethic systems (Luy 2018) indicating a need for comprehensive and non-financial, social psychological and ethical valuation approaches (cf. Spash et al. 2009).

WTP studies on FAW based on stated preferences might further suffer from social desirability particularly when surveys are implemented in face-to-face interviews (Yang et al. 2019). These biases can be reduced by careful survey design including "cheap talk" scripts. An additional bias to be distinguished from social desirability in answering survey questions is termed as "purchase of moral satisfaction" (Bennett et al. 2002). Higher stated than real WTP for FAW stems from a "warm glow" that respondents get for demonstrating WTP to help a good cause, in this case for FAW. Demonstrating WTP for FAW might then also be linked to a positive self-image of respondents being higher within experiments than outside, i.e. stated WTP is higher than revealed WTP (Johansson-Stenman et al. 2012). These biases highlight the complex relationship between moral behaviour and the limits of monetary valuation.

A further challenge for WTP studies on FAW could be the existence of reference-dependent utilities. Reference dependence implies that the value that a person assigns to an attribute, e.g. a particular FAW attribute, is not based on its absolute level, but on its deviation from a reference level. The reference level may depend on past consumption, expectations, the status quo, or other reference points (Hu et al. 2006; Hasund et al. 2011). For example, if a consumer normally buys products with minimum FAW attributes and low prices, his or her reference points may differ from those that normally buy, for example, organically produced animal products with high animal welfare standards and high prices. If these reference points are not considered in WTP studies, a large heterogeneity in the data remains unexplained (Hasund et al. 2011). In double-bounded WTP-studies this problem is also known for starting-point-biases that have to be addressed (Mergenthaler et al. 2009). This could lead to an inefficiency of FAW approaches, as the formation of reference-depend utilities is not understood and thus no attempts can be made to influence the reference values in a targeted manner.

Additionally, also benefits and efforts for farmers providing FAW go beyond financial cost-benefit-analyses (Wildraut et al. 2018). Non-use values represent any other economic value farmers derive from FAW. These types of values may explain why farmers take actions to provide FAW beyond the requirements imposed by legislation, productivity and profitability considerations (e.g. Schreiner et al. 2017). Legal or financial incentivization thereby risks a crowding-out effect undermining farmers' intrinsic motivation for provision of FAW. This would be the case where farmers receive positive emotional feedbacks from their animals when they provide them with FAW enhancing technology, management or close human-animal-contacts. If these measures get incentivized externally they might become commodified and undermine intrinsic motivation for their provision. Lagerkvist et al. (2011) further developed the notion of non-use values in FAW by defining it as consisting of five theoretically distinct types: Pure non-use values, existence values, bequest values, option values and paternalistic altruism (cf. Hansson et al. 2018). Specifically, warm glow effects or impure altruism based on emotion-driven farmer-animal-relations further emphasize these non-monetary benefits and costs. Impure altruism refers to the possibility of animals to 'pay-back' to farmers higher FAW standards not only in terms of higher productivity with output that can be sold. Farmer benefits could also be constituted also in closer human-animal-relationships, i.e. farm animals would reward farmers emotionally for higher FAW measures. This would lead farmers to provide more FAW than what is rewarded monetarily in a market or is required by other institutional settings.

7 FAW between anthropocentrism speciesism

So far, our discussion has taken an *anthropocentric perspective* neglecting animals' own perspectives and preferences (Johansson-Stenman 2006). In an *anthropocentric perspective* FAW is an instrument to provide psychological (solving cognitive dissonance) and ethical (compliance with moral obligations) welfare to humans. This necessarily has to be the case as animal science is only at the beginning to understand FAW from animals own perspective e.g. understanding positive emotional states of animals (e.g. Proctor et al. 2015; Zebunke et al. 2011). Thus, considerations of FAW is strictly human utility oriented (Sullivan 2012). In this utilitarianism view (cf. Cowen 2006) only information about human utility measured within real or hypothetical monetary or non-monetary markets or institutions is employed. FAW is accounted indirectly through human WTP for FAW in the absence of WTP studies for animals themselves. One shortcoming of this perspective is that it assumes humans to be able to assess FAW in their own view. Several studies highlight the difficulty to define FAW properly (e.g. Grethe 2017) and that there is neither a consensus in animal sciences nor among animal sciences and society (Carenzi et al. 2009; Puppe et al. 2012; Hemsworth et al. 2015).

In naturalistic based animal behaviour studies animals are treated paternalistically with apodictic claims (e.g. D'Silva 2006). Implicitly they assume FAW to be a *meritorious good* whereby some people claim to have a

better understanding of what seems to be the right level of FAW (Dawkins 1998). Thereby, animals are not allowed to be included in societies' and markets' trading and negotiation relations directly. Within such an approach, improving FAW is assumed to be detached from any resource competition. However, providing FAW may require resources directly or indirectly through less productive physical production and less efficient use of natural resources. Therefore, animals' preferences under consideration of trade-offs and substitutional effects with other scarce resources should be known to include animals more directly in the market and trading relations about FAW.

If humans are not able to assess animals' own perspective on FAW yet, the utilitarian view of FAW might be misleading. Allowing animals to participate directly in trade with scarce resources in society would allow these trade-offs to be balanced. However, there is a dearth of WTP studies based on monetary or non-monetary prices considering *animals' preferences* estimated by animal behaviour. With such approaches, FAW claims could be objectivized, transformed into resource requirements (Dawkins 1990), then transformed into monetary values and finally be compared to market valuations of humans. Different attempts have been made, for instance whereby "demand curves" for hogs have been estimated by putting food or social contact in exchange for physical efforts (Matthews et al. 1994; Pedersen et al. 2002). Physical efforts could then be transformed into monetary values by linking them also with access to feed. A similar study looked at demand of calves for social contact (Holm et al. 2002), at cows for outdoor access (von Keyserlingk et al. 2017) and the demand of hens for litter vs. food was tested (Dawkins 1993). In this way, animals' trade-off decisions between feed and non-physical welfare aspects can be used to attach "prices" to these non-physical welfare measures by relating the value of feed forfeit to the efforts invested to receive non-physical welfare (e.g. access to outdoor pastures). This would have some similarities to the travel cost method (TCM) used in environmental economics to measure the value of nature reserves from a human perspective, i.e. willingness of persons to spend efforts to enjoy a certain landscape (Brown et al. 1984). Only few specific aspects of FAW measures have been investigated for few farm animals with these approaches yet. Additionally, few attempts have been made yet to monetarize demand curves of farm animals for specific FAW measures. Lusk et al. (2011) already concluded:

> "Although we are aware of economists conducting experiments with animals to test economic theories of consumer choice and of animal scientists conducting experiments with animals to determine relative preferences for different components of a production system, we are unaware of joint efforts to determine the economic value animals place on production systems similar to the kind of human consumer preference work done for cost-benefit analysis. This is an area that is ripe for future research, especially for those interested in non-speciest cost-benefit analysis."

It is not clear yet why these earlier suggestions have not been taken up in agricultural economics research. This might be linked to the fact that animal centred valuation does provide interesting information on the preferences of animals. Yet, they provide valid results only for the behavioural dimension of animal welfare but not for animal health and emotional states which constitute the other dimensions of animal welfare as defined by Fraser (2008). Brain scientists can evoke powerful emotional responses by localized electrical stimulation of the brain applied to distinct brain regions, similar across all mammalian species ever tested. At least seven types of emotional arousal can be evoked: seeking, rage, fear, lust, care, panic/grief and play (Panksepp 2011). These different emotional states of farm animals are hardly considered in FAW-studies. In consequence a use of these approaches for "cost-benefit analysis" is not useful, as animal welfare can only be accomplished if a good state is achieved for all of its dimensions. Here the discussion comes back to FAW as a meritorious good (Dawkins 1998).

8 Future research directions

Based on the above considerations, we highlight some research directions to deepen our knowledge on the valuation of FAW with the aim of giving private sector and public policy interventions a better foundation.

In WTP-studies on FAW, not only mean values should be aimed for, but rather a better understanding is required why respondents give extreme values or reject the exercise altogether. This would give better empirical evidence of people's rejection of monetary reasoning about FAW and supporting the notion of ethical questions involved. Determinants of ethical considerations should be analysed in more detail.

Dual models of information processing taking advantage of Kahneman's system 1 and system 2 concept might be a venue to better understand differences between stated and revealed WTP estimates for FAW. More

empirical research would be required to test these linkages. This also calls for more observational studies and real-world experiments.

Valuing FAW poses complex problems within traditional WTP studies similar to what has been observed in the valuation of biodiversity. New approaches and concepts in a rich literature on the valuation of biodiversity, like concepts of valuing complex goods, could be transferred to the valuation of FAW. Also possible crowding-out effects due to moral concerns about commodification of FAW have to be considered.

Due to high complexities in valuing FAW within government interventions, new participation mechanisms in forming of the political will are required but have not been analysed in the area of FAW. Deliberative polls, citizen assemblies and similar approaches should be tested and evaluated from a scientific perspective, if they are able to provide better valuation of FAW and better informed political decision-making on FAW. In this context it would also be interesting to research if a distinction could be made where research is necessary to improve FAW and where the lack of political action is the cause for stagnation, i.e. research that analyses the transformational aspects of FAW policy making taking into considerations of political economy.

WTP-studies from animals' own perspective on FAW are required. For this purpose, economists should collaborate with animal ethologists to integrate these two perspectives into the development of a FAW framework that considers animals' own views. In this framework, animals would have to make choices to receive more FAW by renouncing other benefits (e.g. how much feed is an animal willing to renounce to gain more space). By attaching monetary values to the amount of benefits renounced it would be possible to link these values to human monetary trading systems. This would help to reduce anthropocentric and paternalistic approaches to the provision of FAW.

Our research recommendations focus on aspects of better understanding the valuation of FAW and fill respective knowledge gaps. We consider this as necessary fundamental agricultural economic research. Based on these results more research in other fields will then be required to transform this improved knowledge into practical policy recommendations. These legal and policy research requirements are beyond the scope of the presented analysis.

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