Livestock Husbandry between Ethics and Economics: Finding a Feasible Way Out by Target Costing?

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Abstract

Livestock husbandry is a major line of conflict in many industrialized countries. Farmers are caught in a dilemma between ethical considerations imposed by, for instance, nongovernmental organizations and the wider public on the one hand and competitive and economic pressures on the other. In this paper we use a target-costing approach to determine whether it is possible to implement more animal-friendly husbandry conditions for turkey fattening in Germany without sacrificing competitiveness. Empirical results show that, at first glance, the willingness on the part of consumers to pay for more animal welfare exceeds the costs to farmers of more animal-friendly husbandry systems. A critical discussion reveals that this result may be flawed by methodological problems for which no solutions have yet been found.

Key words: Animal welfare, livestock husbandry; target costing; willingness to pay

JEL classification numbers: D12; D63; Q12

Introduction

Modern societies in industrialized countries quarrel about the proper methods of livestock husbandry. On the one hand, nongovernmental organizations (such as Greenpeace), consumer protection agencies, progressive agricultural politicians, some ethologists and parts of the wider public expect farmers to meet high ethical standards by implementing animal-friendly husbandry systems. On the other hand, farmers, traditional agricultural politicians and farmers' interest groups point to high competitive pressures and low product prices and question the economic viability of animal-friendly husbandry systems. Thus, farmers are caught in a dilemma. Implementing more animal-friendly husbandry systems could result in an economic disaster due to the lack of a sufficient number of consumers willing to pay for more animal welfare. But ignoring the stakeholders' demands for more animal-friendliness may contribute to a further deterioration of farmers' and farm products' image and legitimacy in society. Consumer studies show that the reputation of meat in particular has faced a dramatic deterioration during recent decades. In the 1970s, typical associations of German consumers with the word *meat* were *good taste*, *power* and *relish*. In the 1990s, the most common associations with *meat* were *swine fever*, *BSE* and *intensive mass animal farming*. Such an image change strongly influences, among other things, consumers' food choice (Koehler and Wildner, 1998) and, therefore, has to be taken into account by farmers when deciding on husbandry conditions.

Is there a feasible way out of the dilemma between ethics and economics? In this paper we choose a target-costing approach to solving the aforementioned goal conflict and identifying economically tolerable measures for improving the animal-friendliness of contemporary husbandry systems. We focus on turkey fattening for two reasons. First, like laying hen husbandry, turkey fattening is one of most severely criticized agricultural production systems. Second, the usually high degree of vertical integration and standardization makes cost calculations for turkey fattening much easier than for pork or beef production. Our objective is to answer the question which measures improve animal welfare in turkey fattening and which of these are economically viable in the sense that consumers are willing to pay for the implementation of these measures and their additional costs.

Target Costing

"Target Costing is a structured approach to determine the life cycle cost at which a proposed product with specified functionality and quality must be produced to generate the desired level of profitability over its life cycle when sold at its anticipated selling price." (Cooper and Slagmulder, 1997). Target costing is a cross functional, market-oriented and team-based system of profit and cost planning and control which "initiates cost management at the earliest stages of product development and applies it throughout the product life cycle" (Ansari *et al*., 1997). It was designed as a tool for solving conflicts between marketing, R&D and production.

The central idea of target costing is that a product should be launched only if it is able to make the desired profit. This means that the actual cost of production has to be lower than the target price minus the profit required from the target price. Target costing is a multi-step process that embraces several major tasks (see Amara, 1998, and Figure 1):

- Determining the *target price* the customer is willing to pay for a given product with specific attributes. This analysis is based on thorough market analysis.
- Determining the *target margin*, i.e. the desired profit per unit of a product.
- Determining the *allowable production costs* by subtracting the target margin from the target price.
- Calculating the *actual costs of producing* the product (also known as *drifting costs*). This analysis is based on cost analyses of actual production processes and technologies.
- Comparing allowable production costs and actual production costs to see whether there is a *target gap*, i.e. a situation in which the latter exceed the former.
- If there is a target gap, decide on the finally acceptable *target costs* and redesign the product or the production process to meet this target. Value Engineering, Quality Function Deployment (QFD) and other tools can be used to associate costs with product features, components and parts as well as functions and process characteristics and thus to identify opportunities for cost savings (Chen and Chung, 2002).

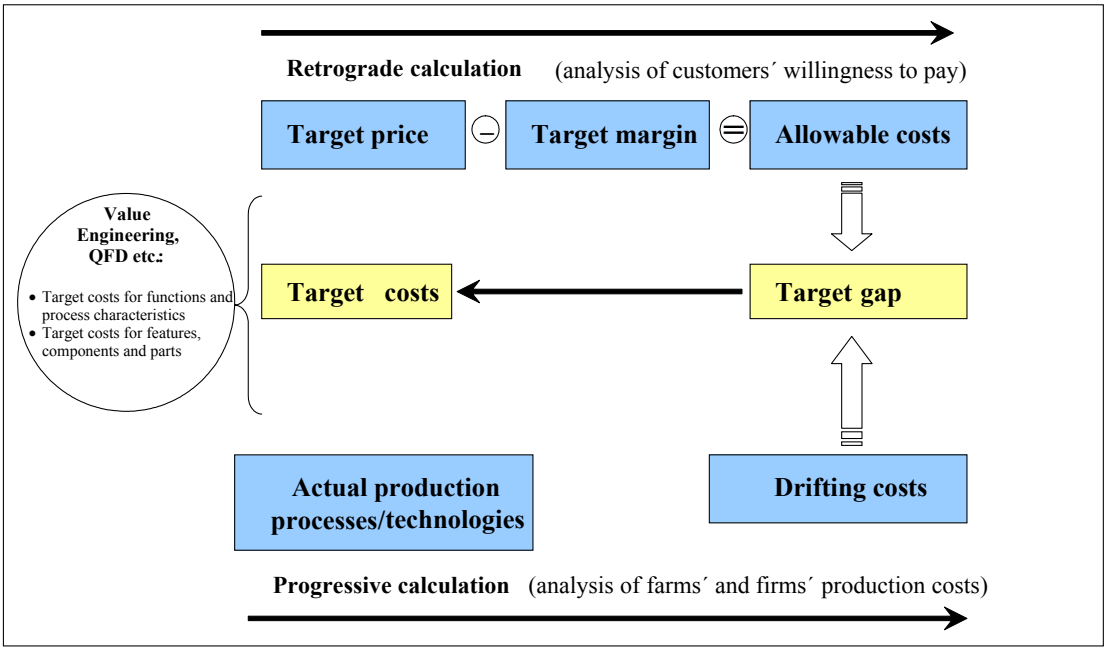

Figure 1. Target costing (after Hahn and Hungenberg, 2001).

Target costing was developed for use in the automobile and automobile suppliers industries (Monden and Hamada, 1991), but it has also become popular in — among others — the electrical and electronics, chemicals and pharmaceuticals and machine industries (Borgernaes and Fridh, 2001; Dekker and Smidt, 2003). So far it has only very rarely been used in the food industry and has not even been discussed for application in agriculture due to the generally low complexity of food and agricultural products and the minor role of product development activities in agriculture. But in industrialized countries, the process quality attributes of agricultural products, which reflect the expectations modern societies have as to how food is produced, have become increasingly important over recent decades. Demands for animal-friendly livestock husbandry, environment-friendly farming, GMO-free food and chain-wide quality assurance and food traceability are outcomes of this development. Therefore, food and agricultural products are nowadays characterized by a complex set of intrinsic and extrinsic quality attributes (Luning, Marcelis and Jongen, 2002).

From the point of view of target costing, this is an interesting development since the complexity of agricultural and food products rises as the importance of extrinsic quality attributes grows,

including, among other things, process qualities such as animal-friendliness. Taking further into account consumers' assumedly limited willingness to pay for more animal welfare, this creates a situation in which target costing may contribute to the design of more animal-friendly and, at the same time, economically viable livestock husbandry systems. Thus, target costing may show a feasible way out of the dilemma between ethics and economics stemming from limited willingness to pay for widely appreciated improvements in animal welfare. Below we apply a target-costing approach to more animal-friendly turkey fattening by

- describing elements of a more animal-friendly turkey husbandry system,
- calculating the drifting costs of these measures,
- presenting empirical data on consumers' willingness to pay for the implementation of these measures, and
- discussing our results in order to conclude which measures are not only desirable from an ethical point of view but also sustainable in economic terms.

Improving Animal Welfare in Turkey Fattening

In Germany turkeys are usually kept in open houses ventilated naturally by wind and gravity. Computerized ventilation systems allow the control of air supply. At the beginning of the rearing period a house temperature of about 21 degrees Celsius is common; later on temperature is reduced by 1 to 2 degrees per week. Houses are about 16 to 18 meters wide and up to 125 meters long. The floor is made of concrete and sometimes equipped with an underfloor heating system. During the first six weeks of the rearing period turkeys are kept on dust-free and fungus-free wood shavings; then rye or barley straw is used. Most turkeys are finished in all-in-all-out systems (22 to 24 weeks) or in rotation systems (19 weeks) (Berk, 2002; Berk, 2003).

Conventional turkey fattening is characterized by several problems that reduce animal welfare. Lack of stimuli causes boredom, which results in behavioral disorders such as cannibalism and feather picking. Poor equipment in turkey houses is also a problem since natural behaviour, such as spending the night on a tree, is restricted. Another problem stems from high stocking density during rearing and finishing. When stocking density is high, stress is caused, and turkeys have no opportunity to engage in natural behavior such as use of wings. Since 1999, a voluntary agreement has restricted turkey stocking density in Germany to 45 kg live weight per m^2 for hens and 50 kg live weight per m^2 for toms. Under certain conditions (farmer's training and experience, veterinary control), the tolerable live weight per m^2 can be up to 52 kg for hens and 58 kg for toms. In other countries, stocking densities up to 60 kg live weight per m^2 can be observed. An exception to the rule is Switzerland, where stocking density is limited to 36.5 kg live weight per m^2.

In this study four measures for improving animal welfare in turkey fattening are taken into account:

- The introduction of **perches** for 40 % of the flock allows natural behavior and creates additional space in the turkey house, thus reducing stress.
- The **reduction of stocking density** to 36.5 kg live weight per m^2 also reduces stress and allows natural behavior.
- A supplementary **outdoor-climate house** creates additional space and provides the turkeys with environmental stimuli.
- Experimental implementation of outside rearing in a **free-range husbandry system** according to Regulation (EU) 1538/1991 Appendix 4 resulted in improved foot health and plumage.

These measures are not common in turkey fattening in Germany, but at least some of them are quite common in ecofarming and in other countries, such as Switzerland. The measures are arranged according to their ethological value, which is lowest for perches and highest for free-range systems — despite some problematic side-effects on animal health and the environment.

Calculating Drifting Costs

Improving animal welfare imposes additional costs on farmers. Since it is the major goal of this study to identify economically tolerable measures for improving the animal-friendliness of turkey husbandry systems, calculating the actual costs of these measures is paramount. Table 1 summarizes the assumptions of our calculation of drifting costs. Data are taken from publicly available sources on turkey rearing and finishing (Berk, 2002; Berk and Achilles, 2002; Damme and Möbius, 2003; KTBL, 2002) and reflect practical experiences with turkey fattening in Germany.

	Unit	Convent. turkey husb.	Perches	Reduced stocking density	Outdoor-climate house	Free-range system
Production system		rotation system (19 weeks)				
Lots per year		2.8	2.8	2.8	2.8	2.8
Toms/hens	%	50	50	50	50	50
House size	m^2	2.087	2.087	2.087	2.087	2.087
Size of outdoor-climate house	m^2	-	-	-	417	-
Fattening places	animals	5,635	5,635	4,362	5,635	2,922
Maximum live weight	kg/m^2	47.5	47.5	36.5	47.5	25
Stocking density	animals/ m^2	2.7	2.7	2.09	2.7	1.4
Feed consumption	kg/animal	37.07	37.07	37.07	37.07	43.8
Feed price	€/kg	0.2	0.2	0.2	0.2	0.2
Daily weight gain	g	109	109	109	109	109
Feed conversion efficiency*	1:...	2.64	2.64	2.64	2.64	3.3
Slaughter weight	kg	12	12	12	12	12
Slaughter yield	%	75	75	75	75	75
Mortality	%	8	8	8	8	8
Wood shavings	kg/animal	0.5	0.5	0.5	0.5	0.5
Price of wood shavings	€/kg	0.03	0.03	0.03	0.03	0.03
Straw (barn)	kg/animal	5.45	5.45	5.45	5.45	5.45
Straw (outdoor-climate house)	kg/animal	-	-	-	1.09	-
Price of straw	€/kg	0.08	0.08	0.08	0.08	0.08
Sand (outdoor-climate house)	m^3/m^2	-	-	-	0.034	-
Price of sand	€/m^3	-	-	-	10.23	-
Financial yield loss	€/animal		-	16.32	-	20.76
Depreciation time of house	years	20	20	20	20	20
Depreciation time of equipment	years	10	10	10	10	10
Repair	% of in-vestment	1	1	1	1	1
Interest rate	%	6	6	6	6	6
Investment building**	€/place	32	32	50	36	60
Investment equipment	€/place	3	3.2	3	3.2	4.5
Additional grassland	m^2					32.496
Additional cost grassland***	€/animal					0.18
Additional cost fence	€/animal					0.47****

Working time requirements of turkey house	working hours per animal	0.11	0.11	0.11	0.11	0.11
Additional working time requirements of outdoor-climate house	working hours per animal				0.05	
Additional working time requirements of free-range system	€/animal					1.8*****
Wages	€/working hour	10.22	10.22	10.22	10.22	10.22

* Very little is known about feed conversion efficiency in free-range turkey husbandry. In ecofarming feed conversion efficiency is 1:3.3 (Berk, 2004). Our calculation is based on the assumption that the same feed conversion efficiency applies for free-range turkey fattening.

** Annual building costs are calculated using the annuity method (residual value: 2€/place).

*** Rent: 300 €/ha, i.e. 0.12 €/animal. Annual cost of grassland cultivation: Seeding, machinery (tractor 67 kW, 3 m, field: 2 ha; 20 kg seeds) + rolling (tractor 45 kW, 3 m, field: 2 ha): (0.96 working hours/ha * 15 €/h wages + 79.74 €/ha machinery cost seeding + 38 €/ha seeds) + (0.77 working hours/ha * 15 €/h wages + 13.61 €/ha machinery cost rolling) = 157.3 €/ha/a, i.e. 0.06 €/animal. Total additional grassland cost: 0.18 €/animal.

**** Assumptions: Wire-netting fence; length: 900 m; wooden stakes; 186 working hours * 15 €/h + 327.67 € = 3117.67 € (Roth and Berger, 1999).

***** This figure is drawn from broiler fattening (Ellendorff et al., 2002).

Table 1. Assumptions of drifting cost calculation.

In Table 2 we calculate the drifting costs of different turkey husbandry systems based on the assumptions summarized in Table 1. The costs of conventional turkey fattening are 1.16 €/kg of slaughter weight. The additional costs per kg of slaughter weight are 0.012 € for sitperches, 0.08 € for reduced stocking density, 0.03 € for outdoor-climate house and 0.35 € for free-range husbandry.

	Unit	Convent. turkey husb.	Perches	Reduced stocking density	Outdoor-climate house	Free-range system
Feed costs	€/animal	7.49	7.49	7.49	7.49	8.80
Chicks	€/animal	1.95	1.95	1.95	1.95	1.95
Veterinary treatments, hygiene	€/animal	0.42	0.42	0.42	0.42	0.42
Energy, water	€/animal	0.34	0.34	0.34	0.34	0.34
Wood shavings, straw	€/animal	0.45	0.45	0.45	0.63	0.45
Catching and loading	€/animal	0.17	0.17	0.17	0.17	0.17
Maintenance building and equipment	€/animal	0.13	0.13	0.52	0.14	0.13
Interest costs current assets	€/animal	0.15	0.15	0.16	0.13	0.15
Miscellenaous	€/animal	0.37	0.37	0.37	0.37	0.43
Total variable costs	€/animal	11.47	11.47	11.87	11.64	12.84
Building costs	€/animal	1.09	1.09	1.71	1.23	2.06
Equipment costs	€/animal	0.15	0.17	0.15	0.17	0.24
Total fixed costs	€/animal	1.24	1.26	1.86	1.40	2.30
Calculatory wages	€/animal	1.20	1.20	1.20	1.25	3.00
Total costs	€/animal	13.92	13.93	14.92	14.29	18.14
Total costs	€/kg	1.16	1.17	1.24	1.19	1.51

Table 2. Calculation of drifting costs.

Figure 2 summarizes the drifting costs of different measures for improving animal welfare.

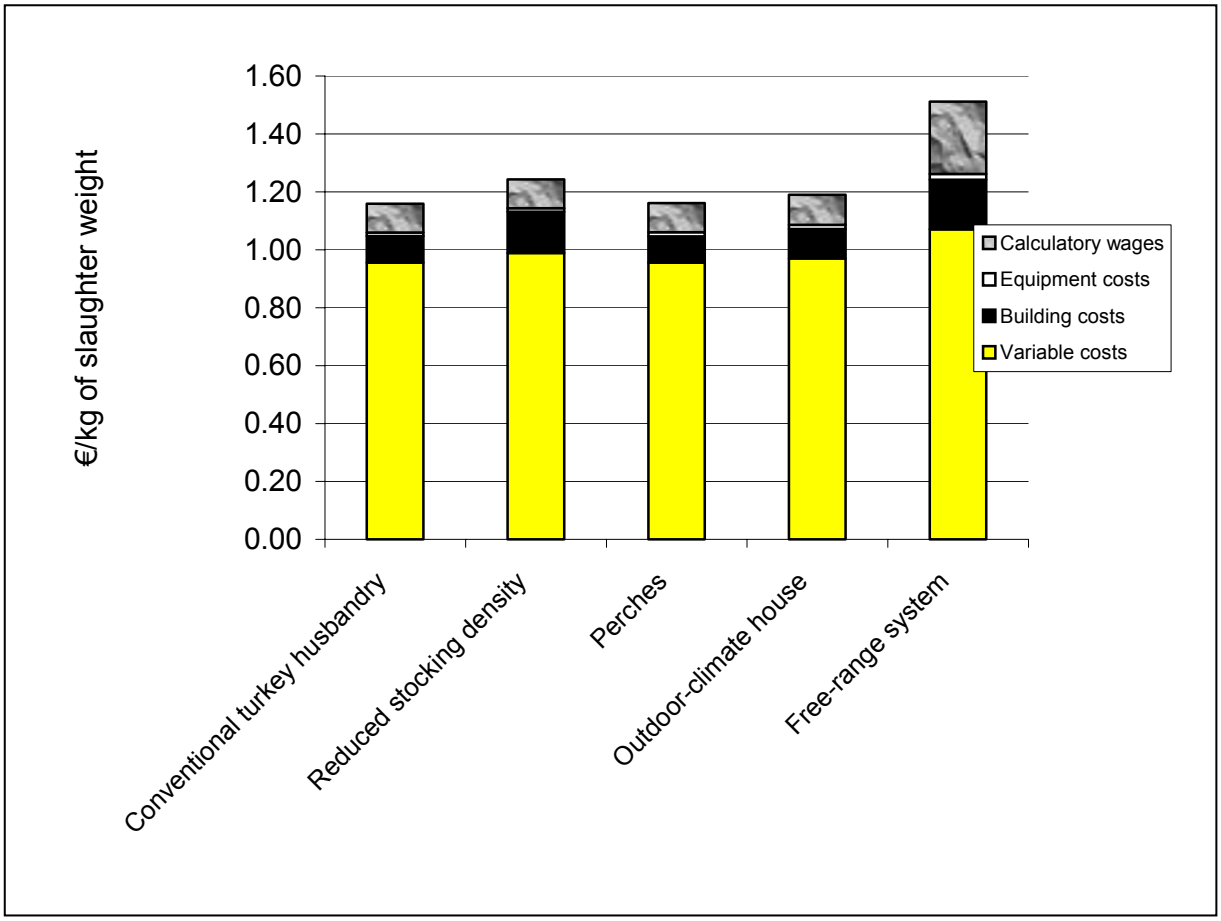

Figure 2. Drifting costs of improved animal welfare in turkey fattening.

Estimating Willingness to Pay

The calculation of allowable production costs is based on an estimation of consumers' willingness to pay for more animal welfare in turkey fattening. Until only a few years ago, economists largely refrained from analyzing animal welfare issues (Bennett *et al.*, 2000). But, building on experiences from environmental economics, this situation has been slowly changing in recent years. Today consumer preferences for farm animal welfare are analyzed on the basis of actual behavior (revealed preferences; see, for instance, Baltzer, 2003; Costa, 2005) as well as stated preferences (Lusk and Hudson, 2004; Enneking and Menzel, 2005). The latter embraces contingent valuation (Bennett, 1996; Glass *et al.*, 2005) as well as choice modelling approaches such as choice experiments (Carlsson *et al.*, 2004). In this study we conducted a conjoint analysis in order to obtain data on German consumers' willingness to pay for more animal welfare in turkey husbandry.

Conjoint analysis can be used to understand how consumers value product attributes by determining consumers' tradeoffs between different levels of these attributes. Conjoint analysis allows the decomposition of consumer preferences into the partial contributions of product features such as price, design and convenience. In a choice-based conjoint analysis respondents are not asked to indicate their preferred combinations of product attributes directly. Instead, they are presented combinations of attributes visualized as product offerings. When the number of possible combinations is very large, conjoint analysis also allows the researcher to build a subset of the possible combinations which is easier to manage (Hauser and Rao, 2004).

A conjoint analysis consists of three major steps: (1) designing the stimuli by decomposing the product, representing the stimuli and reducing the respondent burden, (2) data collection and (3) data analysis. These steps are outlined in more detail in the following paragraphs.

Designing Stimuli

In the conjoint analysis the product, turkey meat, was decomposed by referring to three product attributes relevant to consumers' buying decisions: brand, price and husbandry conditions. The following list provides an overview of these product attributes and their levels:

- Brand:
  - Wiesenhof, Germany's leading brand for poultry meat;
  - Neuland, a brand that has been jointly created by German farmers and nongovernmental organizations – mainly animal prevention organizations – and which stresses above-average standards for animal-friendly husbandry systems;
  - unbranded turkey meat.
- Price, displayed for turkey escalope: 7.99 €/kg, 9.99 €/kg or 11.99 €/kg.
- Measures for improving the animal-friendliness of turkey fattening, i.e. perches, reduced stocking density, outdoor-climate house and a free-range husbandry system.

The combinations of brand, price and measures for animal prevention were visualized as graphical stimulus cards and displayed as realistic product offerings with clearly identifiable product attributes. Three attributes with three or four levels result in 36 stimuli (or profiles). In order to simplify the task for the respondents, a balanced orthogonal design was chosen to reduce the number of profiles each respondent had to rank to 16.

Data Collection

Within five days in early August, 2004, 216 consumers were surveyed by two interviewers in a HERKULES market in Kassel. HERKULES is a subsidiary of the large German retailer EDEKA and operates self-service department stores (hypermarkets) with selling spaces of more than 2,500 m^2. Kassel is a city in the German state of Hessen with approximately 194,000 residents. Many surveys are conducted in Kassel since the socio-demographic characteristics of its population are representative of Germany as a whole. Interviewees were not only asked to rank the product offerings but also questioned about their socio-demographics, buying behavior and attitudes towards agriculture in general as well as animal husbandry.

Before presenting the results of the conjoint analysis, we will first describe the respondents' socio-demographic characteristics and their attitudes towards agriculture and animal husbandry.

In the sample 56.5 % of respondents were female and 43.5 % male. 38.4 % of respondents live in two-person households. Around 60 % of consumers are roughly equally divided among one-, three- and four-person households. Only 6 % live in households with five or more members. The age-groups surveyed can be gathered from Table 3.

Age-group (years)	Percentage of interviewees
up to 20	6.5 %
21-30	18.5 %
31-40	22.2 %
41-50	16.7 %
51-60	17.6 %
61-70	14.4 %
above 70	4.2 %

Table 3. Age-groups in the survey.

Nearly 23 % of respondents were not willing to declare their income. From the remaining interviewees, 21.8 % had an income of up to 1,000 €/month. 19.9 % of respondents declared that they

belonged to each of the following income groups: 1,000 to 2,000 € per month; 2,000 to 2,500 € per month. 16.2 % of surveyed consumers earned more than 2,500 € per month.

The formal education of the respondents turned out to be above-average. 17.6 % had visited a secondary general school (*Hauptschule*), and nearly 31 % had graduated from an intermediate school (*Realschule*). Over 50 % had advanced College Certificates (*Fachhochschulreife*) or General University Entrance Certificates (*Allgemeine Hochschulreife*). 16.7 % of respondents actually hold university degrees, and 2.8 % PhDs.

Only consumers who declared that they eat poultry on a regular basis took part in the survey. 40.7 % of respondents buy poultry once a week, and 18.1 % two or three times a week. Turkey meat, which has a market share of about one-third in the German poultry market is bought more rarely. Poultry is generally more often bought in retail stores such as HERKULES than beef and pork.

The origin of the meat was "very important" for 56 % of the respondents and "important" for 22.7 %. Nearly all respondents declared that they would be willing to buy turkey from animal-friendly husbandry systems if it were offered more often in retail stores.

Agriculture in general, animal prevention and animal husbandry were very important topics for the respondents. About 90 % declared that they were very much interested in these topics and attach great value to the origin of agricultural and food products. About half the respondents feared that more animal prevention in agriculture will result in more imports from Eastern Europe.

Data Analysis

Data analysis in conjoint studies starts with estimating part-worth utilities for each level of each attribute. Regarding animal welfare in turkey fattening consumers very strongly prefer free-range husbandry systems. Reduced stocking density is also welcomed but creates much lower utility. Maybe due to a lack of knowledge about their true ethological value, perches and outdoor-climate houses are not positively evaluated (see Figure 3). This result already hints at one of the fundamental problems with consumer-based approaches to measuring animal welfare, i.e. a divergence between the perceived level of animal welfare associated with a particular production practice and the actual level of welfare experienced by the animal (Bennett *et al.*, 2000).

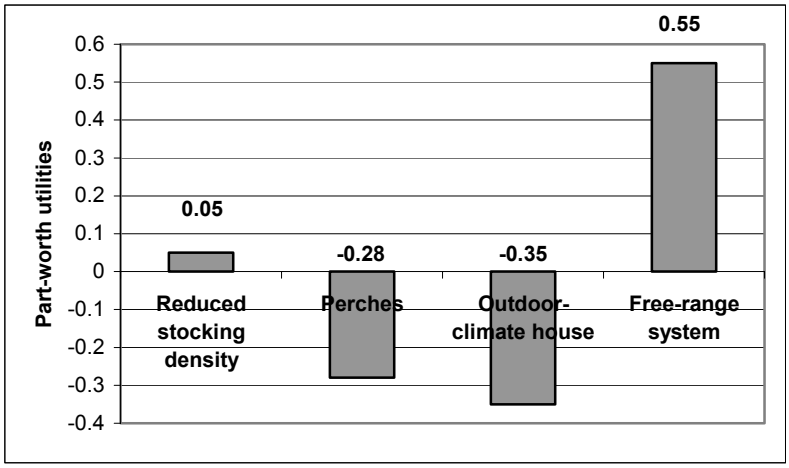

Figure 3. Animal-friendly husbandry: Part-worth utilities.

Concerning product price, the assumed negative linear relationship was empirically supported; the part-worth utility for lower price was higher than for higher prices (see Figure 4).

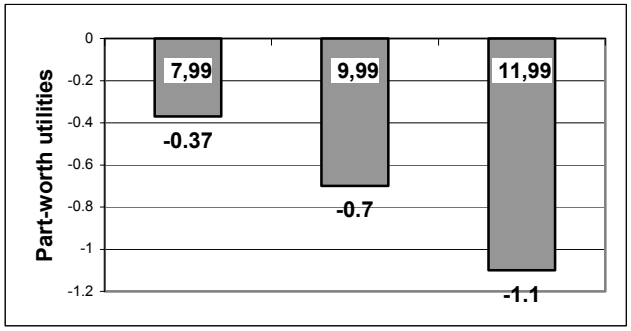

Figure 4. Price: Part-worth utilities.

Knowledge of meat and poultry brands was generally low in our sample. The majority of respondents did not know any meat brands at all; other consumers' knowledge was restricted to the *Wiesenhof* brand and a few regional meat brands. In the survey consumers revealed a strong preference for the *Wiesenhof* brand. Positive but much smaller part-worth utility was attributed to the *Neuland* brand (see Figure 5).

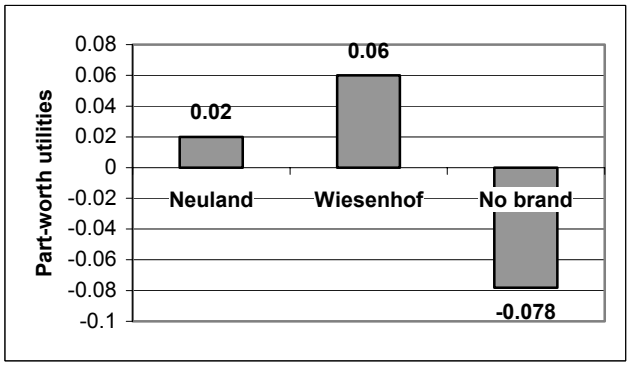

Figure 5. Brand: Part-worth utilities.

In summarizing these results we can say that the most preferred (ideal) product is free-range turkey meat of the brand label *Wiesenhof* at a price of 7.99 €/kg. Furthermore, we can calculate the relative importance of attributes from the range of coefficients (part-worth utilities) for each. Figure 6 shows that improving animal welfare has the highest relative importance of all attributes; then come brand and price.

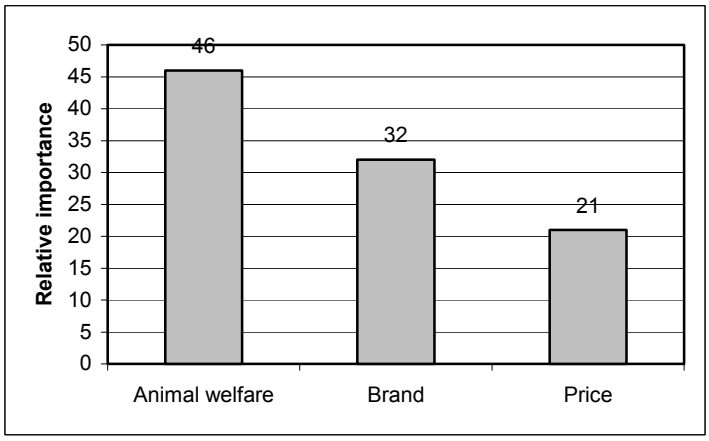

Figure 6. Relative importance of attributes.

Concerning the attribute price, our analysis revealed 78 reversals by factor. Obviously the relationship between price and utility (and demand) is more complex than we initially expected.

Since simulation analysis of market shares is of minor significance for a target-costing analysis, those results are not presented here. What is much more important is consumers' willingness to pay for more animal welfare, which can be estimated by calculating price equivalents for measures implemented for improving turkey husbandry systems. Since outdoor-climate houses were least preferred by the respondents, this measure was chosen as the starting point of the analysis. The price premiums consumers are willing to pay for perches, reduced stocking rates and free-range husbandry systems are displayed in Table 4. It is obvious that consumers' willingness to pay is highest for free-range systems and lowest for perches.

Measures	Price equivalent
Perches	0.20 €/kg
Reduced stocking density	1.17 €/kg
Free-range system	2.63 €/kg

Table 4. Price equivalents for more animal-friendly turkey husbandry.

Discussion of Results: Are More Ethics in Turkey Husbandry Economically Viable?

Comparing actual production costs and allowable production costs is at the heart of target costing. In the case of more animal-friendly husbandry systems, the standard costs of implementing these systems and consumers' willingness to pay for these systems have to be compared. Table 5 summarizes the results of both analyses conducted in this study. Since the outdoor-climate house is least preferred by consumers and served as a starting point for further conjoint analysis, no willingness to pay for this measure is known. A third aspect taken into account here is a qualitative assessment of the contribution of each measure to more animal welfare.

Measures	Contribution to animal welfare	Actual production costs	Consumers' willingness to pay
Perches	low	0.012 €/kg of slaughter weight	0.20 €/kg
Reduced stocking density	medium	0.08 €/kg of slaughter weight	1.17 €/kg
Outdoor-climate house	high	0.03 €/kg of slaughter weight	least preferred
Free-range husbandry	very high	0.35 €/kg of slaughter weight	2.63 €/kg

Table 5. Animal-friendly turkey fattening: Cost comparison.

According to the results of our analysis, there is no target gap for more animal-friendly turkey fattening systems. All measures seem to be economically viable and a goal conflict between ethics and economics is not visible. In such a case, target costing is an easy task because value engineering and other tools for identifying opportunities for cost savings do not have to be applied. But before recommending fundamental changes in husbandry systems to turkey farmers and agriculture politicians, we would like to compare our results with data stemming from market tests carried out by two major German poultry producers. These market tests share many similarities with field experiments and thus provide an opportunity to assess the validity of conjoint analysis, especially asserted willingness to pay.

The first example is taken from the German PHW Group, which owns the *Wiesenhof* brand. PHW offers broiler and other turkey meat from conventional farming, ecofarming and free-range husbandry systems. Both the latter have turned out to be economic failures. Broilers from ecofarming are three

times more expensive in the retail stores than conventional broilers. Today broilers from ecofarming account for only 0.01 % of PHW's total poultry turnover. The company also offers broilers fattened in free-range husbandry systems to consumers. These broilers are less expensive than broilers from ecofarming but still twice as expensive to produce as conventional broilers. At the moment free-range broilers' share of the company's turnover with poultry meat is less than 1 %.

Similar experiences stem from market tests by Heidemark, which is one of Germany's largest producers of turkey meat. A few years ago, due to growing pressures from external stakeholders, Heidemark launched the "Extensive Turkey Fattening" program in cooperation with Greenpeace. Stocking density was reduced by 50 % compared to the usual standards in turkey fattening; prices in retail stores went up by about 20 %. After just over a year, the program had to be stopped due to a lack of consumer demand.

Both market tests confirm early sceptical statements by, for instance, Bröcker (1998) concerning consumers' willingness to pay for more animal welfare. The results of market tests lead one to suppose that consumers do not care very much about how animals are raised and fattened, and that actual willingness to pay at the point of sale is much lower than asserted in the hypothetical buying situations typical of conjoint analyses. Empirical findings about consumer demand for organic foods also show that consumers value so-called non-use values such as environmental and animal welfare attributes and show positive willingnesses to pay in surveys. Nevertheless, actual buying behavior is more heavily influenced by use values such as taste and freshness (Wier and Andersen, 2003). The discrepancy between stated preferences and actual buying behavior is sometimes explained by a lack of information at the point of sale on how farm animals were reared (Anonymous, 2005).

The aforementioned discrepancy also confirms the negative assessments of the (external) validity of conjoint analysis (Krapp and Sattler, 2001; Sattler and Hensel-Börner, 2001; Hartmann and Sattler, 2004). Although conjoint analysis is mature and the most commonly used method and is believed to have considerable advantages over, for instance, direct methods of determining how much people are willing to pay, Sattler and Nitschke (2001) argue that willingness to pay is systematically overestimated due to a hypothetical bias (Harrison and Rutström, 2004). In fact, List and Gallet (2001) found strong evidence for considerable biases in willingness to pay analyses, but Lusk and Hudson (2004) argue that this problem is larger in environmental economics than in agribusiness applications since the elicitation method is more incentive-compatible in the latter.

The hypothetical bias may be largest in survey settings in which respondents are aware of socially desirable behavior such as improved animal welfare. In the literature several reasons for the over-estimation of willingness to pay in hypothetical markets are specified (Braeuer and Suhr, 2005). In settings characterized by social desirability, asserting a positive willingness to pay may in itself provide moral satisfaction and intrinsic rewards. This is often referred to as the warm-glow effect (Andreoni, 1990) and contributes to untrustworthy survey results. There are several ex ante and ex post strategies against the distortion of results of willingness to pay analyses. Although ex ante several attempts to reduce the problem, for example maintaining the anonymity of respondents (Nancarrow and Brace, 2000), have been made, a social desirability bias could not be completely avoided in the conjoint analysis. Ex post strategies such as calibration or calculating the robustness of results (Braeuer and Suhr, 2005) will have to remain for future research.

Conclusions and Practical Implications

More than thirty years after the publication of the basic ideas of this method (Green and Rao, 1971) and despite continuous improvements in preference measurement, deriving allowable production costs from correctly estimated consumer willingness to pay seems to be the Achilles' heel of the use of target costing to find a feasible way out of the dilemma between ethical considerations on the one hand and economic pressures on the other. Market tests like those carried out by the PHW Group and Heidemark are only a very imperfect substitute since consumers are confronted with only one product offering. What is needed are systematic field experiments in which different product offerings are presented and consumers' actual buying behavior is observed. Otherwise it is impossible to correctly distinguish measures for which consumers show a high willingness to pay in non-hypothetical buying situations (revealed preferences) from those for which no such willingness to pay

can be observed at the point-of-sale. Field experiments are considered a way of testing the external validity of willingness to pay analyses (Braeuer and Suhr, 2005). But, due to high costs, full-blown field experiments are only very rarely conducted (Dickinson and Bailey, 2002). Therefore, the question whether more ethics in turkey husbandry are economically viable remains partly open.

In our study we did not want to test the external validity of conjoint analysis but the feasibility of a target-costing approach in finding a way out of the dilemma between ethics and economics. Therefore, some methodological shortcomings in marketing research should not obscure one's view of the more important result that, in principle, target costing is a useful approach for identifying economically acceptable measures for improving animal welfare in livestock husbandry. Taking into account the ethological value of improved husbandry systems, calculating drifting costs of improvements of animal welfare, deriving allowable costs from consumers' willingness to pay and comparing both the latter in order to identify possible target gaps should become a standard approach in redesigning husbandry systems. Since the target-costing approach systematically presents information about the ethological and economic characteristics of husbandry systems, it can be expected to rationalize debates on livestock husbandry conditions and favor logic over emotions. This contributes to the smoothing of societal conflicts about livestock husbandry and may prevent a further deterioration of the image and legitimacy of agriculture in society.

Agriculture is confronted with more and more political and societal expectations going far beyond animal welfare. Environmental protection, non-GMO policies, tracking and tracing agricultural and food products and the introduction of quality management systems are other examples. Many of these measures are implemented without thoroughly taking into account their economic consequences. Farmers facing more and more severe economic pressures usually doubt whether these measures are useful and reject their introduction (for quality assurance schemes in German agriculture, see, for instance, Jahn, Peupert and Spiller, 2003). Again, a target-costing approach taking into consideration actual costs on the farm level and allowable costs may prevent the introduction of measures consumers do not hold in high esteem and are not willing to pay for. So far such a target-costing approach is still missing since most studies focus only on consumers' willingness to pay (see, for instance, Enneking 2004).

Target costing may also turn out to be very useful to politicians, who have to decide on stricter animal protection, environmental or food safety laws. Experiences in Germany with new legislation concerning husbandry conditions for laying hens, for instance, show that political decisions are often made without taking into account the economic consequences for farmers. Such decisions tend to force local producers out of production and favor the import of agricultural products from countries with lower standards. In the end the overall political goal of improved animal welfare is not met due to the substitution of cheaper imports for domestic production; at the same time, domestic production and jobs are lost. Being able to identify improvements in animal welfare which do not seriously harm farmers' competitiveness with foreign producers may prevent politicians from economically disadvantageous decisions.

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