# The power of information from a consumer perspective: Effectiveness and willingness to pay for improved animal welfare in the German pork market

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**Abstract:**

The German Minister of Food and Agriculture initiated a mandatory state label for animal husbandry, revealing livestock production conditions. This study investigates consumer preferences and their willingness to pay price premiums for pork from different husbandry conditions. We tested the original label as well as a modification with additional information on the available living space for the animal, a modification with additional interpretive information (i.e. a colour scale indicating how a product scores on animal husbandry standards), and a combination of both. We conducted a representative online discrete choice experiment (n = 2,015) in Germany and analysed the data using a mixed logit model. Our results show that the label proposed by the government effectively increases the willingness to pay for meat produced with higher standards except the 'organic' level. We also show that indicating a ranking of husbandry conditions could further increase the willingness to pay.

*Keywords: animal welfare; attitude–behaviour gap; willingness to pay*

*Track: Social Responsibility & Ethics*

## 1. Introduction

Meat production and consumption have faced increasing criticism in recent years. Concerns focus on the negative ecological impacts, such as disproportionate land use, greenhouse gas emissions, water extraction, and biodiversity loss (Godfray et al., 2018; Aleksandrowicz, Green, Joy, Smith, and Haines, 2016), as well as the conditions under which animals are raised for meat production (Busch, Gauly, and Spiller, 2018).

Asking consumers, approximately 80% in Germany indicate that livestock production conditions matter when making meat purchases (BMEL, 2022a). However, market data paint a different picture: Organic pork, involving a production method with rather strict husbandry standards, accounts for only 1.78% of the German pork market in 2022 (BÖLW, 2023). So there is a significant gap between consumer attitudes and purchasing behaviour. Several factors contribute to this attitude–behaviour gap: a lack of availability, a high price (Aschemann-Witzel & Niebuhr Aagaard, 2014), or a lack of transparency (Terlau & Hirsch, 2015). When assessing husbandry conditions, a so-called credence attribute (Darby & Karni, 1973; Grunert, Bredahl, and Brunsø, 2004), consumers have to rely on information provided by manufacturers, retailers, or other external parties.

Information on credence attributes can be one way to bridge the attitude–behaviour gap and enable consumers to make informed choices. Product labels can serve as a valuable source of credence information and provide consumers with an indication of a product's quality, reduce pre-purchase evaluation costs, and facilitate purchasing decisions based on personal preferences (Thøgersen, Jørgensen, and Sandager, 2012). Furthermore, labels remind consumers of sustainable and ethical issues and therefore focus consumers' limited attention at the point of sale (Peschel, Orquin, and Loose, 2019).

In 2019, retail and industry introduced a voluntary label in Germany to classify four livestock husbandry conditions. In 2022, the German Minister of Food and Agriculture initiated the launch of a mandatory state label using five levels to indicate livestock husbandry conditions (BMEL, 2022b). The suggested label is designed as a monochrome multi-level label (cf. Figure 1). Both animal husbandry labels aim to provide consumers with information about husbandry conditions. However, both labels currently employ text-based information only, providing one keyword for each level. Consequently, the distinction between levels is not immediately apparent, and this lack of information may result in consumers falling back on heuristics and implicitly making assumptions about the relationship between the levels (Stoltenberg, Unfried, and Manewitsch, 2022). This could lead to a misperception of animal

husbandry conditions and biased consumption patterns (Stoltenberg et al., 2022) and therefore compromise the label's supposed impact in supporting sustainable consumption.

Although the ideal design of a label is still unclear (Torma & Thøgersen, 2021), this effect might be avoided when a multi-level label provides more detailed information about the relation between the label levels and their underlying basis or implications. This could be done by either of the following:

a) Adding an informational layer with additional animal husbandry-specific information. We chose available space per animal which was the most important criteria for the perceived quality of animal husbandry in a short pre-study. By this, we make the difference between the label levels more salient and accessible directly on the label rather than via a QR code.
b) Adding an interpretive layer, evaluating how good a product scores on this aspect. This additional information (e.g. a colour scale for the different levels, similar to the Nutri-Score colours) facilitates consumers' understanding of the message and was shown to be highly effective (Song et al., 2021).

Both additional layers of information can help the consumer assess the difference between the husbandry conditions.

In this paper, we vary the planned label and use a discrete choice experiment (DCE) to investigate whether respondents are willing to pay more for higher animal welfare. We test whether the label fulfils its purpose of providing meaningful information, or if there is a need to enhance the salience of these conditions and the associated differences.

## 2. Method

### *2.1 Attributes and experimental design*

We conducted an experimental study using a DCE. This method allowed us to assess the willingness to pay and the influence of certain product attributes on the willingness to pay. For more realistic answers, we used a special type of DCE, the dual response DCE, wherein respondents first choose the most preferred alternative and second answer whether they would actually buy the product in a supermarket (Brazell et al., 2006). In this study, we only analyse data from the first, the preference, question. To this end, we presented hypothetical purchase scenarios wherein participants had to choose one out of three products in ten rounds. The products (pork cutlets) were described by different attributes chosen according to the literature: animal husbandry condition indicated by the planned mandatory state label (the

basic version of it is shown in Figure 1), price, packaging, and region of origin. The price levels were selected according to the average prices of conventional and organic pork cutlets sold in German supermarkets. Thus, we considered the following four attributes with corresponding levels (see Table 1).


English Translation: Bio = Organic; Auslauf/Freiland = Outdoor Runs/Free-range; Frischluftstall = Indoor with Fresh Air; Stall + Platz = Indoor + Space; Stall = Indoor Housing.
Note: In 03/2023 'Outdoor Runs/Free-range' was changed to 'Outdoor Runs/Pasture'.
Figure 1. Basic version of the planned label

| Attribute | Level |
|---|---|
| Type of Husbandry (*ToH*) | **1 Indoor housing**<br>2 Indoor + space<br>3 Indoor with fresh air<br>4 Outdoor runs/free-range<br>5 Organic |
| Price (€/250g) | €2.19; €2.69; €3.19; €3.69; €4.29; €4.89; €5.59; €6.29 |
| Packaging (*Pac*) | **1 Packaged from the refrigerated section**<br>2 Fresh off the meat counter, later referred to as 'fresh' |
| Region of Origin (*RoO*) | **1 From Germany but outside your region**<br>2 From your region within a radius of 100km, later referred to as 'region' |

Note: Levels in bold are reference levels in the model estimation.
Translated from the German language
Table 1. Attributes and levels used in the hypothetical choice experiment

Additionally, we experimentally manipulated the design of the animal husbandry label. The original label was used for the control group ($G_{original}$). We added information on

available space per animal. In the first experimental group ($G_{space}$), we added a number indicating the area of living space in square meters the animal has at the respective husbandry level and a visualisation of the living space relative to the size of an average animal. In the second experimental group ($G_{colour}$), we coloured the label – similar to the Nutri-Score label – to add interpretive information for the animal husbandry. The colour scale includes a letter from A (green) to E (red) as with the aforementioned label. In the third experimental group ($G_{space + colour}$), we combined both layers, adding information about living space per animal as well as the colour scale. Participants were randomly assigned to one of the four groups. The labels used in the study are depicted in Figure 2.

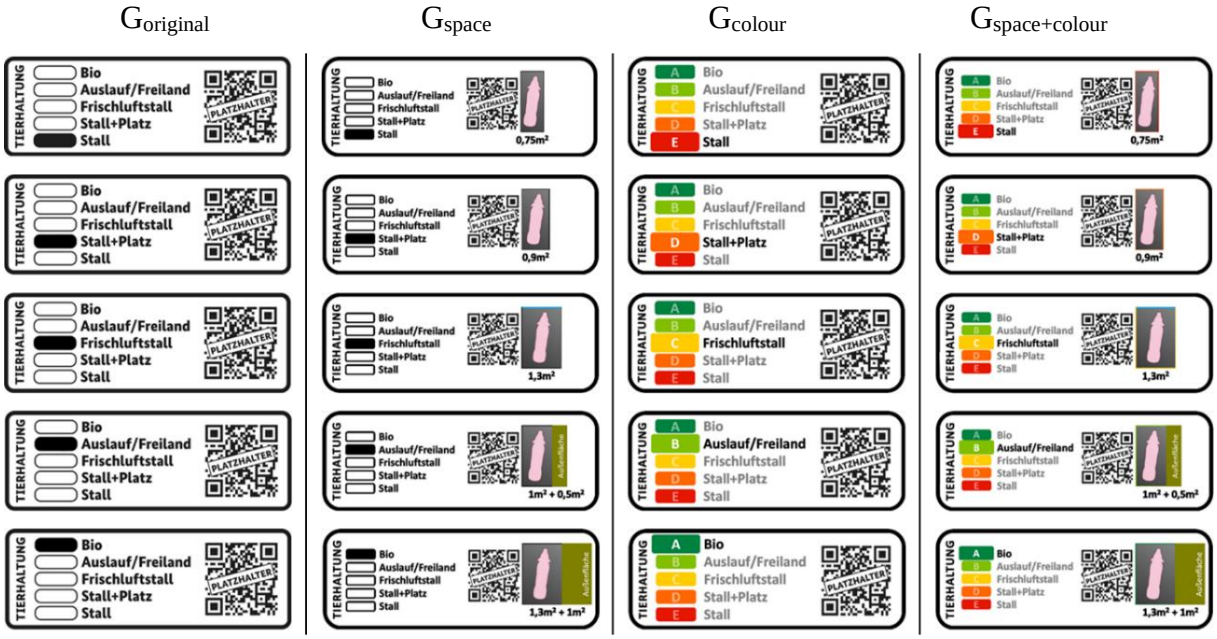

Figure 2. Stimuli in the four experimental groups

*2.2. Sample, design, and estimation*

The survey was conducted with N = 2,015 participants in Germany. The sample in each group was representative with respect to age and gender for the German online population. Participants were screened for pork consumption. The study was conducted in February and March 2023 using the survey software *QuestionPro*. In the questionnaire, the respondents were provided information about the procedure as well as detailed descriptions of the product attributes and levels before the DCE started. The description of the products for the DCE design were assigned to twenty choice tasks, each respondent answered half of them. In summary, our DCE design was constructed to ensure level balance while approaching

orthogonality, minimal overlap, and utility balance (Huber & Zwerina, 1996). Alternatives in each choice set were presented in a randomised order and sequence.

To assess the willingness to pay for the designed attribute levels and the corresponding differences between the experimental groups, we used the standard random utility model according to McFadden (1974). The model assumes that the alternative with the highest total utility is chosen in a choice task. The utility is modelled as a linear function of the shown attribute levels. To control for potential significant heterogeneity, we used a mixed logit model, allowing the parameters of the linear utility function to vary across respondents (Hensher & Greene, 2003). To assess the differences between the experimental groups, we combined their data into a joint dataset and postulated a combined model equation (1) with dummy-coded attribute levels (except price):

$$\begin{aligned} U_i = \;& \beta_{i2}ToH_2 + \beta_{i3}ToH_3 + \beta_{i4}ToH_4 + \beta_{i5}ToH_5 + \gamma_i Price + \beta_{ip}Pac_{fresh} + \beta_{ir}RoO_{region} \\ + \;& \sum_T^{\{space,\ colour,\ space+colour\}} G_i^T(\beta_{i2}^T ToH_2 + \beta_{i3}^T ToH_3 + \beta_{i4}^T ToH_4 + \beta_{i5}^T ToH_5) \end{aligned} \quad (1)$$

where $U_i$ is the explained part of utility for respondent *i*. The variables $ToH_2,\ ToH_3,\ ToH_4,$ and $ToH_5$ are dummy-coded variables (as reported in Table 1) for the type of husbandry. The variables $Pac_{fresh}$ and $RoO_{region}$ are dummy-coded variables for fresh unpacked and for regional products correspondingly. $\beta_{i.}$ denotes the individual parameters for all attributes besides price; $\gamma_i$ is the individual price parameter. $G_i^T$ is a treatment dummy for the experimental groups *space*, *colour*, and *space + colour* and $\beta_{i.}^T$ denotes the individual parameters for the husbandry attribute in these experimental groups. As usual, one dummy is omitted for each attribute to ensure identification so that all $\beta$-coefficients are interpreted as effects relative to the corresponding omitted levels (i.e. $ToH_1, Pac_1,$ and $RoO_1$), cf. Table 1.

## 3. Results

Table 2 shows the estimation results for the postulated model, i.e. for the $\hat{\beta}_{.}/\hat{\gamma}$-, and $\hat{\beta}_{.}^T/\hat{\gamma}$-quotients of parameters in equation (1). The estimates correspond to the mean marginal willingness to pay across respondents for the respective attribute levels. Column $G_{original}$ represents the marginal willingness to pay in the control group for the animal husbandry conditions 2, 3, 4, and 5, relative to (omitted) reference level 1, as well as the marginal willingness to pay for fresh and regional pork cutlets relative to the (omitted) packaged and national origin products, respectively. Columns $\Delta G_{space}$, $\Delta G_{colour}$, and $\Delta G_{space\ +\ colour}$ show the additional average effects of our experimental manipulations compared to the corresponding label levels in the control group. For example, respondents in the control group are willing to

pay €1.02 more for a 250g pork cutlet with the animal husbandry condition 2 compared to the same piece of meat with the animal husbandry condition 1. Respondents in the experimental group $G_{colour}$ will pay €0.66 more for a pork cutlet with the label level 4 compared to label level 4 from $G_{original}$.

| | $G_{original}$ | $\Delta G_{space}$ | $\Delta G_{colour}$ | $\Delta G_{space + colour}$ |
|---|---|---|---|---|
| $ToH_2$ | 1.02*** (0.094) | 0.01 (0.136) | 0.37* (0.146) | 0.04 (0.158) |
| $ToH_3$ | 1.99*** (0.090) | −0.21 (0.137) | 0.57*** (0.131) | 0.53*** (0.141) |
| $ToH_4$ | 3.05*** (0.090) | −0.40** (0.139) | 0.66*** (0.132) | 0.43** (0.143) |
| $ToH_5$ | 2.12*** (0.123) | −0.09 (0.179) | 0.93*** (0.181) | 0.86*** (0.188) |
| $Pac_{fresh}$ | 0.27*** (0.026) | | | |
| $RoO_{region}$ | 0.34*** (0.027) | | | |

Significance codes: *** p < 0.001, ** p < 0.01, * p < 0.05, . p < 0.1; Standard errors in parentheses.

Table 2. Results of the mixed logit willingness to pay estimates for the control group and treatment effects relative to control group

The estimates for the control group ($G_{original}$) show that for the original label higher husbandry label levels correspond with a significantly higher willingness to pay compared to level 1. It increases with the label levels 2, 3, and 4 but drops from levels 4 to 5. We also see a significantly higher willingness to pay for fresh meat as well as for regional meat. The results in column $\Delta G_{space}$ indicate a decrease in the willingness to pay between levels 4 and 1 for the label with additional information about the available space for the animal. For levels 2, 3, and 5, the corresponding changes in willingness to pay are not statistically significant. For the label with the additional interpretive layer, i.e. the colour-coded levels ($\Delta G_{colour}$), the results show an increase in willingness to pay for all levels relative to level 1, and the higher the level of the manipulated label, the more so. When both additional layers of information are combined in one label ($\Delta G_{space + colour}$) the statistically significant increase in willingness to pay for label levels 3, 4, and 5 is always lower than the corresponding increase in column $\Delta G_{colour}$. In total, the impact of the colour scale seems to be stronger than that of the available space per animal, indicating that respondents pay more attention to the (familiar) colour-coded evaluation scheme than to (novel) information cues.

## 4. Discussion, limitations, and conclusion

The German Minister of Food and Agriculture suggested a mandatory state labelling of livestock conditions. Our results confirm the findings of the existing literature on multi-level labels; these labels are an appropriate way to communicate product attributes like animal husbandry conditions (Tonsor & Wolf, 2011; Weinrich & Spiller, 2016). However, the design and the information presented on the label are important. We found that the proposed label is effective as consumers are willing to pay price premiums for meat that is produced under higher animal husbandry standards (label levels 2–5) compared to label level 1.

However, the willingness to pay is not monotonically increasing with the label level, as the willingness to pay for the highest husbandry standard is lower than the one below. This is surprising, as the requirements for organic pork are much higher than those for pork produced under the 'outdoor runs/free-range' condition, and include, e.g., at least twice as much outdoor space available for each animal. But as long as most of the consumers are not aware of such details, this could result in a lower willingness to pay. A second explanation could be that 'organic' is perceived as an indicator of healthy food rather than animal welfare (Aertsens, Mondelaers, Verbeke, Buysse, and Van Huylenbroeck, 2011). In a pre-study, we asked the respondents to rank the five categories based on the wording before showing the visual label (including the ranking). Our respondents had difficulties in classifying the level 'organic' hierarchically. Levels 1 to 4 clearly refer to husbandry conditions and could be ranked correctly. In case of 'organic', the specific conditions remain unclear; this label level was ranked worst, second best, and best in almost equal proportions. So further research is necessary on the label level 'organic'.

Regarding the experimental manipulation of the husbandry label with additional living space information, we did not find any (positive) effects. Most of the results are not significant and, thus, cannot be interpreted. One significant exception is label level 4, which reduces willingness to pay (compared to the original label level). This could be related to the drop in the indoor living space (1 $m^2$) compared to level 3 (1.3 $m^2$).

The additional interpretive layer (colour codes and letters from red [E] to green [A] indicating a ranking) is able to increase the willingness to pay for all label levels. All results are significant and positive.

Adding both, information about living space and a colour scale made the label more effective than the original version. However, compared to the label with a colour scale only, the combined information resulted in a slightly lower willingness to pay.

Our study was not incentivised, the choices in the DCE were hypothetical for the respondents. Experiments including real purchasing behaviour can yield further insights.

Our study shows that the proposed label is effective; consumers are willing to pay price premiums for meat that is produced under higher animal husbandry standards. Consumers willing to pay more are an important enabling factor for the transformation towards higher animal husbandry standards. Then, farmers who convert their barns and have higher costs for animal husbandry could expect to cover these costs with additional income.

However, the design and the information presented on the label are important. We were able to show that colour codes indicating a ranking can significantly influence purchase decisions and increase willingness to pay for meat produced with higher husbandry standards. These findings suggest that the proposed label could communicate the differences between the animal husbandry conditions even better and more effectively. This would enable consumers to shop more in line with their preferences and thus have a more effective steering impact on animal husbandry in Germany.

**References**.

Aertsens, J., Mondelaers, K., Verbeke, W., Buysse, J., & Van Huylenbroeck, G. (2011). The influence of subjective and objective knowledge on attitude, motivations and consumption of organic food. *British Food Journal*, *113*(11), 1353–1378.

Aleksandrowicz, L., Green, R., Joy, E. J., Smith, P., & Haines, A. (2016). The impacts of dietary change on greenhouse gas emissions, land use, water use, and health: A systematic review. *PLOS One*, *11*(11).

Aschemann-Witzel, J., & Niebuhr Aagaard, E. M. (2014). Elaborating on the attitude–behaviour gap regarding organic products: Young Danish consumers and in-store food choice. *International Journal of Consumer Studies*, *38*(5), 550–558.

Brazell, J. D., Diener, C. G., Karniouchina, E., Moore, W. L., Séverin, V., & Uldry, P. F. (2006). The no-choice option and dual response choice designs. *Marketing Letters*, *17*, 255–268.

BMEL – Bundesministeriums für Ernährung und Landwirtschaft (2022a). Deutschland, wie es isst: Der BMEL-Ernährungsreport 2022. Retrieved from https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/ernaehrungsreport-2022.pdf?__blob=publicationFile&v=9 (Last accessed: November 27, 2023).

BMEL (2022b). Gesetzentwurf der Bundesregierung: Gesetz zur Kennzeichnung von Lebensmitteln mit der Haltungsform der Tiere, von denen die Lebensmittel gewonnen wurden. Retrieved from https://www.bmel.de/SharedDocs/Downloads/DE/Glaeserne-Gesetze/Kabinettfassung/tierhaltungskennzeichnungsgesetz-kabinett.pdf?__blob=publicationFile&v=6 (Last accessed: November 27, 2023).

BÖLW – Bund Ökologische Lebensmittelwirtschaft e. V. (2023). Branchenreport 2023 – Ökologische Lebensmittelwirtschaft. Retrieved from

https://www.boelw.de/fileadmin/user_upload/Dokumente/Zahlen_und_Fakten/Broschuere_2023/BOELW_Branchenreport2023.pdf (Last accessed: November 27, 2023).

Busch, G., Gauly, M., & Spiller, A. (2018). Opinion paper: What needs to be changed for successful future livestock farming in Europe? *Animal, 12*(10), 1999–2001.

Darby, M. R., & Karni, E. (1973). Free competition and the optimal amount of fraud. *The Journal of Law and Economics, 16*(1), 67–88.

Godfray, H. C. J., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., Pierrehumbert, R. T., Scarborough, P., Springmann, M., & Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science,* 361(6399).

Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector – A review. *Meat Science, 66*(2), 259–272.

Hensher, D. A., & Greene, W. H. (2003). The mixed logit model: the state of practice. *Transportation, 30*, 133–176.

Huber, J., & Zwerina, K. (1996). The importance of utility balance in efficient choice designs. *Journal of Marketing Research, 33*(3), 307–317.

McFadden, D., (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics*. Academic Press.

Peschel, A. O., Orquin, J. L., & Loose, S. M. (2019). Increasing consumers' attention capture and food choice through bottom-up effects. *Appetite, 132*, 1–7.

Song, J., Brown, M. K., Tan, M., MacGregor, G. A., Webster, J., Campbell, N. R., Trieu, K., Mhurchu, C. N., Cobb, L. K., & He, F. J. (2021). Impact of color-coded and warning nutrition labelling schemes: A systematic review and network meta-analysis. *PLOS medicine, 18*(10), e1003765.

Stoltenberg, B., Unfried, M., & Manewitsch, V. (2022). Better product labels for better consumer choices. *NIM Marketing Intelligence Review, 14*(1), 49–53.

Terlau, W., & Hirsch, D. (2015). Sustainable consumption and the attitude-behaviour-gap phenomenon–causes and measurements towards a sustainable development. *Proceedings in Food System Dynamics,* 199–214.

Thøgersen, J., Jørgensen, A. K., & Sandager, S. (2012). Consumer decision-making regarding a 'green' everyday product. *Psychology & Marketing, 29*(4), 187–197.

Tonsor, G. T., & Wolf, C. A. (2011). On mandatory labeling of animal welfare attributes. *Food Policy, 36*(3), 430–437.

Torma, G., & Thøgersen, J. (2021). A systematic literature review on meta sustainability labelling – What do we (not) know? *Journal of Cleaner Production*, 293, 126194.

Weinrich, R., & Spiller, A. (2016). Can a multi-level label do better than a binary label for animal welfare? A PLS-Analysis of Consumer Satisfaction. *International Food and Agribusiness Management Review, 19*(1030–2016–83135), 1–30.