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# Developing food labelling strategies with the help of extremeness aversion

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**Abstract**

Labelling is an important cue for consumers as it helps to quickly communicate information about a product or production process. However, the majority of labels on the market are binary, such as labels that indicate whether a product was produced using animal welfare friendly standards or not. Yet, there are many intermediate qualities that binary labels do not display. In the long run, if consumers are not able to identify if high quality attributes are contained in the product, due to a lack of information on the product label, then these attributes may disappear from the food market. In turn, this could lead to a market failure. A multi-level label can show different process standards of products explicitly. Nonetheless, before launching a multi-level labelling system, it should be tested if a multi-level labelling system can shift market shares in favour of the labelled products. Using a consumer study with 1538 German consumers (approximately representative for the German population regarding age, gender, income, education and regional distribution) the shares of product choices are calculated. Two comparisons of the shares of product choices will be made, one between no label and a binary label and the other between no label and a multi-level label. The results suggest that a multi-level labelling system achieves higher market shares, can improve animal welfare and can result in higher revenues or sales. The results deliver important information for policymakers in consumer policy and industry.

**Keywords:** Labelling, multi-level labelling, consumer research, animal welfare

## 1. Introduction

Labels are an important information tool for consumers as they help to quickly communicate information about the product or the production process (Andersen, 2006; European Commission, 2006; Harper et al., 2007). Currently, a majority of labels are binary, for example those indicating whether or not a product is sustainable, organically produced or fair-traded. A disadvantage of such labels is that they do not communicate the complexity of underlying continuous variables, for example the production standards. Those variables are usually continuous and not binary, an example of this is animal welfare. At the moment there are two standards for meat on the market: conventionally or organically produced. However, there are many different intermediate stages of animal welfare standards, such as concerning the space for the animals, stable requirements or slaughtering conditions. Thus, a binary labelling strategy might not be appropriate to communicate animal welfare standards since there is not just good and bad in the food market but product heterogeneity. According to Lang and Heasman (2004) the controversy on the good and the bad results in "food wars" that are discussed in public and debated in the (mass) media. However, using a differentiated labelling strategy could defuse this discussion by broadening the scope of the conversation about animal welfare.

## 2. Labelling policies

One possible solution to improve labelling strategies could be to give consumers more information. However, more detailed information about a product's process or quality might result in information overload for consumers. The problem of information overload has been stated by market research over a period of time (Kolodinsky, 2012; Kroeber-Riel and Esch, 2004; van Kleef et al., 2008; Verbeke, 2005). Another suggestion might be to provide the continuous variable itself on the food package. Still, both suggestions are based on providing more information on the package and are often overlooked due to the fact that packaging is already overcrowded with information (Orth and Malkewitz, 2008). The arguments against providing more information on packaging are also supported by the idea that consumers have limited cognitive capacity, viz. limited willingness and opportunity to process information on food packages (Verbeke, 2005).

Additionally, a continuous label, like a nutritional value label, might not be easily comprehensible because consumers may not be able to classify an abstract number on a label. This is backed up by research concerning the traffic light (TL) food labelling system. The TL food

labelling system uses green, amber and red circles to indicate the levels of fat, saturated fat, sugar and salt (NHS, n.d.). An extended system, TL+, evaluates additional nutrients, such as protein and fibre. Thus, abstract numbers concerning the nutritional value are transferred into a multi-level labelling system. In this paper we use the term multi-level label to mean a system that transparently shows that there are different production and quality standards of a product.

Feunekes et al. (2008) compare simple labels (such as "Healthier Choice Tick", "Smileys" and "Stars") to more complex labels (such as TL, "Wheel of Health" and "GDA [Guideline Daily Amount] scores") on the front-of-pack labelling formats. The results suggest that there are only minor differences in consumer friendliness and usage intention between the different labelling types. Due to the lack of time in a shopping situation, Feunekes et al. (ibid.) recommend simpler labelling systems. This is supported by a review article of Grunert and Wills (2007), where they find that consumers like the idea of having simplified information on the front of their product package. Further, the findings show that confusion increases with the complexity of information contained in the GDA scores related nutrition labelling, technical terms, numerical calculations and, for some consumers, percentages. Andrews et al. (2011) also compare the impact of a binary nutrition label indicating a healthier choice (Smart Choices Program) to a TL labelling scheme in a consumer study. The participants state that they prefer the simpler binary label. Nevertheless, the findings show that the binary label can lead to positive (and potentially misleading) nutrient evaluations and product healthiness perceptions when compared to a multi-level labelling system (Andrews et al., 2011). These findings are complemented by Kelly et al. (2009) who find that consumers can identify healthier food with the TL system five times better when compared to the GDA system and three times better when compared to a coloured GDA system. Roberto et al. (2011) conduct an analysis that uses nutrient quizzes and find that participants achieve the best overall performance with the TL+ system when compared to no label, TL and GDA labelling systems.

The presented research regarding the TL system indicates that multi-level labelling could show promise in ethical contexts as well. However, in the context of nutrition labelling the focus is the evaluation of nutrients, whereas ethical labels indicate underlying process standards. Additionally, concerning ethical labelling, different prices of the products are crucial, whereas different nutrients do not necessarily evoke different prices.

Due to the presented shortcomings of possible labelling strategies (binary labelling, detailed information and continuous labels) we suggest that a multi-level label could be a more appropriate labelling system as it communicates differences in the production process respectively product quality. It could also provide detailed information in a simplified manner. Nevertheless, as a multi-level label is more complex than a binary label, it is not clear what the impact on consumers would be.

Well-known multi-level labels are rarely used in the food market, but there are already well-established multi-level labelling systems in the non-food sector, for example the hotel classification system and the energy class labelling system. Both rating systems are used all over the world. So far, there is little research regarding multi-level labelling in the food market, with the exception of the TL labelling. Fisher and Lyon (2012; 2013) suggest using a multi-level label to communicate different ecological attributes in a product. However, before introducing a multi-level label in the food sector, it is necessary to find out if a multi-level label can shift market shares in favour of labelled products. After providing a theoretical background, we will present a consumer study of 1538 participants carried out in Germany in October 2014. Market shares for a binary label and a multi-level label are calculated. Additionally, we calculated if a multi-level animal welfare label might improve animal welfare and if there is a revenue for the supply chain. The article concludes with a discussion and final remarks. This research makes a unique contribution to improve labelling in the food sector and to gain new insight into consumer behaviour regarding food choice. Therefore, the results are not only interesting for decision makers in consumer policy but also for companies.

## 3. Theoretical background: information asymmetry and extremeness aversion

In general, labels serve as reducing information asymmetry (Akerlof, 1970; Antle, 2001; Darby and Karni, 1973; Nelson, 1970). Usually, producers have more information about their products than consumers have. Process attributes (e.g. animal welfare or organic) are credence attributes, which consumers cannot verify when purchasing the final good (Darby and Karni, 1973). Therefore, labels can help consumers who may be looking for special process or product attributes, which are of confidential nature, by transforming credence goods into search goods (Caswell and Mojduszka, 1996; Caswell and Padberg, 1992, Jahn et al., 2005). However, if there are different standards being sold under the same label, it is not possible for consumers to recognize the differences between the diverse production and product standards. Therefore, in the long run, better qualities might disappear from the market, which could lead

to a market failure (Akerlof, 1970). This justifies the need for well-performing labelling systems so that consumers can make well-informed choices. Additionally, there is a greater variety of quality in the food market.

A multi-level label might be an appropriate solution to overcome ill-informed decisions made by consumers when they are in front of supermarket shelves, as a multi-level label delivers more differentiated information in a simplified manner. Therefore, a multi-level label might even be able to prevent market failure when quality differences are more obvious. However, it has not been tested in consumer research how a multi-level label shifts market shares. The question is thus, if a multi-level label can achieve higher market shares for labelled products that imply high quality attributes when compared to an analogous binary label. To answer this question we use a fake animal welfare label in a consumer study to compare a binary and a multi-level label. There are no well-known animal welfare labels in Germany; therefore, bias effects in the study sample are prevented. Additionally, animal welfare is particularly suitable as it is not only a discrete variable, as distinguished in the introduction, but recently is also an intensely discussed topic in Germany (e.g. Busch et al., 2012).

The following sections derive three hypotheses from the literature and also operationalize the theoretical constructs.

***Extremeness aversion***

Simonson and Tversky (1992) conducted a marketing experiment with microwaves. One group was offered a microwave (1) for $ 109.99 and a microwave (2) priced $ 179.99. The second group had an additional choice of a high-end microwave (3) priced at $ 199.99. In the first group 57 % chose microwave (1) and 43 % chose microwave (2). Thus, product (2) seemed less attractive. The results for the second group showed that the share of product (1) drops to 27 %, that the share of microwave (2) increases by 60 % and that the high-end product (3) gains a share of 13 %. The reason for this is a concept introduced by psychologists called extremeness aversion. It shows that often two products alone do not offer enough variety (Varian, 1997). Transferred to the binary label example, it means that some consumers would miss a compromise choice between the high-end and low-end products if the offer only consisted of a product with or without a label. Therefore, consumers might be more likely to choose the product without a label, thus the lower standard (cf. Varian, 1997). However, if there were more than two products, due to the existence of a multi-level label, more consumers would buy a more expensive labelled product. These considerations are backed up by

Smith and Nagle (1995) who showed that while adding a premium product might not lead to increased sales for that product, it would lead to higher sales of products in the mid-price segment. Additionally, Tversky and Simonson (1993) revealed that the relative attractiveness of two products depends on the presence or absence of a third product.

Consequently, the first hypothesis that will be tested is:

> **Hypothesis 1: Introducing additional labels with higher standards, by means of a multi-level label, will result in a shift of the market share that is advantageous for the labelled product.**

Unlike the experiment conducted by Simonson and Tversky (1992), we made the decision to use a five-level label. However, introducing another high-end animal welfare product, to extend the selection to three products, might exacerbate the polarization of the ideologization of agricultural production. According to Lang and Heasman (2004) there are two extremes: "productivity" and "ecology," which results in polarizing debates such as "food wars." In fact, agriculture is much more differentiated than these two contrary constructs. Thus, a multi-level system that indicates more than two levels would result in three standards (conventional, high welfare product, premium product). While the three standards do not capture all of the different standards in livestock farming, separating the standards in this way may help to defuse the good and evil discussion in agriculture and reflect a more differentiated picture of livestock farming. Consequently, we decided to use a five-level multi-level label.

To identify the market share of the animal welfare label, the share of the consumers' choice between high welfare meat[1] and conventional meat will be calculated for two groups. One half of the consumer group will see a binary label, hence a choice between two products and the other half will see a multi-level label, thus a choice between six products. Additionally, it is important to know how the buyers and non-buyers of high welfare meat can be characterized and how they are distributed between the two groups. Asking participants to respond to different statements that express their attitudes on quality aspects, food labelling and purchasing behaviour will operationalise this.

If the results show that more consumers buy high welfare meat in the multi-level group compared to the binary group, then it still is not clear whether animal welfare livestock conditions

[1] By high welfare meat we mean meat that is produced to higher standards than the legal requirements.

would improve. This can be calculated with the help of animal welfare scores. The higher the standards of a label are, the more animal welfare scores will be allocated. Consequently, the second hypothesis is:

**Hypothesis 2: Introducing a more differentiated labelling system will lead to higher animal welfare in general.**

If more consumers chose more expensive products it would also enhance the revenue, which can be calculated with the provided prices. Therefore, the third hypothesis is tested:

**Hypothesis 3: Introducing more higher priced products will enhance the total revenue.**

## 4. Material and methods

The data collection took place in Germany in October 2014 via an online access panel. The sample size was 1538. To obtain representative results for the German population, quotas were set for age, gender, education and income. As we used a split sampling to differentiate between a binary and a multi-level label, respondents from the first group (n = 769) saw a binary animal welfare label. Respondents from the second group saw a multi-level animal welfare label (n = 769). The participants were randomly allocated into a group. The quotas were also set within the sub-samples. We provided the information that the label is controlled by the Federal Republic of Germany due to the fact that a label controlled by the state gains more trust and credibility (Sønderkov and Daugberg, 2011).

First, the consumers were given information and shown the binary or the multi-level label. Figure 1 and 2 show the labels and the information that were presented to the participants. The three-star animal welfare label and the binary animal welfare label have the same standards in order to simplify comparisons afterwards. The consumers received two examples of the standards of the animal welfare label: space and transport time requirements (the minimum standards are those legally required by the Federal Republic of Germany). These two standards were chosen as examples because transportation time has an influence on animal welfare (Vecerek, 2006) and is an important and straightforward aspect for consumers (Pouta et al., 2010). Also, stocking density is central for animal welfare from a scientific perspective (Bokkers et al., 2011; Talebi et al., 2014; Turnbull et al., 2005) and also considered essential by consumers (de Jonge and von Trijp, 2013; Vanhonacker et al. 2009).

**Figure 1:** Information and label for sub-sample 1


It is about animal welfare in livestock farming. The label is controlled and granted by the Federal Republic of Germany. The requirements go beyond the legal minimum standards of livestock farming. Here are two examples:

In the traditional, conventional pig fattening there are **0.75 sqm of space** availabel per pig by law. The transport time to the slaughterhouse may take **8 hours**.

A fattening pig standing in a stall that is certified with the label has are **1.50 sqm of space** available. The transportation duration to the slaughterhouse may not take more than **4 hours.**

**Figure 2**: Information and label for sub-sample 2


It is about animal welfare in livestock farming. The label is controlled and granted by the Federal Republic of Germany. The requirements go beyond the legal minimum standards of livestock farming. Here are two examples:

5 stars: **2.00 sqm** space and maximum **2 hours** transport time to slaughterhouse
4 stars: **1.75 sqm** space and maximum **3 hours** transport time to slaughterhouse
3 stars: **1.50 sqm** space and maximum **4 hours** transport time to slaughterhouse
2 stars: **1.25 sqm** space and maximum **5 hours** transport time to slaughterhouse
1 star: **1.00 sqm** space and maximum **6 hours** transport time to slaughterhouse
without label: **0.75 sqm** Platz and maximum **8 hours** transport time to slaughterhouse

After providing the information, the consumers had to make a choice on what meat they wanted to purchase. They could either buy conventionally produced meat without a label or they could choose high welfare meat with the label (Figures 3 and 4). The prices used in the survey were based on 2014 prices given by the Agricultural Market Information Society (AMI) in Germany (AMI 2014a, 2014b) in order to use realistic prices. This results in no-market standard threshold. A pre-screener was set to only ask respondents that buy meat, both regularly and occasionally.

**Figure 3**: Product choice (sub-sample 1)

**Figure 4**: Product choice (sub-sample 2)


In order to reduce the hypothetical willingness to pay bias, a cheap talk script was provided to all respondents as follows:

> Before stating your willingness to pay, we would like to provide an important hint. Several surveys showed that respondents often overestimate their willingness to pay. That means, they state high prices, but when being able to buy the product in the supermarket, they are no more willing to pay that price. Therefore, we ask you to imagine a shopping situation as realistically as possible and to state the price you would really pay if there are cheaper products that might influence your opinion. Please consider accurately how you would act if you bought the product and brought it home.

The following questions regarding quality aspects, labelling and purchasing behaviour were the same for both sub-samples. In the last part of the questionnaire the participants were asked to answer questions concerning the established multi-level labelling systems of the hotel classification and the energy class labelling.

Respondents scored their answers on a five-point Likert scale. All statements had been presented randomly so that sequence effects were prevented. The data was analysed using the statistical software IBM® SPSS, version 21, applying uni-, bi- and multivariate analysis methods.

## 5. Results and discussion

Due to the set quotas, the survey approximately represents the German population. Average age is 44 years, 49.2 % are male and 50.8 % are female. Regional distribution and education levels correspond with the German population. Of the respondents, 30.1 % have a net household income of less than € 1,500 per month and 69.9 % have more than € 1,500. Only the education levels were not perfectly representative, as the higher education level is overrepresented. However, this is quite common for online surveys as Granello and Wheaton (2004) show. Table 1 shows the percentage share for both sub-samples separately and its given distribution for the German population.

**Table 1.** Sample characterization

| Variable | Description | Frequency (%) sub-sample 1 | Frequency (%) sub-sample 2 | Frequency (%) Germany |
|---|---|---|---|---|
| Age | 16 to 29 | 22.1 | 20.7 | 22.3 |
| | 30 to 39 | 21.1 | 17.3 | 17.3 |
| | 40 to 49 | 23.1 | 20.7 | 21.1 |
| | 50 to 59 | 23.1 | 23.7 | 22.8 |
| | 60 to 69 | 16.6 | 17.7 | 16.6 |
| Gender | Male | 49.5 | 49.0 | 48.8 |
| | Female | 50.5 | 51.0 | 51.2 |
| Region | North | 15.7 | 16.5 | 16.1 |
| | South | 26.8 | 37.1 | 28.7 |
| | East | 21.4 | 25.2 | 21.0 |
| | West | 35.7 | 21.2 | 34.2 |
| Education level | No qualification | 1.2 | 0.5 | 4.8 |
| | Primary school | 21.1 | 19.0 | 30.7 |
| | Secondary school | 36.9 | 37.6 | 32.3 |
| | Technical college qualification | 9.8 | 9.9 | 7.7 |
| | A-level | 31.1 | 33.0 | 24.5 |
| Net household income | Less than 500 | 3.4 | 2.9 | 2.1 |
| | 500-899 | 8.1 | 7.7 | 10.4 |
| | 900-1,499 | 19.2 | 19.1 | 21.8 |
| | 1,500-1,999 | 19.0 | 19.7 | 16.4 |
| | 2,000-2,599 | 17.9 | 19.0 | 15.6 |
| | 2,600-3,199 | 12.6 | 13.4 | 10.9 |
| | More than 3,200 | 19.8 | 18.2 | 22.8 |

Source: Preliminary results on basis of the census 2011, census data in the version of 10/04/2004 (Federal Statistical Office, 2014)

### *Results for hypotheses 1 and 2*

As explained, the participants were asked to choose one of the products as shown in Figure 1 and 2 after providing the mentioned cheap talk script. The results show (Table 4) that in the

binary sub-sample, 30.4 % of the consumers chose the product with the animal welfare label. Having the choice between six different products in the second sub-sample, there were less no-label buyers: 23.4 % chose the conventionally produced meat. As the results show, the three-, four- and five-star label buyers together make up 29.5 % of the sample. Compared to the binary label group this share is nearly identical. Consequently, non-label buyers might partly tend to purchase one or two-star labelled products if additional choices exist.

As it can be seen in Table 4, there are more consumers choosing the five-star labelled product than the four-star label product. This could be explained by the fact that the five-star labelled product is considered to be a luxury product. As Brunsø et al. (2004) show, there is a consumer segment in Germany that wants to purchase the best quality that is available in the food market.

The preceding results confirm the first hypothesis:

> **Hypothesis 1: Introducing additional labels with higher standards, by means of a multi-level label, will result in a shift of the market share that is advantageous for the labelled products.**

As more choices were introduced using the multi-level label, more consumers selected a one- or two-star labelled product. Having the choice between a labelled product and a non-labelled product, nearly 69.6 % of the consumers decided on a non-labelled product. Having six options, only 23.7 % opted for a non-labelled product. These results are in line with the theory of extremeness aversion shown by Simonson and Tversky (1992). Simonson and Tversky show that offering a wider range of products causes consumers to be less likely to choose the product at the lowest price.

To calculate if there is an improvement of animal welfare, which is illustrated by a shift in the market share to animal welfare products, we assume that if 1 % of the respondents chooses the one-star labelled high welfare meat it equates to an improvement of 1 point in the animal welfare score (AWS). As shown above, the binary label has the same standards as the three-star label. Consequently, the share of choosing the binary label has to be multiplied by three. Hence, a share of 30.4 % results in 91.2 AWS. Thus, altogether the binary label system causes an improvement of animal welfare of 91.2 AWS, whereas the multi-level label system causes an improvement of 177.8 AWS. Therefore, the difference is 86.6 AWS, which means that a

multi-level label system would improve animal welfare conditions in general. Consequently, the second hypothesis:

**Hypothesis 2: Introducing a more differentiated labelling system will lead to higher animal welfare in general.**

Can be confirmed. Table 4 gives an overview for hypotheses one and two.

**Table 4.** Animal welfare contribution – improving animal welfare

| **Binary animal welfare label** | | **Multi-level animal welfare label** | |
|---|---|---|---|
| No label | 69.6 % → 0 AWS | No label | 23.7 % → 0 AWS |
| | | One-star label | 25.0 % → 25.0 AWS |
| | | Two-star label | 21.8 % → 43.6 AWS |
| Animal welfare label | 30.4 % → 91.2 AWS | Three-star label | 16.5 % → 49.5 AWS |
| | | Four-star label | 5.3 % → 21.2 AWS |
| | | Five-star label | 7.7 % → 38.5 AWS |
| Improvement of 91.2 AWS | | Improvement of 177.8 AWS | |
| **delta = 86.6 AWS** | | | |

N = 1538, n = 769 per split

***Characteristics of labelled product buyers and no-labelled product buyers***

Additionally, participants were asked to respond to several statements in order to identify relevant characteristics of the buyers and the non-buyers of a labelled product. In a first step, a factor analysis was carried out in order to reduce complexity. According to Kaiser (1974) the result is "meritorious" with a Kaiser-Meyer-Olkin value of 0.859 and an explained total variance of 70.06 %. Bartlett's test of sphericity is highly significant, which validates that the variables are highly correlated (Backhaus et al., 2006). The complete results can be found in the appendix (Table A.1).

Subsequently, cross tabulations were used to identify significant differences between the buyers and non-buyers of the labelled products and the factors. The factors were split into dummy variables, 1 signalling a negative value and 2 signalling a positive value, respectively for each group. Two of the five resulting factors showed significant differences between the buyers and the non-buyers: the factor "Pro labelling" (Cronbach's alpha = 0.885) and the factor "Quality affinity" (Cronbach's alpha: 0.857). These factors entered the cluster analyses as a focal point. Cluster analyses were carried out in the same way for both groups. Both analyses result in two clusters (complete results in Tables A.2 and A.3 in the appendix): Cluster 1, the

"Quality cautious label lovers", had high factor mean values for the factors "Pro labelling" and "Quality affinity" (group 1: μ = 0.21 and μ = 0.73, group 2: μ = 0.44 and μ = 0.57). Cluster 2, the "Label negating quality deniers", had negative factor mean values for both factors (group 1: μ = -0.23 and μ = -0.80, group 2: μ = -0.53 and μ = -0.66).

Afterwards, cross tabulations were used to show the distribution of the product choice for each group crossed with the clusters (see appendix, Tables A.4 and A.5). The results suggest that a multi-level label can also address the consumer group that attaches importance to quality and does not pay attention to labels (cluster 2). While 76.5 % of the "Label negating quality deniers" decided on the product without the label in group 1, the share of the consumers choosing the product without the label is only 35.7 % in the multi-level group.

***Results for hypothesis 3***

The last section analyses the economic success calculated in the total revenue. To calculate the marginal added value, the price of the high welfare product is subtracted from the price of the conventional product (€ 7.09). The difference is multiplied with the number of consumers who chose high welfare meat. For example, the price for the high welfare meat with the binary label is € 14.18 minus € 7.09 makes a difference of € 7.09. There are 234 consumers who chose the binary labelled high welfare meat. Therefore, € 7.09 times 234 makes a product of € 1659.06 in total, which is the revenue for the binary label. For the multi-level label, the sum of all products for each level of the label is the revenue. The result is a total revenue of € 3233.02. In the last step, the difference between the binary and the multi-level label is calculated. As Table 5 shows, this difference is € 1573.96 and is therefore the positive revenue across the supply chain. Thus, hypothesis three:

**Hypothesis 3: Introducing more higher priced products will enhance the total revenue.**

Is proven. The total revenue is higher for the multi-level labelling system compared to the binary labelling system.

**Table 5.** Economic contribution – increasing added value

| **Binary animal welfare label** | | **Multi-level animal welfare label** | |
|---|---|---|---|
| No label | € 0 | No label | € 0 |
| | | One-star label | € 2.36 x 192 = € 453.12 |
| | | Two-star label | € 4.73 x 168 = € 794.64 |

| | | | |
|---|---|---|---|
| Animal welfare label | € 7.09 x 234 = € 1659.06 | Three-star label | € 7.09 x 127 = € 900.43 |
| | | Four-star label | € 9.45 x 41 = € 387.45 |
| | | Five-star label | € 11.82 x 59 = € 697.38 |
| Added value of € 1659.06 | | Added value of € 3233.02 | |
| **delta = € 1573.96** | | | |

N = 1538, n = 769 per split

Due to a lack of data, it is not possible to calculate what part of the supply chain received what marginal added value. In future research, it might be important to calculate the distribution of the revenue along the supply chain. Nonetheless, in our research the revenue is clearly positive, which means that we not only find a positive animal welfare contribution but also a positive revenue for the supply chain.

However, it has to be taken into consideration that with the multi-level labelling system there are also several additional costs apart from the contribution margin. First, the costs in agricultural production increase as, for example, more space is required. Second, costs rise due to complex standard setting and due to the challenging certification process. Third, transportation costs increase when farmers who have livestock to be transported are further away from each other than the maximum transportation duration allows. Hence, the transporter is not used to full capacity. Fourth, there are higher slaughter and processing costs due to economies of scale when the batches are small. Fifth, there are higher costs for retailers during the implementation time, as some meat might be sold for the same price as the conventional meat when expiration date approaches. Sixth, space costs in retail have to be considered. While space requirements doubles when introducing a binary label, space requirements are three times higher for a five level multi-level label. Hence, opportunity costs rise as other products have to be delisted. Additionally, refrigerated display case is more expensive than non-refrigerated shelf space. These aspects affect the contributions to the margins and have to be considered carefully when setting standards and prices. In this context, the optimum market segmentation should also be discussed. We showed that the financial benefit rises with the introduction of a multi-level label. Nevertheless, to determine the optimal market segmentation, the gains have to be calculated. Due to the lack of data, the optimal market segmentation cannot be estimated. Future research should try to include these data.

## 6. Conclusion

Labelling is an important information tool for consumers as people are increasingly becoming interested in product or production qualities (Caswell and Joseph, 2008). However, current labelling strategies result in information overload (Kolodinsky, 2012; Kroeber-Riel and Esch, 2004; van Kleef et al., 2008; Verbeke, 2005) as there is too much information on product packages (Orth and Malkewitz, 2008). A binary label should be a cue to reduce information overload by highlighting certain production or product standards. Yet, binary labels also reduce continuous variables to binary variables, such as animal welfare, which is not appropriate from a scientific point of view. A multi-level labelling system might provide more information in differentiated manner and thus is more complex than a binary labelling system. Therefore, the impact on consumers was not clear. Before introducing a multi-level labelling system, it is important for policymakers to know if a multi-level label can achieve higher market shares for labelled products that imply higher quality attributes, when compared to binary label alternatives.

The results for the multi-level labelling system are convincing. While consumers have the choice between a product with an animal welfare label and a conventional product (binary labelling system), 69.9 % opt for the labelled product, this share is 23.7 % when consumers have the choice between five different labelled products and a conventional product (five-level labelling system).

Furthermore, it was tested how a multi-level labelling system could improve animal welfare in Germany. It was shown that a multi-level label might be able to nearly double the improvement of animal welfare when compared to a binary label. A multi-level label could therefore be an appropriate tool to improve other ethical aspects, such as sustainability. Further research should also test the concept of a multi-level labelling system for other continuous labelling aspects such as sustainability.

Additionally, the survey showed that the revenue is nearly doubled by a multi-level label, compared to a binary one. Yet, there is a need for more research on the distribution of the total revenue across the supply chain. Besides the potential that the revenue delivers, it has also to be taken into consideration that additional costs will arise, including costs associated with higher animal welfare standards in agriculture, more complex certification scheme or because there are smaller orders to be processed in the slaughterhouse. Due to a lack of data, no statements can be made concerning the contribution margin.

Furthermore, there are other aspects that have to be taken into consideration before introducing a multi-level label. Only an appropriate marketing strategy will allow diffusion in the food market to ensure that a multi-level label becomes more than a niche label. A closer look at the established hotel star classification and the energy class labelling systems might provide insight into how launching a multi-level labelling system in the food market could be successful.

This article is a first attempt to get insights into whether a multi-level labelling system is an advantageous food labelling strategy. The results clearly demonstrate that multi-level labelling systems show promise. This fact is important for policymakers in consumer policy because a multi-level label might be an appropriate tool to promote product differentiation. As research shows, a consumer segment exists which wants high welfare products (Harper und Makatouni 2002, Kehlbacher et al. 2012, Lagerkvist und Hess 2011, Schulze et al. 2008). Thus, a multi-level label could help to spread high welfare meat in retail. This labelling strategy might also help prevent market failure as product differences become obvious to consumers, which should result in differentiated WTPs. Hence, the results are also relevant to companies in the food sector because a multi-level label can help producers display product advantages in an enhanced way.

Of course, there are challenges associated with setting standards, allocating the labels and monitoring compliance. It might be difficult for the food industry to establish a multi-level label as interests are not consistent. Consequently, it might be more advantageous to allocate the label by the state. Additionally, labels controlled by the state gain more trust and credibility (Sønderkov and Daugberg, 2011). However, a multi-stakeholder approach might raise compliance and acceptance. This can also lead to higher usage and market penetration of a multi-level label.

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## Literature


Akerlof, G.A., 1970. The Market for "Lemons": Qualitative Uncertainty and the Market Mechanism. Quarterly Journal of Economics. 84 (3), 488-500.

AMI, 2014a. Markt Bilanz Vieh und Fleisch 2014. Bonn.

AMI, 2014b. Öko-Landbau 2014. Bonn.

Andersen, A.M., 2006. Consumer evaluation of environmental and animal welfare labelling. Working Paper, Denmark.

Andrews, J.C., Burton, S., Kees, J., 2011. Is Simpler Always Better? Consumer Evaluations of Front-of-Package Nutrition Symbols. Journal of Public Policy and Marketing. 30 (2), 175-190.

Antle, J.M., 2001. Economic analysis of food safety, in: B. Gardner, G. Rausser (Eds.), Handbook of agricultural economics, 1B Amsterdam, pp. 1084-1136.

Backhaus, K., B. Erichson, W. Plinke, Weiber, R., 2006. Multivariate Analysemethoden: Eine anwendungsorientierte Einführung. 11th Edition. Springer, Berlin.

Bokkers, E.A.M., de Boer, I.J.M., Koene, P. 2011. Space needs of broilers. Animal Welfare. 20 (4), 623–632.

Brunsø, K., Scholderer, J., Grunert, K.G., 2004. Testing relationships between values and food-related lifestyle: results from two European countries. Appetite. 43 (2), 195-205.

Busch, G., Kayser, M., Spiller, A., 2012. Massentierhaltung aus Vebrauchersicht – Assoziationen und Einstellungen. Ökodienstleistungen und Landwirtschaft: Herausforderungen und Konsequenzen für Foschung und Praxis, pp. 123-124. Wien: 22. Jahrestagung der Österreichischen

Caswell, J.A., Joseph, S. (2008). Consumer Demand for Quality: Major Determinant for Agricultural and Food Trade in the Future? Journal of International Agricultural Trade and Development. 4 (1), 99-116.

Caswell, J.A., Mojduszka, E.M., 1996. Using informational labeling to influence the market for quality and in food products. 78 (5), 1248-1253.

Caswell, J.A., Padberg, D.I., 1992. Toward a more comprehensive theory of food labels. American Journal of Agricultural Economics. 74 (2), 460-468.

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

De Jonge, J., van Trijp, H.C.M., 2013. The impact of broiler production system practices on consumer perceptions of animal welfare. Poultry Science 92 (12), 3080-3095.

European Commission, 2006. Labelling: competitiveness, consumer information and better regulation for the EU. http://ec.europa.eu/food/food/labellingnutrition/betterregulation/competitiveness_consumer_info.pdf (last accessed on 14.11.2014).

Federal Statistical Office, 2014. Bevölkerungsstand nach dem Zensus 2011. URL: https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/Bevoelkerungsstand/AktuellZensus.html (last accessed on 14.11.2014).

Feunekes, G.I.J., Gortemaker, I.A., Willems, A.A., Lion, R., van den Kommer, M., 2008. Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. Appetite. 50 (1), 57-70.

Fischer, C., Lyon, T.P., Arbor, A., 2012. Competing Environmental Labels. Washington and Ann Arbor.

Fischer, C., Lyon, T.P., Arbor, A., 2013. A Theory of Multi-Tier Ecolabels. 134th EAAE Seminar on "Labels on sustainability: an issue for consumers, producers, policy makers, and NGOs" | European Association of Agricultural Economists (EAAE) | Paris, France | March 22, 2013.

Granello, D. H., Wheaton, J. E., 2004. Online data collection: strategies for research. Journal of Counseling & Development. 82 (4), 387–393.

Grunert, K. G., Wills, J. M., 2007. A review of European research on consumer response to nutrition information on food labels. Journal of Public Health. 15 (5), 385-399.

Harper, G., Makatouni, A., 2002. Consumer perception of organic food production and farm animal welfare. British Food Journal. 104 (3), 287-299.

Harper, L., Souta, P., Ince, J., Mckenzie, J., 2007. Food labelling consumer research: what consumers want. A literature review. Food Standards Agency.

Jahn, G., Schramm, M., Spiller, A., 2005. The reliability of certification. Journal of Consumer Policy. 28 (1), 53-73.

Kaiser, H. F. 1974. An index of simplicity. Psychometrika. 39 (1): 31-36.

Kehlbacher, A., Bennett, R., Balcombe, K., 2012. Measuring the consumer benefits of improving farm animal welfare to inform welfare labelling. Food Policy. 37 (6), 627-633.

Kelly, B. Hughes, C., Chapman, K., Louie, J.C.-Y., Dixon, H., Crawford, J., King, L., Daube, M., Slevin, T., 2009. Consumer testing of the acceptability and effectiveness of front-of-pack food labelling systems for the Australian grocery market. Health Promotion International. 24 (2), 120-129.

Kolodinsky, J., 2012. Persistence of Health Labeling Information Asymmetry in the United States: Historical Perspectives and Twenty-First Century Realities. Journal of Macromarketing. 32 (2), 193–207.

Kroeber-Riel, W., Esch, F.-R., 2004. Strategie und Technik der Werbung: Verhaltenswissenschaftliche Ansätze, Kohlhammer GmbH, Stuttgart.

Lagerkvist, C.J., Hess, S., 2011. A meta-analysis of consumer willingness to pay for farm animal welfare. European Review of Agricultural Economics. 38 (1), 55-78.

Lang, T., Heasman, M., 2004. Food wars. The global battle for mouths, minds and markets. Earthscan Publications, London.

Malhotra, N.K., 1982. Information load and consumer decision making. Journal of Consumer Research. 8 (4), 419-430.

Nelson, P., 1970. Information and consumer behaviour. Journal of Political Economy. 78 (2), 311-329.

NHS, n.d. Food labels. URL: http://www.nhs.uk/Livewell/Goodfood/Pages/food-labelling.aspx (last accessed on 23.01.2015).

Orth, U.R., Malkewitz, K., 2008. Holistic Package and Consumer Brand Impressions. Journal of Marketing. 36 (5), 706–712.

Pouta, E., Heikkila, J., Forsman-Hugg, S., Isoniemi, M., Makela, J., 2010. Consumer choice of broiler meat: The effects of country of origin and production methods. Food Quality and Preference. 21 (5), 539–546.

Roberto, C.A., Bragg, M.A., Schwartz, M.B., Seamans, M.J., Musicus, A.,Novak, N., Brownell, K.D., 2011. Facts Up Front Versus Traffic Light Food Labels A Randomized Controlled Trial. American Journal of Preventive Medicine. 43 (2), 134-141.

Schulze, B., Spiller, A., Lemke, D., 2008. Glücksschwein oder arme Sau? Die Einstellung der Verbaucher zur modernen Nutztierhaltung, in Spiller, A., Schulze, B. (Eds.). Zukunftsperspektiven der Fleischwirtschaft - Verbraucher, Märkte Geschäftsbeziehungen, Göttingen, Universitätsverlag Göttingen, pp. 465–489.

Simonsons, I., Tversky, A., 1992. Choice in context: Tradeoff contrast and extremeness aversion. Journal of Marketing Research. 29 (3), 281-295.

Smith, G.E., Nagle, T. T., 1995. Frames of reference and buyers' perception of price and value. California Management Review. 38 (1), 98-116.

Sønderkov, K.M., Daugbjerg, C., 2011. The state and consumer confidence in eco-labeling: organic labeling in Denmark, Sweden, The United Kingdom and The United States. Agriculture and Human Value. 28 (4), 507-517.

Talebi, A., von Keyserlingk, M.A.G., Telezhenko, E., Weary, D.M., 2014. Reduced stocking density mitigates the negative effects of regrouping in dairy cattle. Journal of Dairy Science. 97 (3), 1358-1363.

Turnbull, J.F., Bell, A., Adams, C.E., Bron, J., Huntingford, F., 2005. Stocking density and welfare of cage farmed Atlantic salmon: application of a multivariate analysis. Aquaculture. 243 (1-4), 121-132.

Tvesky, A., Simonson, I., 1993. Context-depended differences. Management Science. 39 (10), 1179-1189.

Van Kleef, E., van Trijp, H., Paeps, F., Fernández-Celemín, L., 2008. Consumer preferences for front-of-pack calories labelling. Public Health Nutrition. 11 (2), 203–13.

Vanhonacker, F., Verbeke, W., Van Poucke, E., Buijs, S., Tuyttens, F.A.M., 2009. Societal concern related to stocking density, pen size and group size in farm animal production. Livestock Science. 123 (1), 16–22.

Varian, H.R., 1997. Versioning information goods. University of California, Berkeley.

Vecerek, V., S. Grbalova, E. Voslarova, B. Janackova, Malena, M., 2006. Effects of travel distance and the season of the year on death rates of broilers transported to poultry processing plants. Poultry Science. 85 (11),1881–1884.

## Appendices

**Table A.1.** Results of the factor analysis

| Factors and the corresponding variables | Mean | Std.dev. | Factor loading |
|---|---|---|---|
| Time pressure (Cronbach's alpha: 0.887) | | | |
| I find myself pressed for time when I go grocery shopping. | -0.51 | 0.947 | 0.888 |
| I am in a hurry when I do my grocery shopping. | -0.43 | 0.951 | 0.886 |
| I have only a limited amount of time to finish my grocery shopping. | -0.22 | 1.076 | 0.842 |
| I quickly finish my grocery shopping because I have other things to do. | -0.09 | 0.997 | 0.829 |
| Pro labelling (Cronbach's alpha: 0.885) | | | |
| Labels help me to find the best quality of food. | 0.24 | 0.886 | 0.844 |
| I have a great degree of trust in food labels. | -0.13 | 0.882 | 0.839 |
| I rather trust food with labels than alternative products without labels. | 0.09 | 0.940 | 0.810 |
| Labels are a good thing. | 0.43 | 0.824 | 0.803 |
| Information on food packaging is an important purchase guide because I trust it. | 0.17 | 0.882 | 0.734 |
| Quality affinity (Cronbach's alpha: 0.857) | | | |
| In general, I try to purchase the very best quality. | 0.49 | 0.868 | 0.837 |
| I always try to choose the best quality products. | 0.49 | 0.839 | 0.836 |
| It is very important for me to get a good quality product. | 0.97 | 0.721 | 0.800 |
| When it comes to purchasing products, I try to make the best choice. | 0.65 | 0.811 | 0.786 |
| High knowledge of food labels (Cronbach's alpha: 0.778) | | | |
| I know what the different labels imply. | -0.36 | 0.801 | 0.845 |
| I know a lot about labels on food. | -0.57 | 0.833 | 0.817 |
| Contra labelling (Cronbach's alpha: 0.766) | | | |
| Information on food confuses me. | 0.03 | 0.876 | 0.813 |
| All the labels on food makes me insecure. | 0.13 | 0.935 | 0.793 |
| Information on the product package of food is often incomprehensible. | 0.51 | 0.846 | 0.767 |
| Among many labels it is not possible to realize the meaning. | 0.71 | 0.803 | 0.642 |
| KMO (Kaiser-Meyer-Olkin) = 0.859; explained total variance = 70.06 % | | | |

Scale from -3 "Strongly agree" to +3 "Strongly disagree"
n = 1538

**Table A.2.** Results of the cluster analysis for split 1

| | **Cluster 1** | **Cluster 2** |
|---|---|---|
| Cluster size absolute and in % | 348 (50.2 %)<br>Factor mean value (standard deviation) | 345 (49.8 %)<br>Factor mean value (standard deviation) |
| Factor 1: Pro labelling | 0.21<br>(0.895) | -0.23<br>(0.683) |
| Factor 2: Quality affinity | 0.73<br>(1.071) | -0.80<br>(0.640) |

**Table A.3.** Results of the cluster analysis for split 2

| | **Cluster 1** | **Cluster 2** |
|---|---|---|
| Cluster size absolute and in % | 403 (56.2 %)<br>Factor mean value (standard deviation) | 314 (43.8 %)<br>Factor mean value (standard deviation) |
| Factor 1: Pro labelling | 0.44<br>(0.777) | -0.53<br>(0.937) |
| Factor 2: Quality affinity | 0.57<br>(0.715) | -0.66<br>(0.797) |

**Table A.4.** Cross tabulation of split 1

| | | **Cluster 1**<br>**Quality cautious label lovers** | **Cluster 2**<br>**Label negating quality deniers** | **Total** |
|---|---|---|---|---|
| **No label** | %<br>n | 63.5<br>(221) | 76.5<br>(264) | 70.0<br>(485) |
| **Product with label** | %<br>n | 36.5<br>(127) | 23.5<br>(81) | 30.0<br>(208) |
| **Total** | %<br>n | 100.0<br>(348) | 100.0<br>(345) | 100.0<br>(693) |

N = 693; Pearson's Chi-squared: 13.973; p = 0.000

**Table A.5.** Cross tabulation of split 2

| | | **Cluster 1 Quality cautious label lovers** | **Cluster 2 Label negating quality deniers** | **Total** |
|---|---|---|---|---|
| **No label** | % | 13.6 | 35.7 | 23.3 |
| | n | (55) | (112) | (167) |
| **Product with 1 star** | % | 24.1 | 27.1 | 25.4 |
| | n | (97) | (85) | (2182) |
| **Product with 2 stars** | % | 24.8 | 16.6 | 21.2 |
| | n | (100) | (52) | (152) |
| **Product with 3 stars** | % | 20.8 | 11.5 | 16.7 |
| | n | (84) | (36) | (120) |
| **Product with 4 stars** | % | 6.7 | 3.8 | 5.4 |
| | n | (27) | (12) | (39) |
| **Product with 5 stars** | % | 9.9 | 5.4 | 7.9 |
| | n | (40) | (17) | (57) |
| **Total** | % | 100.0 | 100.0 | 100.0 |
| | n | (314) | (403) | (717) |

N = 717; Pearson's Chi-squared: 59.524; p = 0.000

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