
The Pet Food Industry: An Innovative Distribution Channel for Animal Welfare Meat?

Wiebke Pirsich and Ludwig Theuvsen

Dept. of Agricultural Economics and Rural Development, Georg-August-University of Goettingen, Germany;
wiebke.pirsich@agr.uni-goettingen.de; theuvsen@uni-goettingen.de

ABSTRACT

This paper investigates the notion of launching an innovative pet food segment labelled “made from animal welfare meat” to achieve an added value for by-products that accrue in the production of animal welfare meat. Since the pet food market is characterized by a large premium segment and pet owners are generally believed to be interested in the welfare of animals, the idea seems promising at first sight, but there is a lack of reliable evidence. Therefore, the main objective of this investigation was to determine, based on existing data from previous studies, the particular interest of pet owners in the welfare of farm animals before further cost-intensive studies are developed and conducted. The results of a comparison of pet owners’ and non-pet owners’ attitudes to the issue of animal welfare in livestock farming revealed highly significant differences. Pet owners not only have a more critical attitude towards intensive livestock farming but are also very interested in animal welfare meat and show a significantly higher willingness-to-pay for animal-friendly meat products. On the basis of these findings, specific studies analysing the market potential and the feasibility of pet food made of animal welfare meat are highly recommended.

Keywords: *animal welfare meat, companion animals, pet food, pet owners, by-products*

1 Introduction

The image of the German meat industry has been suffering for some time from negative media coverage of intensive livestock farming. As a result, a significant loss of acceptance of the current husbandry conditions of farm animals can be found among German consumers as can calls for a strengthening of animal welfare standards (Cembalo et al., 2016; de Jonge et al., 2015; European Commission, 2007; Lagerkvist and Hess, 2010; Nocella et al., 2010; Schulze et al., 2008; Verbeke and Viane, 1999). The meat industry has responded to these developments and demands by expanding the meat market to include a segment for so-called animal welfare meat, that is, meat and meat products that originate from animals kept in production systems fulfilling higher animal welfare standards than required by law and labelled based on the guidelines of animal welfare certification programs. Thus, animal welfare meat fills a market gap between conventional meat products, which suffer from growing public criticism and loss of acceptance, and high-price organic products, which have not so far been able to capture a significant share of the meat market (Main et al., 2014; van Loo et al., 2014).

Various research studies have shown considerable market potential for products of more animal-friendly livestock farming (de Jonge et al., 2015; Nocella et al., 2010; Pouta et al., 2010; Schulze et al., 2008). In Germany, the target group for animal welfare products is estimated to be about 20 % of consumers (Schulze et al., 2008). The price premium these consumers are willing to pay varies widely (de Jonge et al., 2015; Grunert et al., 2009; Nocella et al., 2010; Pouta et al., 2010). However, looking at the reality of the meat market is disillusioning: With few exceptions, animal welfare labels have not yet attained any great importance in the German meat market despite repeated reports of their market potential and growing public concerns regarding animal welfare standards in intensive livestock production systems (Grunert, 2006; Weinrich et al., 2015). Explanations for their limited success in the market are diverse. Among other factors, it has been noted that the cost effects of

improved animal welfare standards lead to a significant price difference in comparison with standard products (McEachern and Schröder, 2002; Nocella et al., 2010; Padel and Foster, 2009). This effect is reinforced by the issue of joint production: Each slaughtered animal delivers a wide spectrum of very diverse meat and by-products, which all have to be marketed for different purposes, such as sales to final consumers, meat processing, and pet food production. So far, it is mainly premium cuts that can be sold at higher prices, so they have to bear the entire additional costs of higher animal welfare standards whereas all other cuts and by-products have to be sold at “normal” market prices without a premium for higher animal welfare standards. Consequently, the price difference between premium cuts and the standard range becomes much greater than it would be if a price premium could be applied for all cuts and by-products (Deimel et al., 2010). For this reason, it is crucial to find suitable distribution channels for the remaining cuts and by-products. Only in this way can the additional price premium for animal welfare meat be kept as low as possible and the opportunity for higher market shares increase for products from animal welfare programs.

Searching for innovative distribution channels for animal welfare meat begs the question whether using slaughter by-products in the pet food industry would offer a feasible option. One mandatory requirement for the successful distribution of pet food made from animal welfare meat or by-products is the existence of a corresponding target group among pet owners, who show considerable willingness-to-buy and willingness-to-pay for higher animal welfare standards. Since the pet food market is characterized by a wide spectrum of high-price premium products (Boya et al., 2014; Euromonitor, 2016; Tesfom and Birch, 2010) and pet owners can be assumed to be very interested in animal welfare, there seems to be considerable market potential that has so far remained untapped.

With these considerations in mind, this investigation examines whether it would be possible to achieve an added value in the pet food industry for by-products that accrue in the production of animal welfare meat. The underlying idea is to launch a new pet food segment labelled “made from animal welfare meat”. The first prerequisite for the feasibility of this idea is evidence that animal welfare holds significance for pet owners. Therefore, the main objective of this investigation is to assess the interest of pet owners in the welfare of farm animals based on existing data from previous studies before further cost-intensive studies are developed and conducted.

2 The human–companion animal bond

The role of companion animals at humans’ side has changed considerably over time. In the past, dogs, for instance, were mainly kept for hunting, herding and protection, whereas cats were used primarily for pest control (Walsh, 2009). Even today, dogs are still used as working dogs, for example, in the medical service as guide dogs, as police dogs, as herding and guard dogs in agriculture and as hunting dogs in forestry (Knoth, 2008). However, besides these different possible professional uses, nowadays cats and dogs as well as other pets are mainly kept for companionship (Boya et al., 2012; Spencer et al., 2006). Thus, in developed countries, companion animals often play an integral part in humans’ lives. An important motive for animal companionship is the human need for attention and affection (Spencer, et al.; 2006). Companion animals are able to understand human emotions, and, conversely, pet owners can interpret the various reactions of their animals. This results in bilateral communication, resulting in a strong human–companion animal bond (Sollund, 2011). Human–animal companionship literature often refers to an increasing humanization or anthropomorphism of companion animals by their owners, which often leads to greater equality in the perception and treatment of companion animals and humans in the Western world (Boya et al., 2012). Nast (2006) emphasizes that, for many humans, companion animals serve as substitutes for a child or partner, and Archer (1997) points out that the relationship between owners and their pets is comparable to the relationship between parents and their children. Being with an animal leads to positive emotions in many humans, relieves their loneliness and gives them a sense of security (Archer, 1997). The strong bond between humans and their companion animals arises through the release of oxytocin when cuddling and petting animals. This is the same hormone that strengthens the maternal bond between a mother and her child when it is released during nursing (Sollund, 2011). Therefore, over time, companion animals have become equal family members for many pet owners. Archer (1997), for example, found that 48% of dog owners participating in his study considered their dogs real family members. He also found that pet owners overwhelm their animals with affection and will pay almost any amount to make sure their pets do not lack for anything.

Due to this strong human–companion animal bond, the question arises whether pet owners transfer their strong positive feelings towards companion animals to farm animals at least to some extent. It can be easily imagined that, if pet owners have high requirements regarding the welfare of their pets, they will similarly have

higher requirements than non-pet owners regarding agricultural livestock farming. Scientific evidence of this consideration, reflected in a significant difference in the attitudes of pet owners and non-pet owners towards animal welfare in livestock farming, would justify the development and implementation of further studies specifically investigating the potential and feasibility of pet food made from animal welfare meat.

In general, it has been shown that citizens of Western European countries in particular are increasingly critical of the production processes used in intensive livestock farming (Verbecke and Viaene, 1999; European Commission 2007). This was confirmed in 2007 in a large-scale study of the attitudes of EU citizens towards animal welfare, which revealed that a large number of EU citizens attach great importance to the protection and improvement of the welfare of farmed animals. According to this study, 78% of German citizens agreed with the statement that the welfare conditions of farm animals need to be improved (European Commission, 2007). Since that time, as a consequence of changing citizen attitudes, the issue of animal welfare has gained more and more attention in scientific research. The increasingly anthropomorphic perception of animals and the growing alienation of the public from agricultural production processes through increasing urbanization have been cited as the main reasons for changing attitudes towards agricultural livestock farming (Deimel et al., 2010; Edwards, 2004; Schröder and McEachen, 2004). However, while livestock farming is already a hot topic among the general public, some studies point out that pet owners are especially critical of this issue (Boogaard et al., 2006; Hagelin et al., 2002; von Alvensleben, 2002). These studies indicate that significant differences exist between the attitudes of pet owners and non-pet owners regarding the wellbeing of farm animals. According to Boogaard et al. (2006), pet ownership is an important contributor to the perception of animal welfare in livestock farming. In addition, von Alvensleben (2002) assumes that pet owners have a special interest in the welfare of farm animals due to their anthropomorphic bonds to animals. Furthermore, Hagelin et al. (2002) found that pet owners find it less acceptable than non-pet owners to use animals in biomedical research.

Considering these findings, it can be assumed that pet owners have a special interest in improved housing conditions in livestock farming and are therefore particularly open to products from animal-friendly production, including pet food made of animal welfare meat. The following section provides a detailed overview of the current situation and specific characteristics of the German pet food market.

3 The German pet food market

According to the German industry association Zentralverband Zoologischer Fachbetriebe (ZZF), in 2015 at least one companion animal lived in 43% of all German households. That amounts to approximately 30 million companion animals owned in Germany, of which 12.9 million are cats and 7.9 million dogs (ZZF, 2016). This large number of companion animals indicates the economic importance of pet ownership. In recent years, the market for pet food has continuously grown with regard to volume and value (ZZF, 2016; Euromonitor, 2016). The pet food industry has been able to withstand the unstable global economy easily due to passionate pet owners who are willing to spend considerable amounts even in economically insecure times (Deng and Swanson, 2015). However, Euromonitor (2016) has predicted that the market will soon mature and become saturated. Nevertheless, German pet owners spent the remarkable amount of €4.5 billion on pet supplies in 2015. By far the largest share of this amount was accounted for by convenience pet food (€3.16 billion), whereby €1.61 billion were spent for cat food and €1.32 billion for dog food. Approximately one third of all pet food sales can be attributed to specialist retailers (e.g., pet shops). Examining the sales of the three different categories of pet food—wet, dry and treats—reveals clear differences between dog and cat food (Euromonitor, 2016; ZZF, 2016).

The highly fragmented pet food market in Germany is dominated by the international brand manufacturers Mars and Nestlé (Nielsen as cited in Statista, 2017). Furthermore, there are numerous small- and medium-sized players acting in this very competitive market. In particular, smaller private manufacturers offering specialist niche and premium products are increasingly strengthened by changing consumer demands (Euromonitor, 2016).

Since cats and dogs are carnivores, they have essential requirements for high quality protein and amino acids, which are mainly found in meat. While a meatless diet is possible for dogs under certain conditions, cats are dependent on meat-based nutrition. Thus, requirements for the production and ingredients of cat food and dog food differ somewhat; nonetheless, meat is a basic component of both (Aldrich, 2006; Meeker and Meisinger, 2015).

With regard to the pet food production sector, the availability of reliable data is very limited (Aldrich, 2006). Therefore, it is difficult to provide exact information on the types and volumes of raw ingredients used in pet food production. Although there are mandatory labelling requirements for ingredients (EC no. 767/2009), these requirements allow only limited conclusions, since it is sufficient to indicate only the category to which the raw material belongs (e.g., meat and animal by-products, vegetables, grains, fats and oils etc.). In any case, the ingredients on the label are listed in decreasing order of their weight proportion, with the heaviest ingredient first (EU, 2009). However, it is generally known that a large proportion of the animal by-products accruing in the meat industry are used for pet food production since they are cheap but very valuable due to their high protein content (Meeker and Meisinger, 2015; Schlesinger and Joffe, 2011). In Europe, the use of animal by-products is regulated by regulation (EC) no. 1774/2002, which divides such products into three categories. According to these specifications, only category 3 material is permitted for the use in the feed industry. These are primarily parts of slaughtered animals, which are in principle suitable for human consumption but are not in demand by consumers and, therefore, need to be rendered. These include organs, bones, udders, hides and skins, hooves and horns and so forth (EU, 2002). Furthermore, processed by-products such as protein meals (e.g., meat and bone meal, meat meal, fish meal) as well as animal fats and oils are widely used in the feed industry (Aldrich, 2006). The non-animal ingredients used are primarily grains, potatoes and other vegetables.

3 Consumer research on pet food shopping

Consumer research on companion animals and pet food purchasing decisions is rather young. Accordingly, only a few studies have addressed questions related to consumer behaviour and pet ownership (Aylesworth et al., 1999; Tesfom and Birch, 2010). However, frequent studies on human–companion animal relationship indicate the great importance of the significant changes in the interaction between owners and their pets for the pet food industry. Thus, the current trend of humanization and the associated opportunities for product marketing are attracting the attention of marketing specialists and scientists (Aylesworth et al., 1999; Bontempo, 2005; Boya et al., 2012). According to Dotson and Hyatt (2008), American dog owners have never had such an intensive relationship with their animals as today. Thus, it is of utmost importance for pet owners to ensure their animals have a long and healthy life. Feeding pets a wholesome nutritional diet is an essential contribution to health and, therefore, a major concern for responsible pet owners. This fact is seen as the major reason for the growing demand for specialized and premium pet foods (Bontempo, 2005). Furthermore, Schaffer (2009) and Deng and Swanson (2015) observed that major trends in human nutrition are often also applied in the pet food market. Because of this anthropomorphism of the pet-food buying process (Boya et al., 2014), product choice for cat and dog food seem to have become nearly limitless (Aldrich, 2006; Bontempo, 2005). According to Aldrich (2006), various factors influence consumer product choice in the pet food market, including, cost, feed format (wet, dry or treats), nutritional requirements (balanced provision of nutrients, obesity), performance situations (lactation), palatability problems (pets' preferences) and even the pet owner's personal preferences (Aldrich, 2006). In fact, some pet owners who abstain from meat for ethical and/or health reasons also feed their pets a vegetarian or vegan diet (Rothgerber, 2013). However, feeding a meatless diet to carnivores has to be questioned critically from the ethical as well as from the nutritional perspective. Rothgerber (2013) describes this problem as the “vegetarian's dilemma” of vegetarian pet owners.

De Godoy et al. (2016) pointed out that product claims such as “organic”, “natural”, “grain-free”, “GMO-free”, “human-grade”, “holistic”, “wholesome ingredients” and “raw and dehydrated” particularly attract pet owners' attention, which reflects the wide array of specialized or premium pet foods. In the United States, approximately 10% of all pet food sales can be assigned to the category “super premium”, which indicates an average price premium of 20%. The category “mass premium” achieves market shares of 30% with products priced 10% to 20% above average pet food (PFI, 2014 as cited in Deng and Swanson, 2015). According to Carter et al. (2014), the enormous growth of the natural pet food segment can be traced back to some pet owners' refusal to feed their pets by-products; they believe that meat and wholegrains have a higher nutritional value for their pets. In contrast Contreras (2009) states that there is evidence that some dogs are more sensitive to grain-based sources of carbohydrates than others, therefore, some dog owners prefer to feed products labelled “grain-free”. Boya et al. (2014) concluded that the wide product range in the dog food segment is a clear indication of different target groups among dog owners. In an investigation on the pet food–related purchasing behaviour of dog owners, they found that consumer segmentation based on sociodemographics does not work for dog owners (Boya et al., 2012). Instead, in a follow-up study they showed that the relationship between pet owners and their dogs significantly influences their purchasing behaviour in terms of pet food shopping. The authors' segmentation approach resulted in three groups of dog owners showing differently strong relationships with their dogs. Their findings confirmed previous research by Tesfom and Birch (2010), who showed that dog owners in general put more emphasis on healthy nutrition for their dogs than on their own nutrition. Fur-

thermore, dog owners are more brand loyal in terms of pet food than they are in their human food choices (Boya et al., 2014). The pronounced loyalty of dog owners to certain dog food brands had also been noted by Clark et al. (2011). While Tesfom and Birch (2010) also found that dog owners in general are less price sensitive when it comes to pet food choices compared to their own food, Boya et al. (2014) could not unconditionally confirm these findings. Their results indicated that only the group of dog owners who were most attached to their dogs could be characterized as less price conscious when making dog food choices vs. human food choices. Therefore, the major conclusion of their study is that dog owners with a remarkably strong relationship with their dogs represent an extremely interesting target group for the pet food industry. Accordingly, an approach targeted to this consumer group could offer significant growth potential in the premium pet food segment (Boya et al., 2014).

4 Research Objective

The previous market failure of animal welfare meat products is partly attributed to the high additional costs compared to conventional food products. So far, the higher production costs of animal welfare meat can only be borne by the premium cuts, since no additional value can be generated for the remaining parts and by-products of slaughtered animals. If it were possible to market all parts at a higher price, the current price difference between conventional and animal welfare meat could be reduced, thus providing better market opportunities for the latter. One possible solution to this problem is to use by-products from animals from more animal-friendly production systems in the pet food industry. Therefore, the question arises whether there is a sales potential for “pet food made from animal welfare meat” in the premium pet food market. So far, no studies have investigated the attitudes of pet owners towards conventional livestock farming. However, a prerequisite for successfully marketing “pet food made from animal welfare meat” is that pet owners show significant interest in farm animal welfare and are willing to pay more for the added value of animal welfare products. Accordingly, this study examines the following research questions

1. Do pet owners and non-pet owners differ significantly in their general animal welfare understanding?
2. Do pet owners and non-pet owners differ significantly in their attitudes towards animal welfare and livestock farming?
3. Do pet owners and non-pet owners differ significantly in their willingness to pay for animal welfare meat?
4. Do cat owners and dog owners differ significantly in their attitudes towards animal welfare and livestock farming?

5 Methodology

The data underlying this investigation originates from a study that primarily examined consumers' meat shopping behaviour with regard to their attitudes towards animal welfare in intensive livestock farming. Since the respondents also provided details on pet ownership, a detailed comparison of the attitudes of pet owners and non-pet owners is possible. The survey was conducted in June 2015 among 667 consumers living in Germany. To ensure high-quality data, the services of a professional online consumer panel provider were used. In order to obtain a sample almost representative for the German population, quotas were set for sex, age and regional distribution. The survey was divided into various sections. First, respondents' sociodemographics, including detailed information on pet ownership and their responsibility for grocery shopping, were gathered. In the second part, respondents were questioned, among other things, about their meat shopping behaviour and consumption as well as their attitudes towards intensive livestock farming and animal welfare meat. For this purpose, mainly items found in previous research by Schulze and Spiller (2008) and Weinrich et al. (2015) were chosen, which were measured on 5-point Likert and Likert-like scales. Finally, data was analysed with IBM SPSS Statistics for Windows, Version 23.0 by means of uni- and bivariate methods. The respondents were first divided into the groups “pet owners” (the household includes at least one companion animal) and “non-pet owners” (the household includes no companion animals). For further investigation, the groups “dog owners” and “cat owners” were formed, whereby dog owners own at least one dog but no cats; in contrast, cat owners own at least one cat but no dogs. In both groups, however, other companion animals may belong to the respondents' households. Differences between the groups were examined by means of chi-square test or t-test.

6 Results

Since respondents who stated they were not responsible for grocery shopping were screened out, the original number of 667 respondents was reduced. Table 1 shows the main characteristics of the 620 data sets that remained for further analysis.

Table 1. Sample characteristics as compared to data of German Federal Statistical Office, n = 620

Variable	Level	Frequency sample	Frequency Germany ¹	Frequency pet owners ^a	Frequency non-pet owners ^b
Sample size	quantity (in percent)	620 (100%)	-	340 (54.8%)	280 (45.2%)
Gender*	female	50.8%	52.2%	54.4%	46.4%
	male	49.2%	47.8%	45.6%	53.6%
Age***	18–34 years	26.5%	26.6%	28.8%	23.6%
	35–54 years	38.6%	39.1%	42.6%	33.6%
	55 years and older	35.0%	34.3%	28.5%	42.9%
Regional distribution ^{n.s.}	North	16.6%	16.2%	17.4%	15.7%
	South	28.7%	28.6%	26.8%	31.1%
	East	19.8%	20.5%	33.5%	36.4%
	West	34.8%	35.3%	22.4%	19.8%
Net household income*	low (less than €1,500/month)	25.5%	-	21.5%	30.4%
	medium (€1,500 –€3n500/month)	53.7%	-	54.4%	52.8%
	high (more than €3,500/month)	20.8%	-	24.1%	16.8%
Education level ^{n.s.}	low	13.4%	-	13.8%	12.9%
	medium	58.5%	-	56.2%	61.4%
	high	28.1%	-	30.0%	25.7%
Residential area*	rural	18.5%	-	22.1%	14.3%
	urban	45.5%	-	44.7%	46.4%
	metropolitan	36.0%	-	33.2%	39.3%

Source: Authors' calculations; ¹German Federal Statistical Office, 2014, a = pet owners (at least one companion animal in household); b = non-owners (no companion animal in household); *** = χ^2 -test significance level: $p \leq 0.001$, * = χ^2 -test significance level: $p \leq 0.05$; ^{n.s.} = χ^2 -test significance level: $p > 0.05$

A subdivision of the sample into pet owners and non-pet owners shows that more than half the respondents (54.4%) indicated that their household includes at least one companion animal. The two groups differ significantly in terms of gender, age, net household income and residential area. More women stated that they own pets, whereas respondents in the age group 55 years and older own pets less frequently. Furthermore, respondents with a net household income of less than €1,500 per month are less likely to keep a pet, while it is more likely that respondents living in rural areas own a companion animal. Regional distribution and educational level do not have a significant influence on pet ownership. A closer look at pet ownership and companion animal categories reveals that 58.8% of pet owners stated they own at least one cat, 47.6% own at least one dog, 17.1% keep small rodents, 16.2% fish, 12.1% birds and 3.8% reptiles. It must be taken into account that a pet owner can obviously keep pets from different categories at the same time.

To gain deeper insight into consumers' animal welfare understanding with regard to meat products, they were asked which requirements are mandatory from their point of view to label meat products as "from animal friendly production". Table 2 shows that the evaluation of the importance of the given criteria is almost the same in both groups. Thus, free-range production and improved housing conditions are the most important criteria for both pet owners and non-pet owners, followed by not using antibiotics or genetically modified feed. Local origin is significantly more important for pet owners (32.4%) than for non-pet owners (25.0%); the same applies for the criterion organic production, which was mentioned significantly more often by pet owners (28.8%) than by non-pet owners (21.1%). For both groups, better taste was relatively unimportant.

Table 2. Requirements to label meat products as “from animal friendly production”. The table shows the percentage of respondents who quoted the respective criterion as mandatory.

Variable ¹	Frequency pet-owners ^a	Frequency non-pet owners ^b
Free-range production	81.5%	80.7%
Improved housing conditions	72.1%	72.5%
No use of antibiotics	66.2%	71.4%
No use of genetically modified feed	61.2%	68.6%
Local origin*	32.4%	25.0%
Organic production*	28.8%	21.1%
Better taste	21.8%	20.7%

N = 620; ¹ = “Which requirements are mandatory from your point of view, to label meat products as ‘from animal friendly production?’”; a = pet owners (at least one companion animal in household); b = non-owners (no companion animal in household); * = χ^2 -test significance level: $p \leq 0.01$

The attitudes of the respondents towards animal welfare and livestock farming were measured by several items shown in Table 3. A comparison of the attitudes of pet owners and non-pet owners reveals significant differences for each item, however, sharply contrasting attitudes were not found between the groups. Pet owners (0.22) obviously knew slightly more about livestock farming in Germany than non-pet owners (-0.04). Overall, however, the knowledge in both groups was rather low. In contrast, pet owners (0.81) strongly agreed with the statement that the requirements for animal welfare in livestock farming are not sufficient. The agreement among the non-pet owners was slightly lower (0.61). Similarly, more pet owners (0.49) agreed that many farmers do not take good care of their animals than non-pet owners (0.26). While non-pet owners (-0.06) were somewhat undecided about reducing their meat consumption for animal welfare reasons, pet owners (0.37) showed some willingness to consume less meat. Concerning their need for information, pet owners (1.02) wanted to have more information about livestock farming than did non-pet owners (0.75). While shopping for meat, non-pet owners (-0.01) seemed to worry less about animal welfare than pet owners (-0.18), who did not agree with the item “While shopping, I do not think about animal welfare”. However, both pet owners (-0.01) and non-pet owners (-0.47) only rarely sought out information about the housing conditions of farm animals before purchasing meat products. In contrast, both pet owners (1.33) and non-pet owners (1.06) stated that it is very important for them that their meat products originate from animal friendlier livestock farming. However, the pet owners (1.00) showed a greater willingness to pay price premiums for animal-friendly meat products than the non-pet owners (0.75).

Table 3. Attitudes towards animal welfare in intensive livestock farming. Comparison of pet owners and non-pet owners.

Item	pet owners		non-pet owners	
	mean	std. dev.	mean	std. dev
I know a lot about how farm animals are kept in Germany. ^{1***}	0.22	1.046	-0.04	0.940
The requirements for animal welfare in livestock farming are not sufficient. ^{1*}	0.81	0.975	0.61	0.957
Many farmers do not take good care for their animals. ^{1**}	0.49	0.972	0.26	0.957
I've already thought about reducing my meat consumption for animal welfare reasons. ^{1***}	0.37	1.218	-0.06	1.292
When buying meat, I wish I had more information on the housing conditions of the farm animals. ^{1***}	1.02	0.961	0.75	1.036
While shopping, I do not think about animal welfare. ^{1*}	-0.18	1.145	-0.01	1.053
I find out about the housing conditions of the farm animals before purchasing meat. ^{1***}	-0.01.	1.139	-0.47	0.999
How important is it to you that your meat products originate from animal friendlier livestock farming? ^{2****}	1.33	0.808	1.06	0.921
I am happy to pay more for meat products that originate traceably from animal friendlier livestock farming. ^{1**}	1.00	1.001	0.75	1.045

N = 620; *** = t-test significance level: $p \leq 0.001$, ** = t-test significance level: $p \leq 0.01$, * = t-test significance level: $p \leq 0.05$; ¹ = scale from -2 (I totally disagree) to +2 (I totally agree); ² = scale from -2 (not important at all) to +2 (very important)

Since both groups stated they are willing in principle to pay more for animal welfare meat, it is of special interest to know how high a maximum price premium they would accept. Therefore, the respondents were asked to choose the maximum price premium they would be willing to pay for animal welfare meat. Table 4 shows the relative distribution of their responses over the given price premiums with significant differences between the pet owners and the non-pet owners (χ^2 -test: $p = 0.009$). Pet owners are willing to pay somewhat higher price premiums than non-pet owners. While 56.1% of the non-pet owners were not willing to pay a price premium of more than 10%, only 42.9% of the pet owners would not accept an extra charge of more than 10% for animal

welfare meat. In contrast, 7.4% of the pet owners stated they would even be willing to pay up to 100% more for animal welfare meat, whereas only 2.9% of the non-pet owners would accept this level of extra cost.

Table 4. Maximum price premium for animal welfare meat accepted by the respondents.

Price premium ^{1**}	Frequency	Frequency
	pet-owners	non-pet owners
0%	8.2%	13.6%
up to 10%	34.7%	42.5%
up to 20%	35.9%	31.8%
up to 50%	13.8%	9.3%
up to 100%	5.3%	1.4%
up to 200%	0.3%	0.4%
more than 200%	1.8%	1.1%

N = 620; ¹ = "What is the maximum price premium you are willing to pay for animal welfare meat?"; ** = χ^2 -test significance level: $p < 0.01$

The next point to be examined was whether dog owners differ in their attitudes towards animal welfare and livestock farming compared to cat owners. However, a comparison of the mean values by means of a t-test for the items previously discussed showed no significant differences between the two groups. The mean values for the cat owners and the dog owners were almost identical to the mean values for all pet owners. The exact results of the t-test comparing cat owners and dog owners are shown in Table 5.

Table 5. Attitudes towards animal welfare in intensive livestock farming. Comparison of dog owners and cat owners.

Item	dog owners (n = 102)		cat owners (n = 139)	
	mean	std. dev.	mean	std. dev.
I know a lot about how farm animals are kept in Germany. ^{1, n.s.}	0.18	0.969	0.20	1.093
The requirements for animal welfare in livestock farming are not sufficient. ^{1, n.s.}	0.85	0.948	0.75	0.967
Many farmers do not take good care for their animals. ^{1, n.s.}	0.45	0.971	0.51	0.906
I've already thought about reducing my meat consumption for animal welfare reasons. ^{1, n.s.}	0.30	1.109	0.34	1.260
When buying meat, I wish I had more information on the housing conditions of the farm animals. ^{1, n.s.}	1.00	0.965	0.99	0.929
While shopping, I do not think about animal welfare. ^{1, n.s.}	-0.18	1.066	-0.08	1.155
I find out about the housing conditions of the farm animals before purchasing meat. ^{1, n.s.}	-0.01	1.127	-0.14	1.189
How important is it to you that your meat products originate from more animal friendly livestock farming? ^{2, n.s.}	1.36	0.715	1.31	0.824
I am happy to pay more for meat products that originate traceably from more animal friendly livestock farming. ^{1, n.s.}	0.99	0.933	0.92	1.015

N = 241; n.s = t-test significance level: $p \geq 0.05$; ¹ = scale from -2 (I totally disagree) to +2 (I totally agree); ² = scale from -2 (not important at all) to +2 (very important)

7 Discussion and conclusions

The present study compared the attitudes of pet owners and non-pet owners towards the issue of animal welfare in intensive livestock farming. In the literature on animal welfare, the increasing anthropomorphism of animals in the Western world is often stated as a main reason for the strong criticism of the housing conditions of farm animals (Boogaard et al., 2006; Hagelin et al., 2002; von Alvensleben, 2002). Since pet owners tend to humanize their companion animals, it is suspected they transfer the human-animal bond they experience with their pets to farm animals. This assumption leads to the hypothesis that pet owners have a greater interest in the welfare of farm animals, which was confirmed by the results of this study. Thus, pet owners not only have a significantly more critical attitude towards intensive livestock farming, but are also significantly more interested in animal welfare meat products. Furthermore, they have a significantly higher willingness than non-pet owners to pay for the added value of animal welfare meat products. Thus, pet owners present a particularly interesting target group for products from more animal friendly livestock farming. Furthermore, pet owners meet the basic requirements essential for a successful market launch of pet food made from animal welfare meat. Since no differences were found between the attitudes of cat owners and those of dog owners, it seems that pet food made from animal welfare meat would be equally interesting for both the dog food and the cat food market. Hence, further pursuit of the basic idea with specific studies analysing the market potential as well as the feasibility of pet food made of animal welfare meat is highly recommended. In this regard, numerous questions arise on both the producer and the consumer side. On the producer side, it must first be clarified whether the production of pet food using animal protein exclusively sources from animal welfare meat and by-

products is generally possible. Since detailed information on the production of pet food is rare, various problems may well arise which are not yet obvious. The spent hen issue is a case in point (Aldrich, 2006; Karthik et al., 2010). In principle, it would be conceivable to use spent hens for pet food production. But, due to the low meat content of spent hens, slaughtering and cutting these animals is not feasible from an economic point of view, whereas processing entire spent hens—including feathers—into poultry meal is possible, and the use of poultry meal in pet food is nutritionally suitable (Karthik et al., 2010). However, according to Aldrich (2006), so far all attempts to use large amounts of poultry meal in the pet food industry have failed since pet owners do not accept the use of feathers in pet food production. The same applies to the use of blood meal, which also causes palatability problems in dogs and has lower protein quality (Dust et al., 2005).

As already mentioned, on the consumer side, the prerequisites for a market launch of pet food made from animal welfare meat are initially promising. Pet owners are especially approachable regarding animal welfare issues, and their general willingness to pay for animal welfare products is higher than consumers' average willingness to pay in Germany. According to Boya et al. (2014), there is a segment among dog owners that places particular emphasis on special health and quality aspects of pet food and is not price-sensitive. In addition, dog owners are much more brand-focused in their pet food choices than they are in their human food choices. From the point of view of a labelling initiative, this fact represents a clear advantage for pet food over the human meat market. However, Schlesinger and Joffe (2011) point out that pet owners with high quality requirements often reject pet food containing by-products. This disagrees with the original aim of using by-products from more animal friendly livestock farming for pet food production in order to achieve added value. Furthermore, the question arises to what extent products from the high-end segment compete against one another. Thus, it must be examined whether the special quality attributes of other high quality pet food are considered more important by pet owners than the use of animal welfare meat. In they are, it should be determined whether a combination of different special values (e.g., grain-free and made from animal welfare meat) would be possible and recommendable.

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