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FEEDS OF THE FUTURE:
A CHOICE EXPERIMENT OF CHICKEN BREAST PRODUCED
WITH MICRO-ALGAE OR INSECT MEAL

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Abstract

Increasing global demand for animal-based proteins will require the integration of alternative protein sources as a means to ensure products can be sustainably produced into the future. We elicit German consumer preferences for chicken breast produced using spirulina or insect meal compared to the traditional protein feed source – soybean meal within a discrete choice experimental approach with an information treatment. Spirulina is known for darkening the meat colour when incorporated into poultry diets; insect meal can also slightly alter meat colour. When no information is given about the feed used in production—the source of meat discolouration—consumers were apathetic towards the dark colour produced with spirulina, and consumers preferred chicken breast produced with insect meal. Consumers who received information on the feed type used in production behaved heterogeneously; non-environmentally-conscious consumers were not willing to accept chicken breast produced with insect meal, whereas environmentally-conscious preferred this product. Overall, German consumers are not likely to reject chicken breast produced using alternative protein sources; however, this study points to the importance that credible information and labelling play in consumers' product choice decisions and thus raises questions over the need for the mandatory declaration of novel feedstuffs in meat production.

Keywords

Consumer preference, meat colour, alternative protein sources, protein gap.

1 Introduction

Recent changing global diets including more animal-based proteins necessitate a substantial amount of plant-based protein as an input. Increasing the productivity of current systems will not be enough to ensure the availability of required protein; therefore alternative sources of protein will be needed to keep up for the demand of animal products (RÖÖS ET AL., 2017). This is highly critical for meat from monogastric production systems, such as poultry production, that rely on high quality proteins.

This phenomenon is a global one exacerbating regional challenges. In recent decades, Western Europe, predominantly the Netherlands and Germany, have become highly specialized in pork and poultry production, which require large inputs of high quality proteins, of which the demand for protein feed is being met through imported soybean meal from South America (SCHREUDER and DE VISSER, 2014); known as the European protein gap. This dependence on global markets is a precarious one, and to remain competitive protein feed sources should be developed and produced in Europe for Europeans (IBID). Additionally, as stakeholders in their food production systems, European consumers are becoming increasingly aware and demanding changes to the current animal production systems (BUSCH ET AL., 2018). Particularly German consumers tend to be skeptical of genetically-modified crops (CHRISTOPH ET AL., 2008), and this manifests in an aversion towards soy products; so in turn consumers are starting to prefer products derived from regionally produced feeds (PROFETA and HAMM, 2018).

The objective of this paper is to investigate German consumer preferences for chicken breast products produced with either spirulina or insect meal¹ as protein sources that could be locally produced in Germany.

2 Literature

This study is motivated by a series of studies investigating the effects of incorporating micro-alga, spirulina, or insects, partially-defatted black soldier fly larvae meal, as protein sources into meat-type chicken diets. Numerous animal nutritionists have verified the viability of the two protein sources in meat-type chicken diets (HOLMAN and MALAU-ADULI, 2013; MAKKAR ET AL., 2014; NEUMANN ET AL., 2018, 2017). Subsequently, the resulting product quality has also been evaluated (ALTMANN ET AL., 2018A; PIETERSE ET AL., 2019; TOYOMIZU ET AL., 2001), yet a number of questions remain unanswered regarding consumer reaction and choice preferences for chicken breast produced with new or changed search, experience, and credence production system attributes.

In comparison to a traditional meat-type chicken diet of either fishmeal or soybean meal as the main protein source, using micro-alga spirulina protein results in a meat more red-orange in colour (ALTMANN ET AL., 2018A; TOYOMIZU ET AL., 2001). In comparison, when meat-type chickens are fed an insect meal of black soldier flies (ALTMANN ET AL., 2018A) only a slight increase in the yellow tones in meat emerged, when compared to chicken produced on a wheat- and soybean-based diet, as is typical in Western Europe. In both cases, the altered raw meat colour is observable with a colourimeter.

A change in meat colour away from familiar tones will likely have implications for consumer product choice behaviour in the retail market, given that colour is a dominant search criteria for chicken meat-buyers (KENNEDY ET AL., 2004; KUTTAPPAN ET AL., 2012). On the one hand, a bright red colour could be preferred by consumers, and this is the sole reason for the use of highly oxygenated modified atmosphere packaging of fresh meats (GREBITUS ET AL., 2013). On the other hand, changes in colour could alienate consumers who are used to chicken referred to as the 'white meat' (LUSK ET AL., 2018).

KENNEDY ET AL. (2005) studied consumer preferences for corn- vs. grain-fed chicken products in Northern Ireland and found that unlike in the USA (SUNDE, 1992), consumers in Northern Ireland responded negatively to the corn-fed derived yellow meat colour. We hypothesize that the unfamiliar colour will likely disconcert consumers, who are more familiar with purchasing 'white' chicken breast, therefore leading to a reduced willingness-to-pay or a complete rejection of chicken breast produced with alternate protein feed. However, we suspect that additional information explaining the origin of the altered colour and its impacts on meat quality, will reduce consumer suspicion and rejection and thus lead to an increase in product acceptance and willingness-to-pay for micro-alga and insect-meal based feed alternatives.

Additionally, we hypothesize that the identification of chicken breasts as 'insect-fed' in-itself will elicit a reluctance to choose these products as existing evidence points to the strong effect of disgust and rejection towards entomophagy by western consumers (DEROY ET AL., 2015; HOLM JENSEN and LIEBEROTH, 2019;). This disgust often directly translates into decreased eating quality (SCHOUTETEN ET AL., 2016) and willingness to try (TAN ET AL., 2016). Although in our study the insects are indirectly incorporated into the food production system as poultry feed, we still assume that the disgust factor will play a similar role in influencing consumer behaviour.

However, information on what 'insect-fed' translates into in terms of product quality, such as sensory aspects and production sustainability, may have the effect of over-coming disgust for

¹ Currently, insect meal is only allowed in aquaculture production and pet food (EU Commission Regulation 2017/893), but a decision regarding the use in poultry feed is expected in 2019.

some consumers. Previous studies confirmed that black soldier fly larvae also increases the overall aroma of a cooked chicken breast (ALTMANN ET AL., 2018A, 2018B). Yet, some consumers prefer a strong flavour (BETT ET AL., 2013); whereas others value chicken because of its bland flavour making it versatile in the kitchen (KENNEDY ET AL., 2004). In addition, sustainability claims influence the perception of product quality for highly-knowledgeable consumers, yet has a limited impact for consumers with a limited knowledge of sustainability (SAMANT and SEO, 2016). Therefore, we hypothesize that when consumers are informed about insect feed they will behave more heterogeneously in their choice behaviour based on personal and psychometric characteristics.

To date much of the literature assessing preferences for production system attributes has focussed on the labelling of quality attributes (MEYERDING ET AL., 2018; RISIUS ET AL., 2017; SAMANT and SEO, 2016; VAN LOO ET AL., 2014). However, there is limited knowledge on the role that labels may play in over-riding negative perceptions, such as those on product appearance or disgust. Therefore, we include a sustainability label and health claim in the design of our choice experiments to determine if such “nudges” would override consumers concerns over visual appearance.

Overall, our study adds to the small literature on assessing consumer preferences for animal production process attributes by quantifying the role meat colour plays in consumer’s product evaluation using choice experimental methods. LUSK ET AL. 2018 did investigate US consumers’ preferences for pork colour, based on quality grade labels. They concluded that consumers’ preferences for meat colour are heterogeneous; despite a strong preference for redder pork chops, there exists a niche of consumers who prefer a whiter product. Research that employed information treatments to elicit consumer reactions to new and possible unfamiliar product attributes by RISIUS AND HAMM (2017) found that specific animal production systems information (e.g. ‘extensive suckler cow husbandry’) positively influenced consumer preferences, while also causing an increase in preference heterogeneity. Investigating sustainable fish products, BRONNMAN and ASCHE (2017) and BRONNMANN and HOFFMANN (2018) also established that providing information on product attributes, such as labels, strengthens preferences and results in a higher probability of purchase regarding these attributes. Regarding packaging technology for fresh meat products, GREBITUS ET AL. (2013) found that providing information does not always induce changes in consumer behaviour; although it did make preferences more heterogeneous.

3 Approach

3.1 Theoretical Assumptions and Framework

Discrete choice analysis is grounded in attribute-utility theory (DING ET AL., 2015). Basically, consumers choose products so as to maximize their utility from any bundle of products. Yet, utility is not equal across products, but rather a summation of a product’s intrinsic attributes (LANCASTER, 1966). Utility may be a specific function or a ‘good feeling’, or some other form of gratification, while undesirable attributes are assumed to reduce gratification and thus an individual’s utility. Consequently, the assumption is that consumers only opt for products that encompass an over-riding positive utility, and in a discrete choice scenario will choose the product returning the highest utility, i.e. with numerous and/or highly valued preferable attributes, *ceteris paribus*. In this way, utility maximization of product attributes can be assumed to explain consumer behaviour (MCFADDEN, 1986).

As illustrated by the Total Food Quality Model (GRUNERT ET AL., 1996), consumers perceive meat quality based on search, experience and credence attributes (GRUNERT ET AL., 2004); these attributes in turn influence consumer choice behaviour. Search attributes are those that can be evaluated on-site by a consumer, such as meat colour or marbling. However, experience and

credence attributes cannot be directly evaluated during a purchase choice decision. Experience attributes usually pertain to eating quality and are assessed by the consumer after purchase. Credence attributes cannot be assessed by the consumers, rather consumers rely on third parties to ascertain these attributes, such as a fair-trade or GMO-free label. Although consumers may not be able to directly evaluate experience and credence attributes, the attributes still influence decision-making. For example, experience attributes may influence re-purchasing decisions and labelling has shown to have a clear impact on consumer preferences (VAN LOO ET AL., 2014).

3.2 Survey

In order to verify or dispute our hypotheses, a consumer survey was designed and included: questions on consumer choice and shopping behaviour, as well as attitudes. The Food Technology Neophobia Scale (COX and EVANS, 2008), The New Ecological Paradigm (NEP) Scale (DUNLAP ET AL., 2000) and the Wellness Scale (KRAFT AND GOODELL, 1993) were included to measure neophobia, environmentally- and health-consciousness, respectively. The attitudinal scales are composed of multiple statements, where respondents answer how much he/she agrees with the statement on a 5-point hedonic scale. The Food Technology Neophobia Scale used in this study consisted of 13 statements; the NEP Scale 15 statements; and the Wellness Scale 19 statements. The statements were randomized within each scale set and the scales were presented in a randomized order within the survey. Choice behaviour was elicited using a discrete choice model, including the attributes of feed type, labelling, and price (Table 2); an information treatment split the sample. Approximately half of the sample completed the discrete choice experiment after receiving written information on a specific feed used during chicken breast production (Table 1); the chicken breast packages were also indicated as, e.g., ‘Spirulina-fed’ throughout the choice experiment. The remainder of respondents completed the choice experiment without information or knowledge on which feeds were used during production.

Table 1: Information statements provided to the split sample

Feed Type	Information Treatment
Spirulina	<ul style="list-style-type: none"> ▪ Spirulina-fed poultry produces meat with a high content of omega fatty acids ▪ Spirulina is regarded as a "super food" ▪ The use of spirulina in the feeding of poultry can reduce the area required for agricultural feed production ▪ Spirulina, which contains carotenoids, gives poultry meat a light reddish-orange colour
Insect	<ul style="list-style-type: none"> ▪ Insects are a naturally eaten by poultry ▪ Insect-based feed can increase the sustainability of poultry production ▪ Insect-based feed can increase the flavour of poultry meat
Soy	<ul style="list-style-type: none"> ▪ Soy is the most important protein feed in German poultry production ▪ The cultivation of soybeans has driven the deforestation of rainforests in South America ▪ Soy has a protein composition that is important for the growth of poultry ▪ Feeding high amounts of soy can lead to an accumulation of omega-3 fatty acids in poultry meat

Data was collected in February 2018 as part of a Germany-wide online survey programmed in Unipark (Questback GmbH, Cologne, Germany) and distributed by Survey Sampling International (SSI) to an online panel. Respondents were randomly selected based on gender and age quotas representative of census data (STATISTISCHES BUNDESAMT, 2017) and only household shoppers of chicken breast were included. A total of n=1197 respondents completed the survey. The data were then checked to ensure quality based on trap questions and duration to complete the survey. After quality checks, 1074 responses remained, split as uninformed (n=540) and informed (n=534) respondents. The final sample and split-groups provided a good reproduction of census data, with slight negative deviations in household income. Our sample was also slightly more highly educated with 29% reporting a university degree, compared to 23% of the national population.

3.3 Choice Experiment

To elicit consumer preferences, a choice experiment was created using standardized photos taken by the authors of three different chicken breast packages. The photos were edited to include a sales tag with price per package and kilogram, as is obligatory in Germany. Package and kilogram prices were based on a bi-city (covering two federal states) inventory conducted in the fall of 2017. At least one location per major grocery store chain was visited in each city to ascertain the price range for non-organic chicken breast. In the end, prices of 2.99€, 5.98€ and 8.98€ per package were used in the experiment. In addition, labels signifying sustainability (ProPlanet) and healthiness (rich in omega fatty acids) were included in the design. ProPlanet is a third party label used by the Rewe Group to signify general sustainability (ecological, societal, and economic) aspects. We included ProPlanet because of its broad sustainability claim, as well as it is one of the few sustainability labels currently found on meat products in Germany. Attributes and levels included in the design are listed in Table 2. Subsequently, respondents completed a total of 9 choice sets consisting of two different chicken breast products and a ‘no buy’ option.

Table 2: Attributes and levels applied in the choice experiment

Attributes	Levels
Feed Type	Spirulina (SP) Insect (IN) Soy
Label	ProPlanet (PRO) Rich in omega fatty acids (OMEGA) No label
Price	2.99 € (5.98 €/kg) 5.98 € (11.96 €/kg) 8.98 € (17.96 €/kg)

3.4 Econometric Model

In order to estimate consumer preferences and willingness-to-pay (WTP) for alternatively-fed chicken breast, we employed a random parameter logit model (RPL). This model is derived from random utility theory and stems from MCFADDEN’S (1973) conditional logit model, which assumes homogenous preferences; whereas a RPL model allows for preferences to vary randomly and independently of socio-demographic characteristics, amongst consumers (REVELT AND TRAIN, 1998).

A portion of the utility is deterministic (based on attributes) and the remainder is random. The utility received by individual i from alternative j (in our study a package of chicken breast) given choice scenario t is explained by

$$U_{ijt} = \beta_i X_{ijt} + \varepsilon_{ijt},$$

where ε_{ijt} is the random unknown component that is independent and identically distributed across individuals for j alternatives during t . The deterministic portion comprises X_{ijt} , which is a vector of j ’s observable attributes, and β_i as a vector of unobserved coefficients pertaining to the heterogeneous preferences across the individuals, but not depending on alternatives.

The deterministic portion is assumed to be linear, so that individual i ’s marginal utilities of observable attributes ($h = \text{price, feed type, etc.}$) associated with alternative j can be summed with a positive scale factor σ :

$$U_{ijt} = \sigma \sum_{h=1}^H \beta_{ih} X_{ijth} + \varepsilon_{ijt}.$$

where β_{ih} is the marginal utility received by individual i from attribute h . However, we are interested in the population dynamics; therefore we estimate the population parameter weights

$$\beta_{ih} = \bar{\beta}_h + i_h z_{ih},$$

where $\bar{\beta}_h$ is the mean of marginal utilities derived from the sampled population, i_h is the deviation of preferences among individuals and z_{ih} represents the random draws prescribed from a pre-specified distribution for individual i and attribute h .

We assume that an individual is always maximizing utility; therefore the probability of individual i choosing alternative j during choice scenario t is

$$P_{ijt} = P(U_{ijt} > U_{ikt} \quad \forall k \neq j).$$

We estimated our models with 250 Halton draws. We coded feed type and label attributes as dummy variables, as well as the no buy option. Reference levels for feed type and label attributes were ‘soy’, because it is currently the industry standard and ‘no label’ in order to determine marginal utility and its respective WTP. Price was input as a continuous variable with a fixed effect. All other variables were modelled as random components.

We collected data on consumer attitudes using attitudinal scales. NEP values contributed the most in explaining consumer motives, compared to the other two attitudinal scales used, and therefore we interacted an individual’s NEP value with alternative attributes; the resulting interaction variable contributed to explaining choice preferences. Therefore, we included an interaction effect in our model. This is a common approach to account for observable consumer preference heterogeneity (Ding et al., 2015). Both uninformed and informed consumer data were analysed with the same model in order to ensure comparability. Our model can be represented as

$$U_i = \beta_i price + \beta_i SP + \beta_i IN + \beta_i PRO + \beta_i OMEGA + \beta_i SP * NEP + \beta_i IN * NEP \\ + \beta_i PRO * NEP + \beta_i OMEGA * NEP + \beta_i NOBUY$$

where SP signifies a choice containing spirulina feed type; IN signifies a choice fed with insect feed; PRO pertains to the ProPlanet label; OMEGA corresponds to the rich on omega fatty acids label; and the parallel terms with NEP are continuous variables relating to a positive choice of attribute h by individual i and his/her associated NEP value.

Finally, we estimated WTP in preference space for the feed type and labels according to HENSCHER ET AL. (2005):

$$WTP = \frac{\beta_{attribute}}{\beta_{price}}$$

4 Empirical Results

Results for the RPL models for both uninformed and informed consumer samples are presented in Table 3. As is expected, the price coefficients in both models are negative and highly significant. In addition, the NOBUY alternative remains highly negative and significant, signalling that respondents in our study preferred to participate and choose a chicken breast product compared to opting out altogether. However, in both models the coefficient standard deviation is large and significant indicating that, on average, the consumers have heterogeneous preferences; i.e. they have differing reasons as to why they decide to participate or not.

The uninformed consumers show a significant degree of preference heterogeneity when it comes to deciding about the darkly pigmented chicken breast produced with spirulina feed. This is illustrated by the large coefficient standard deviation that is highly significant. Perhaps because of this the mean coefficient for spirulina, although negative, remains insignificant. Chicken breast produced with insect feed is preferred by the uninformed respondents. This goes to show that the insect feed, partially-defatted black soldier fly meal, used in the production of the chicken breasts does have a perceptible effect on the appearance, compared to the traditional soybean feed, and the yellow meat colour is preferred. The labels did not over-ride the appearance derived from feed type; both the OMEGA and PRO coefficients remained insignificant; uninformed consumers exhibit significantly heterogeneous preferences regarding

the omega fatty acid label (OMEGA). Simultaneously, the PRO*NEP interaction coefficient is positive and significant. This is logical given that environmentally-conscious consumers would be drawn to choose a label corresponding with a sustainability claim. However, also here the coefficient standard deviation is significant. This is likely the result of asymmetrical information, because ProPlanet is a retailer-specific certification label found on numerous products, including meat, but only in specific German retailers.

Table 3: Estimates of coefficient means and standard deviations (SD) for respondents in uninformed and informed treatments

Variable	Coefficient Estimates			
	Uninformed		Informed	
	Mean	SD	Mean	SD
Price	-0.3637***	NA	-0.3591***	NA
<i>Random</i>				
SP	-0.4393	1.9086***	-1.3226	1.2195***
IN	0.8611*	0.0128	-3.7137***	-2.4898***
PRO	-0.7092	-0.0146	0.1106	-0.2687*
OMEGA	-0.2606	-0.3931*	1.0510*	0.6433***
SP*NEP	0.0168	-0.0692	0.4231*	0.5501***
IN*NEP	-0.1333	-0.0118	1.2219***	-0.1139
PRO*NEP	0.4322***	0.2437***	0.05939	0.0342
OMEGA*NEP	0.1092	-0.0763	-0.2746*	-0.0012
NOBUY	-2.7229***	2.4683***	-2.1734***	-2.6893***
Log likelihood	-4034.99		-3915.43	
LR Chi ² statistic	1371.95		1863.22	

*** signifies $p < 0.01$; ** signifies $p < 0.05$; * signifies $p < 0.1$

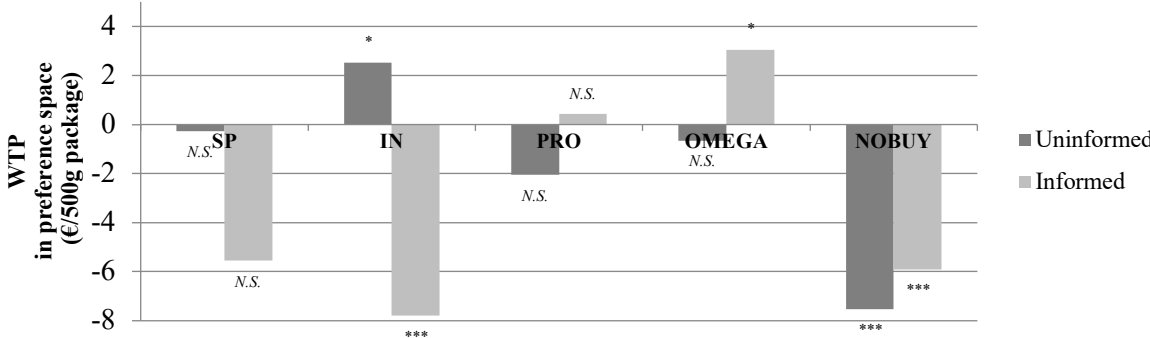
Our key finding is that consumers exhibit very heterogeneous preferences when it came to the feed types; however the preference heterogeneity is reduced with the corresponding NEP interaction terms. As documented by GREBITUS ET AL. (2013) and RISIUS and HAMM (2017), providing information increases preference heterogeneity amongst consumers. After receiving information on the alternative feeds used in production, our informed sample had a large(er) and statistically significant standard deviation for nearly every coefficient, compared to the uninformed sample. But the heterogeneity can be contracted within consumer groups; i.e. as a group, environmentally-conscious consumers react more similarly towards the alternative. This can be observed through the shrinking absolute values of the coefficient standard deviation between the alternative feed variables and the associated interaction variables. The coefficient standard deviation becomes insignificant for IN*NEP, compared to IN, illustrating that environmental-consciousness can explain much of the consumer preference and its heterogeneity; whereas environmental-consciousness only accounts for a portion of consumer preference heterogeneity, in the case for SP*NEP. Likely, consumers just do not know how to respond to the intensively altered appearance, i.e. dark colour; therefore it influences decisions in a less uniform manner. Our observations add to the findings of PROFETA AND HAMM (2019), who also reported decreased standard deviations when interacting organic and local scale latent variables with the attribute ‘regional feed’ in order to describe consumer preferences for animal products produced with ‘regional feed’. Overall, for both alternative feed types it can be derived that preference heterogeneity is due to differing attitudes and motives amongst consumers.

This is further shown by the highly negative coefficients for SP and IN in the informed model; although only the IN coefficient is statistically significant. This shows that information is not enough to influence consumer preferences, and that identification with information has a negative impact on the preferences of consumers who are not environmentally motivated.

However, both coefficients become positive and significant when interacted with NEP. This goes to show that environmentally-conscious consumers have a higher degree of preference towards the alternatively-fed chicken breasts.

Surprisingly, the PRO*NEP coefficient is insignificant in the informed sample. This could be due to consumers adjusting their sustainability decision-making criteria from relying on a label to the indicated feed type. The OMEGA*NEP coefficient is slightly negative and significant.

Figure 1: Willingness-to-pay (WTP) in preference space for alternative attributes on average when accounting for environmentally-consciousness



When environmentally-conscious consumers are accounted for, the WTP in preference space for chicken breast produced with insect meal becomes very negative, on average (Figure 1). In other words, the average (not environmentally motivated) consumer will reject this product if they are informed of the feed type. Additionally, providing information on the origin of the intensive coloured chicken breast produced with spirulina did not result in an improved WTP on average; rather WTP remained insignificant compared to the standard product. In both the uninformed and the informed models, there is no clear preference for the chicken breast produced with spirulina. Nonetheless, we feel it is important to point out that in both models the coefficients are negative; therefore, further research with non-hypothetical scenarios, where consumers can see the real product up close (not a photo on a screen) should be conducted, in order to ascertain the true effect meat colour has on consumer preferences for chicken breast fed with spirulina. Throughout all models, preferences for labels remained weak, suggesting that search attributes may be preferred to credence attributes. We observed a preference for the OMEGA label in the informed sample; however not in the uninformed sample. By itself, PRO remained insignificant throughout for the average consumer.

5 Conclusions and Implications

In general, uninformed and informed consumers are indifferent towards the dark meat colour resulting from spirulina feed. Yet, informed environmentally-conscious consumers prefer this type of chicken breast, so we must assume it is based on environmental grounds stemming from the informational statements, either enhancing the spirulina feed attribute or discounting the soy feed attribute. Nonetheless, this signals the likelihood of a niche market. There are likely opportunities for poultry producers to institute bio-marking or product quality schemes, where consumers are not solely reliant on credence attributes, such as a label (ProPlanet), but can rely on the meat colour for choosing an environmentally-conscious product. Our results suggest that consumers may prefer search attributes to credence labels. However, informing consumers regarding the link between spirulina and the meat colour is a necessary precursor. This could be one step in strengthening consumer trust in normative product attributes, without off-putting consumer quality expectations.

Insect meal, on the other hand, presents a more complex case. Were insect meal to replace soybean meal in poultry diets within Germany, likely consumers would not notice. In fact, our

results show that the consumers would prefer these products based on appearance, alone. Leaving the question whether or why poultry packers and retailers should consider identifying the feed type used in production on a chicken breast produced with insect meal.

Consumers are becoming more interested and stronger voiced, as stakeholders in food production systems. Therefore, if producers and retailers are not transparent and it was to 'come out' later that insect meal was used in poultry production; it could be met with backlash from a portion of consumers. Although our informed model shows that environmentally-conscious individuals prefer the chicken breast produced with insect meal, there remains a sub-set of the population that is environmentally-apatetic and are not willing to accept the chicken breast produced with insect meal unless at largely discounted prices. This reaction could likely stem out of disgust at the thought of an insect within their food production system. We consider it likely that this proportion of consumers is small and could be won over, eventually, by product tastings and exposure (DEROY ET AL., 2015).

Based on the effect of information and the niching of environmentally-conscious consumers versus apathetic consumers, there is an argument for the declaration of feed. Similar to the diversification of production system in egg production, the labelling of feed in meat-type chicken production can assist consumers in choosing products that best fit their ideals. At the very least consumers have the option to inform themselves of feed type used in production, if they so wish. The added level of transparency may, additionally, help to fill in some of the missing information consumers have regarding their food production; information they should be entitled to as stakeholders.

Overall, our models show that without information on feed type, spirulina and insect meal used in the production of chicken breast would likely be accepted by German consumers. Nonetheless, the provision of information and feed type identification should be executed despite resulting in heterogeneous preferences, because it allows consumers the possibility to make decisions based on their psychometric characteristics. In turn, allowing for environmentally-conscious consumers to choose preferred chicken breasts, while retailers could benefit from niche marketing and associated pricing.

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