The Role of Trust in the Appreciation of Sustainability Attributes in the Choice of Pork and Broiler Meat

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BACKGROUND

Meat production and consumption have come under scrutiny in the context of the green transition of the food sector

Today meat production systems are challenged by the consumers demands for farm animal welfare and sustainability

Meat products are therefore increasingly marketed with production systems characteristics

Production characteristics are credence attributes that presuppose that consumer find the information credible – which should be related to consumer trust in actors in the food chain

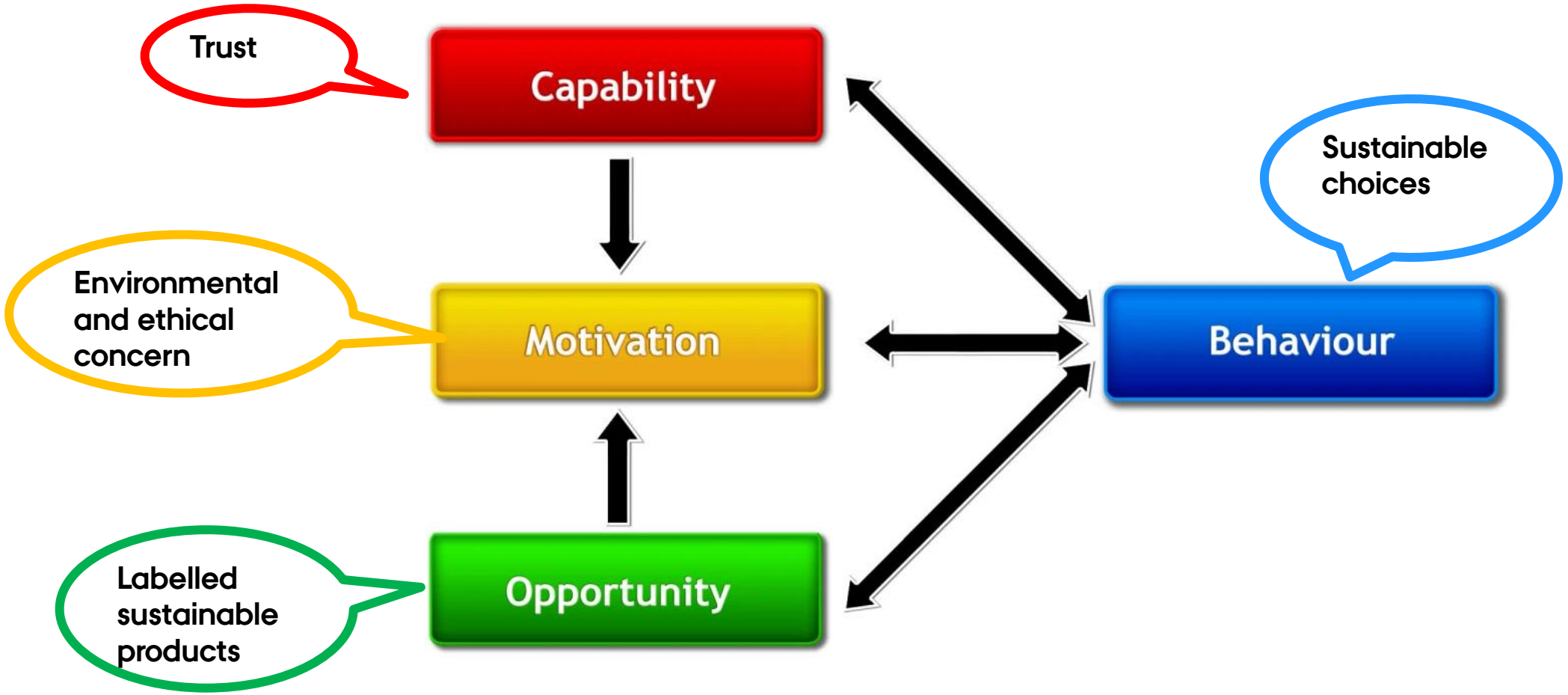
Consumer trust is not particularly high

Can instruments like blockchain help in marketing meat based on credence characteristics?

QUESTIONS

1. What is the role of trust in the demand for sustainable food products?
2. What are European consumers' preferences for credence characteristics of pork and broiler products and are they related to consumer trust?
3. Can blockchain technology increase consumer trust and confidence in the use of information on credence attributes for pork and broiler products?

What is the role of trust in the demand for sustainable food products?



Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 1-12.

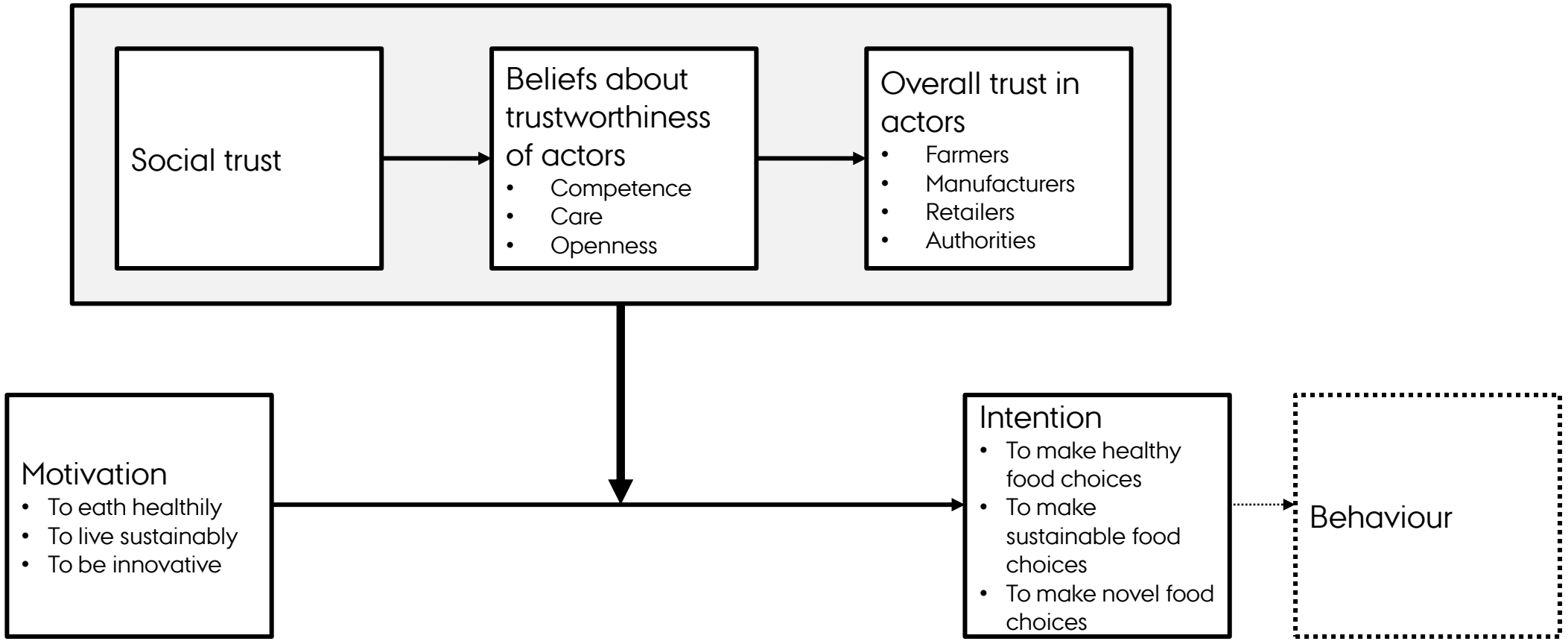
THE TRUST TRACKER PROJECT

EIT Food is funding the TrustTracker project, an instrument designed to track consumer trust into the main groups of food chain actors, and to investigate how this affects consumer confidence in the integrity of the food supply and in the technologies used in food production

TrustTracker started in 2018 with data collection in 5 countries, extending to 13 countries in 2019 and 18 countries in 2020

As part of this project, we have looked at the role of trust as a moderator of the relationship between motivation and intention

Macready, A. L., Hieke, S., Klimczuk-Kochańska, M., Szumiał, S., Vranken, L., & Grunert, K. G. (2020). Consumer trust in the food value chain and its impact on consumer confidence: A model for assessing consumer trust and evidence from a 5-country study in Europe. *Food Policy*, *92*, 101880.


Social trust
Beliefs about trustworthiness of actors
• Competence
• Care
• Openness
Overall trust in actors
• Farmers
• Manufacturers
• Retailers
• Authorities
Motivation
• To eath healthily
• To live sustainably
• To be innovative
Intention
• To make healthy food choices
• To make sustainable food choices
• To make novel food choices
Behaviour

DATA COLLECTION

Online survey, 1000 respondents per country, administered by Ipsos, nationally representative in terms of age, gender and region

2018 5 countries, not used in moderation analysis

2019 13 countries, 2020 18 countries; 13 countries used in moderation analysis

Belgium, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Poland, Spain, Switzerland, UK (Czech Republic, Greece, Portugal, Romania, Turkey)

MEASURES

Overall trust: Single item measure adapted from Sapp et al, 2009, 7-point scale ranging from 1='Very little trust' to 7='Very high level of trust'

Beliefs in trustworthiness: competence, care, openness, adapted from Poortinga & Pidgeon (2003) and de Jonge et al (2007)

Motivation for healthy eating: 3 items from Roininen et al., 1999 (positively framed items with highest loadings)

Motivation for sustainable living: 3 items from Thøgersen et al., 2008, who adapted from Dunlap, 2002 (only items not referring to self-reported behaviour)

Motivation for innovativeness: 5 items from Brunsø et al., 2021

Intentions for sustainable choices: 3 items adapted from Lu et al., 2015 ('green buying intention')

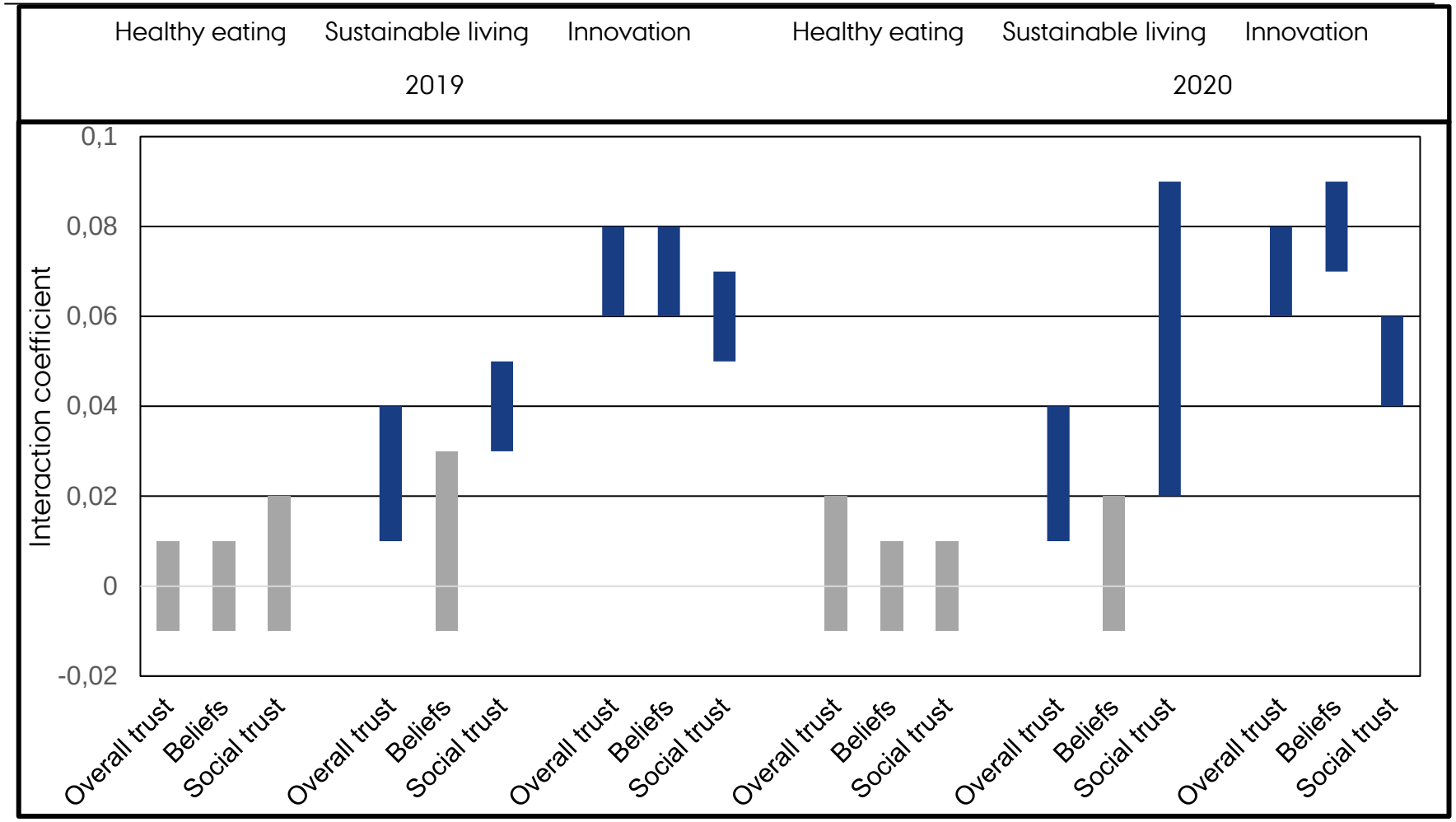
Intentions for healthy choices: 3 newly developed items, reflecting Lu et al., 2015

Intentions for new product adoptions: 3 items adapted from Goldsmith & Hofacker, 1991

All the above: 1='Strongly disagree' to 7='Strongly agree'

MODERATION ANALYSIS

TRUST ACROSS ALL ACTORS, 2019 AND 2020 DATA, 13 COUNTRIES, BASED ON MODEL 1 OF HAYES PROCESS MACRO



CONCLUSIONS 1

Generally, trust in food chain actors moderates the relationship between motivation and intention for sustainable living and for new product adoption, but not for healthy eating

Decades of attempts to promote healthy eating may have made people confident that they can judge the healthiness of food products

A lack of healthy diet therefore does not appear to be a trust issue

For sustainability, overall trust seems to be more important than beliefs in trustworthiness, underlining the importance of the affective component of trust

What are European consumers' preferences for credence characteristics of pork and broiler products and are they related to consumer trust?

mEAT quality

EUROPEAN RESEARCH PROJECT 2021-2025

Funded by the European Union

meatquality.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 101000344. It reflects only the author's view and that the European Commission is not responsible for any use that may be made of the information it contains

The overall aim of *mEATquality* is to provide consumers with quality pork and broiler meat, by developing novel solutions with farmers and chain partners that address societal demands, environmental concerns and economic needs

- To determine consumer preferences for intrinsic and extrinsic quality of meat relating to the animal husbandry and meat quality aspects investigated

METHODOLOGY

1. We conducted a discrete-choice experiment for purchase of pork (pork chops) and chicken (chicken breasts)
2. We analyzed the data with a latent class choice analysis to derive different segments of European consumers.
3. We compare the segments in terms of trust, environmental concern, ethical orientation
4. We investigate whether certification by blockchain makes any difference in consumer valuation of credence characteristics

Discrete-Choice experiment

Latent class analysis

Comparison of segments in terms of trust

Analysis of potential effect of blockchain certification

Ethical orientation

Inspired by Shanahan and Hyman's (2003), items were generated for the five domains 1. Empathy 2. Respect 3. Incorruptibility 4. Piety 5. Reliability

After 2 rounds of pre-testing, we reduced the scale from 21- items to 10-items.

Environmental concern

Measured by 4 items fro Hawes, Winterich & Naylor (2014)

Trust

Measured by four items from Macready et al. (2020)

Ethical Orientation	
A	I have the capacity to act according to my ethical principles and follow my moral compass even if this can be challenging and displeasing to others.
B	I communicate my moral values to others both verbally and with my actions.
C	I aim to be transparent and unambiguous towards others regarding my values, objectives, and overall stance in life.
D	I strive to be kind and courteous to other people.
E	I have a generous nature, I usually have emotional, time and material surplus for others.
F	When I tend to other peoples' emotional, and material needs, I don't expect anything in return.
H	In my everyday life, I exercise tolerance with situations, practices, and people with whom I disagree.
I	I am truthful and sincere with others in all circumstances.
J	I believe in the reliability and truthfulness of other peoples' character and actions when interacting with them.
K	I generally feel calm and in control of myself when I interact with others.

DATA COLLECTION

Online survey with 500 respondents representative of each country's distribution on gender, age, education and regional distribution in Denmark, the Netherlands, Poland, Italy, Spain and Germany (3028 in total)

CHOICE EXPERIMENT

Attributes were selected based on the literature, validated by expert interviews, and narrowed down based on a pretest (n=200, Germany) using best-worst scaling

Overview of attributes and levels

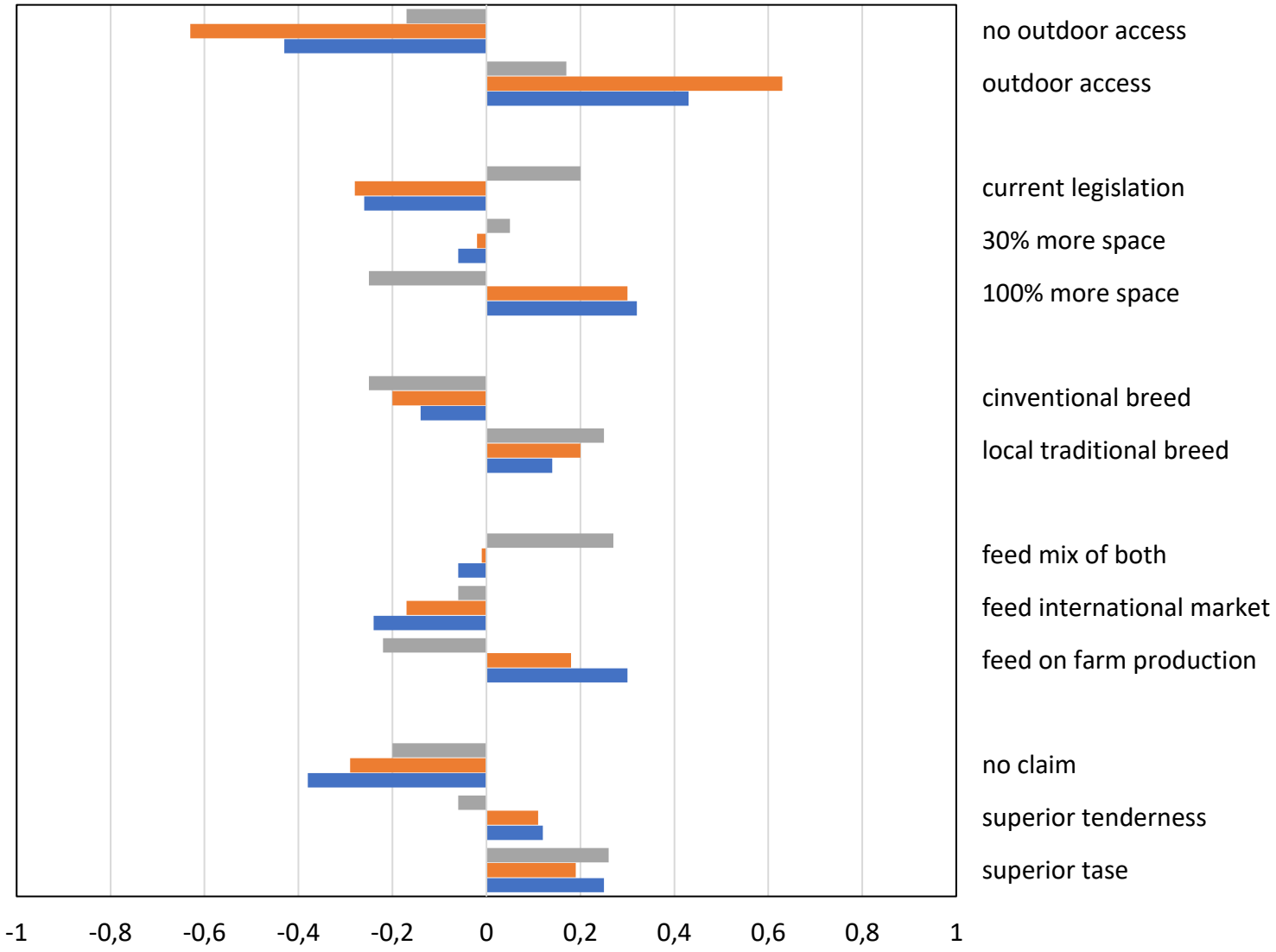
Overview of attributes and levels			
Sensory properties	Superior taste	Superior tenderness	None
Feed origin	On-farm production	Purchased in international market	Mix of on-farm production and purchased feed on international market
Breed	Traditional, local breed	Mainstream, conventional breed	
Space allocation	Current legislation	30% more than current legislation	100% more than current legislation
Space quality	Outdoor access	No outdoor access	None
Price	**25% more than usual price**	**50% more than usual price**	**75% more than usual price**

Example of a choice set for chicken breast

	Alternative A	**Alternative B**	**Alternative C**
			
Sensory properties	-	Superior taste	**I choose to buy none of these products**
Feed origin	Purchased feed on international market	On-farm production	
Breed	Local, traditional breed	Mainstream, conventional breed	
Space allocation in relation to current legislation	30% more space	100% more space	
Space quality	Outdoor access	No outdoor access	
Price	6,25€	7,50€	
I would choose:	**A____**	**B____**	**C____**

CHOICE EXPERIMENT

- Respondents were instructed to imagine choosing their preferred pork chops/chicken breast alternative in their usual grocery store
- Overall, the design compromised 36 choice sets, 9 per person per meat category in a randomized order
- Prices were computed based on self-reported reference price
  - Respondents with unrealistic reference prices (> mean + 3*SD) were excluded (2%)
- Respondents who always chose the no-choice option were excluded from the analysis (6%)
- We ran models with 1-6 classes; a model with 3 classes was chosen based on the BIC score, class size and interpretation
  - A multilevel analysis with country as grouping factor did not reveal major country differences
- Random parameter panel design with 4 blocks and no-choice option (D-error: .25)



no outdoor access

outdoor access

current legislation

30% more space

100% more space

cinventional breed

local traditional breed

feed mix of both

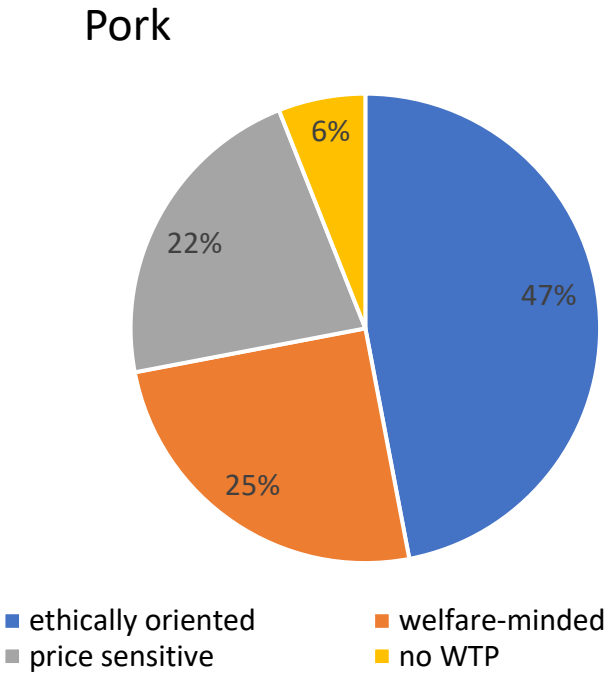
feed international market

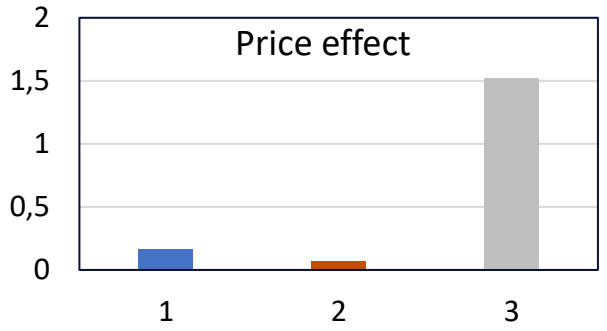
feed on farm production

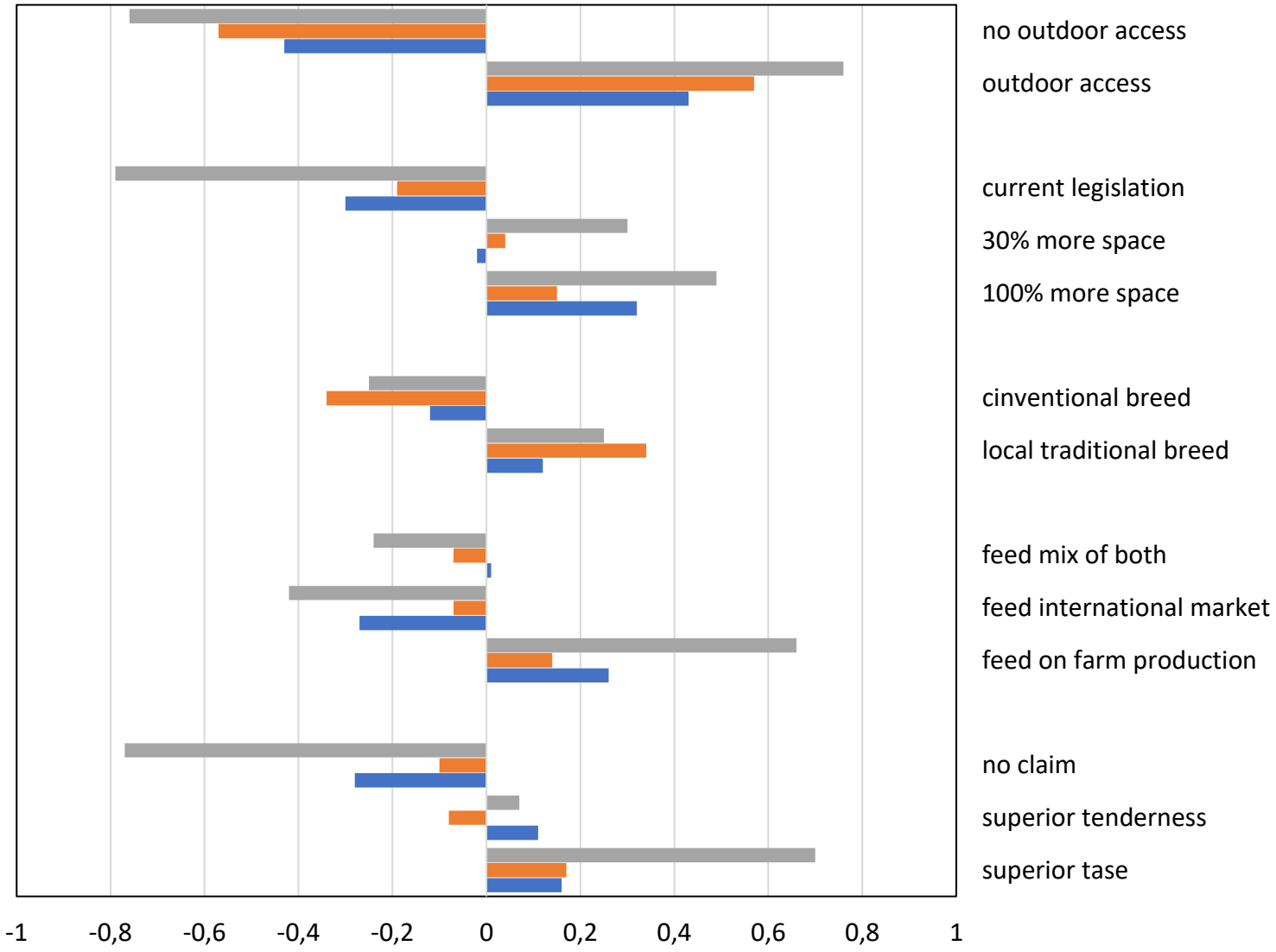
no claim

superior tenderness

superior tase







no outdoor access

outdoor access

current legislation

30% more space

100% more space

cinventional breed

local traditional breed

feed mix of both

feed international market

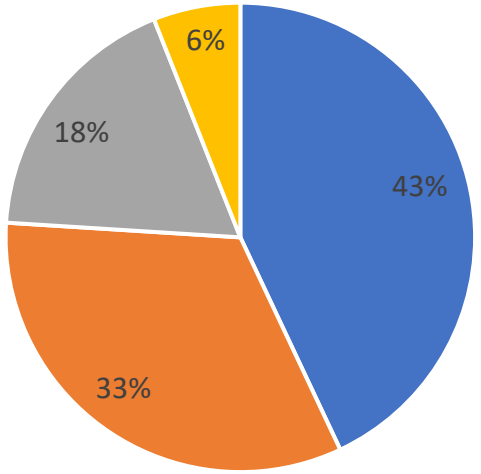
feed on farm production

no claim

superior tenderness

superior tase

Chicken

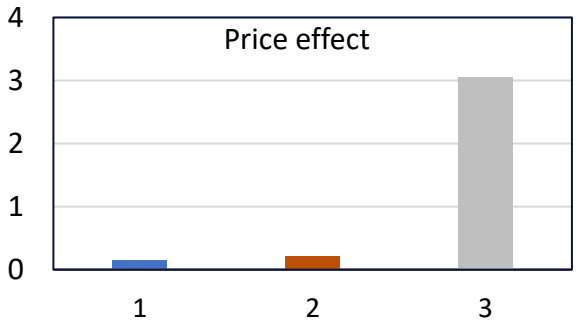


ethically oriented

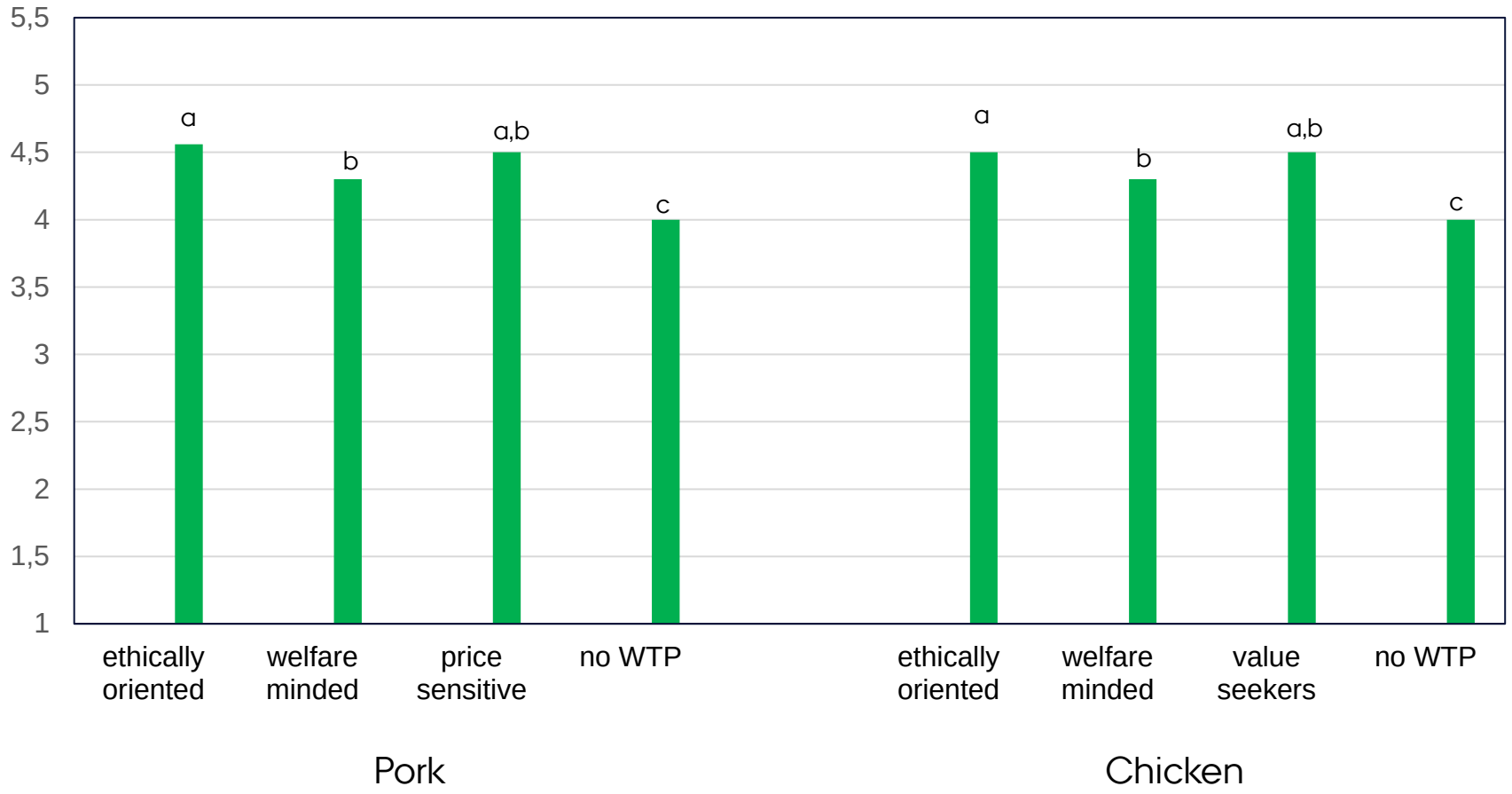
welfare minded

value seekers

no WTP



TRUST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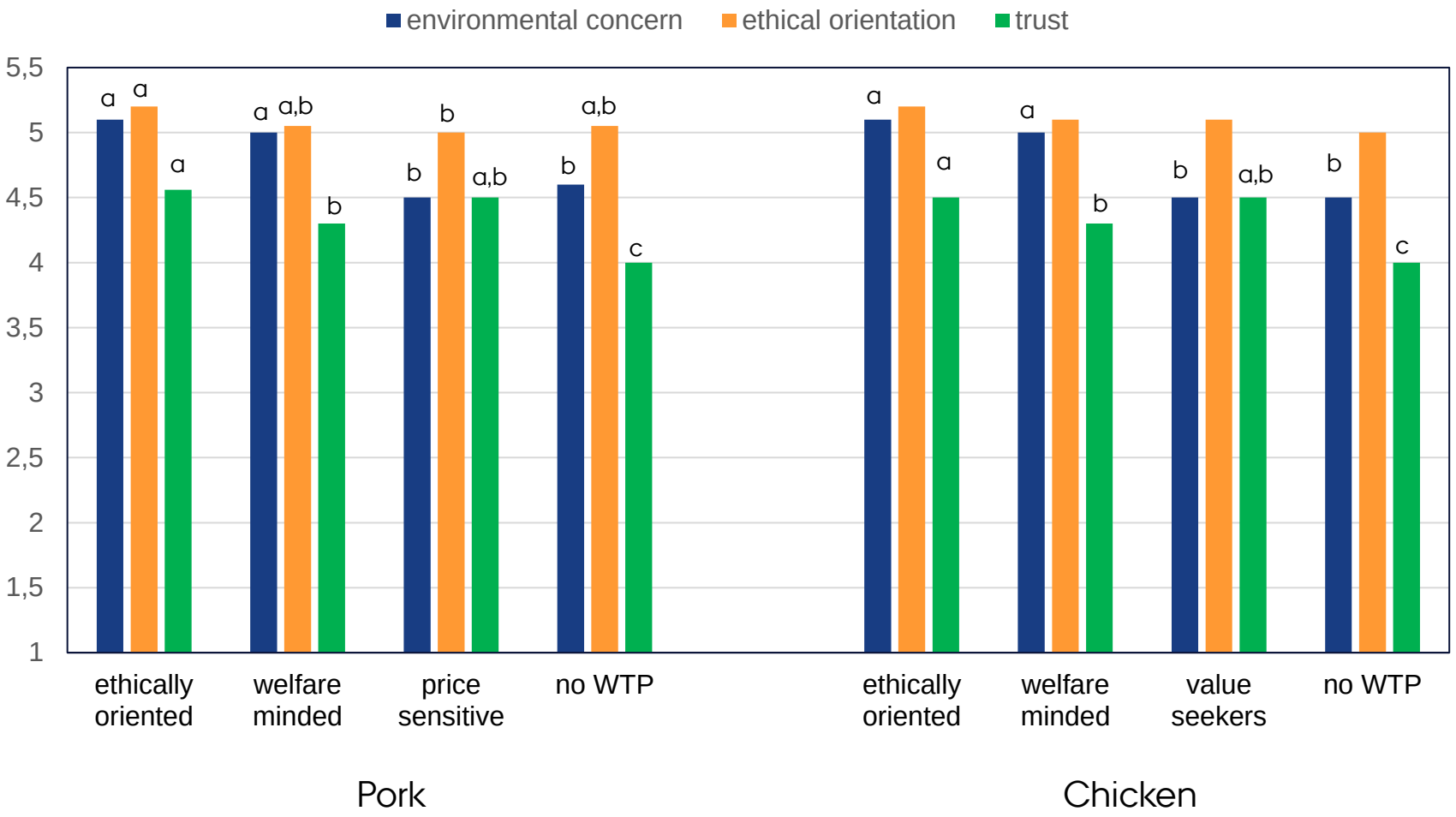
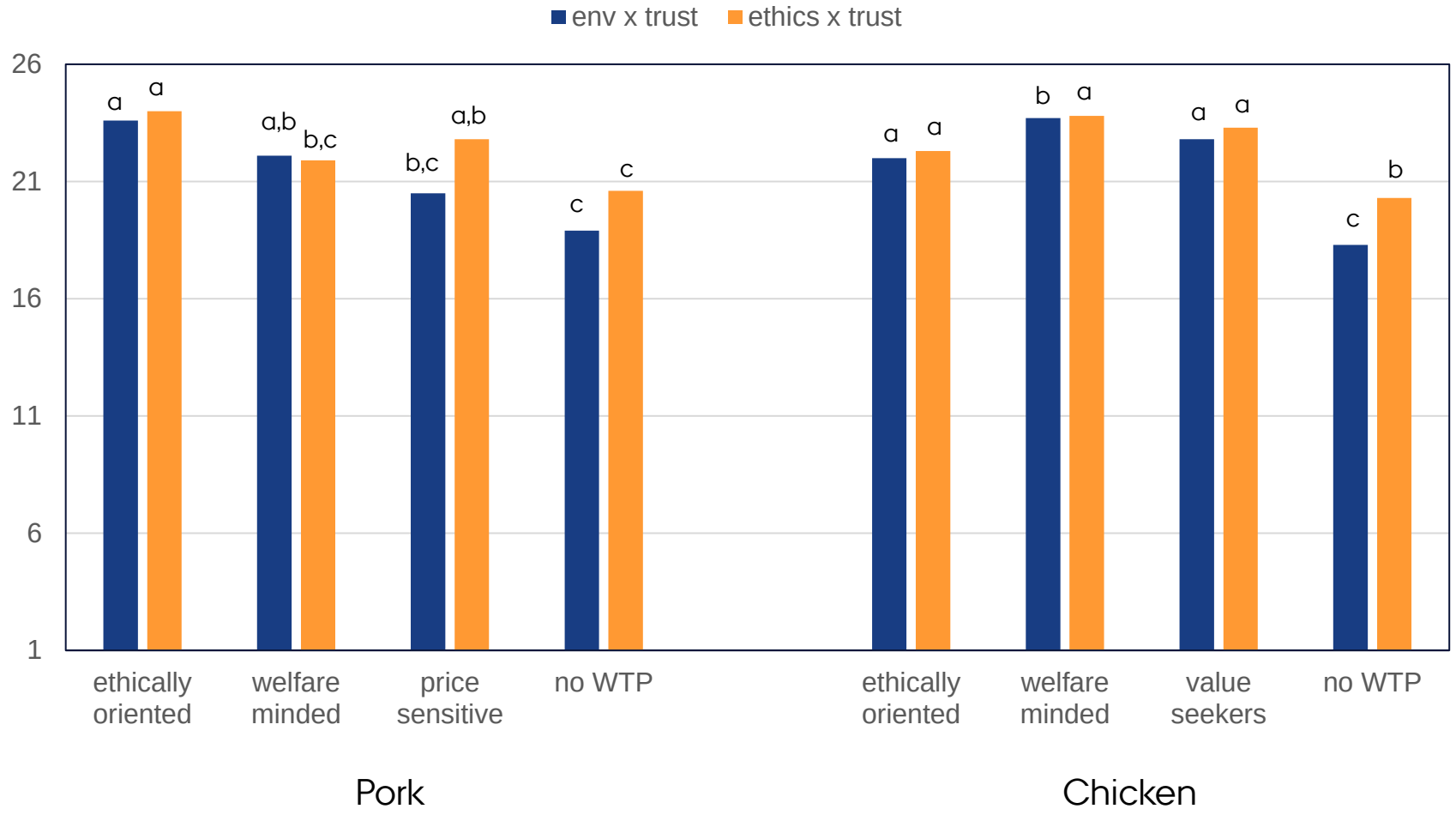
c
ethically oriented
welfare minded
price sensitive
no WTP
ethically oriented
welfare minded
value seekers
no WTP
Pork
Chicken

TRUST VS. MOTIVATION



TRUST X MOTIVATION



CONCLUSIONS 2

In a pan-European study, a majority of consumers were interested in production attributes when choosing pork and chicken meat

Both attributes related to animal welfare and to sustainability had appeal, but to different groups of consumers

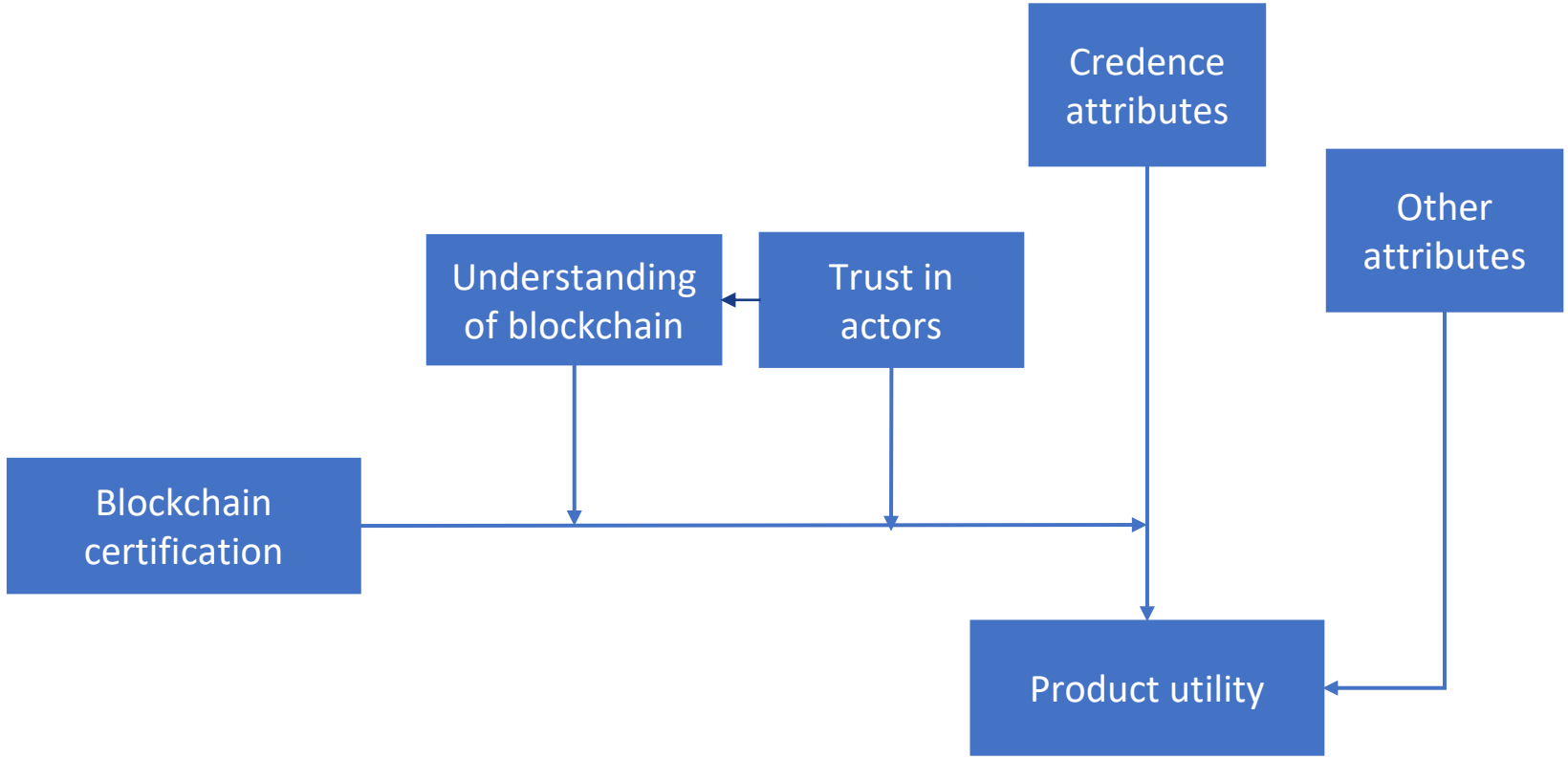
In addition, there are price-driven consumers and those that do not want to pay any premiums beyond current prices

Preferences for production attributes are related to environmental concern, trust in the food chain, and ethical orientation

The pattern of trust in the consumer segments is not clear-cut

Can blockchain technology increase consumer trust and confidence in the use of information on credence attributes for pork and broiler products?

TRUST AND BLOCKCHAIN



Group 1	Group 2
Discrete-Choice experiment	Blockchain information
Blockchain information	Discrete-Choice experiment “blockchain certified”
Measurement of familiarity, objective understanding, subjective understanding	Measurement of familiarity, objective understanding, subjective understanding

Pork and chicken are commonly consumed food products in..... The food product originates at a farm, is moved to slaughtering and processing, and finally to a retailer – that means it is handled by several actors before ending with the consumer. If consumers are interested in the way the pork or chicken has been produced – for example, with regard to the sustainability or the animal welfare of the production process - this information has to travel from one actor to the next, a process that is prone to error and even fraud. By using blockchain technology, one can make sure that information is always accurate.

Blockchain technology can be used as a digital decentralized bookkeeping system, which is based on advanced algorithms and computer power. Imagine an excel datasheet with credit and debit in two columns, this is called a ledger. In a blockchain system, information in a ledger can only be added, never changed, deleted, or manipulated with. Everyone in the supply chain has a copy of this ledger, which means everyone has documentation for what has happened. In this way, the information in the blockchain is decentralized and there exists a "shared-truth" of what has happened. When the meat moves a step in the supply chain, the user with the right evidence or proof can add this information to the ledger and the ledger is then updated. Everyone in the chain gets an update that it has gone from A to B and C, and everyone with the ledger then shares the information that this has occurred. Through what is known as cryptography, data and information through the chain can be 100% trusted as it cannot be manipulated.

Blockchain is simply a chain of blocks with information. A block contains 3 things. One: the information, an example could be "this is organic pork/chicken", two: a hash code, which is a unique digital fingerprint in the form of a randomly generated piece of code, and three: the hash code from the previous block, which is what binds the blocks together. If the information in the block is changed, the hash will change as well, and every actor involved gets notified. This means that if a supplier tries to declare conventional pork or chicken as organic pork or chicken, thereby tampering with the information in a block, the hash of the block will change and now no longer fits the next block, making the chain invalid. This is what makes blockchain transparent, trackable, and immutable.

What makes blockchain so valuable for you, is that a product can be equipped with a QR code that can be scanned and gives you access to view all of this data. This enables you to track every step of how the pork or chicken were produced and how they were shipped. This ensures creditable transparency so that you can trust the information that comes with a product before you buy it.

UNDERSTANDING AND EFFECT OF BLOCKCHAIN CLAIM

Variable	*Subjective understanding*		*Objective understanding*	
	β	***Std. error***	***β***	***Std. error***
Intercept	0.69***	0.19	1.78***	0.11
Technology readiness	0.36***	0.04	0.32***	0.02
Ethical orientation	0.17***	0.03	0.13***	0.02
Environmental concern	0.17***	0.02	0.09***	0.02
Blockchain familiarity	0.16***	0.02	0.07	0.01
Blockchain claim	0.11*	0.06	0.04***	0.03
Trust	0.07*	0.03	0.07***	0.02
	Adj. R^2= .15		Adj. R^2= .19	

		Pork chops		**Chicken breast**	
Other attributes		No Blockchain	Blockchain claim	No Blockchain	Blockchain claim
	Sensory	0.09	0.09	0.07	0.07
Credence attributes					
	Feed	0.03	**0.04**	0.05	0.05
	Breed	0.05	**0.06**	0.07	0.06
	Space	0.03	0.03	0.03	**0.05**
	Outdoor	0.12	**0.14**	0.12	**0.13**
Price		0.43	**0.40**	0.43	**0.41**

EFFECTS OF UNDERSTANDING AND TRUST ON ATTRIBUTE UTILITIES WITH AND WITHOUT BLOCKCHAIN CLAIM

	Pork		Chicken	
	No Blockchain	Blockchain claim	No Blockchain	Blockchain claim
Interaction effects				
Subj. und. * Feed	+	+	+	+
Subj. und. *Breed				
Subj. und. * Space			+	
Subj. und. *Outdoor	+	+	+	+
Obj. und. * Feed				
Obj. und. *Breed		+		
Obj. und. * Space			.	
Obj. und. *Outdoor		+		+
Trust * Feed	+			
Trust *Breed				
Trust * Space		-		
Trust *Outdoor	-	-	-	-

CONCLUSIONS 3

Claiming that credence attribute information was blockchain certified had small, but significant impact on utilities assigned to credence attributes

Understanding of blockchain is important

Use of blockchain certification is itself a question of trust – even though blockchain certification may increase trust in the long run

Higher levels of trust in food chain actors may imply that product differentiation in terms of production characteristics is not regarded as necessary

OVERALL CONCLUSIONS

Consumer trust is an important factor in the green transition of the food sector, but the relationships are complex

Trust can be a moderator for the link from motivation to live sustainability to the intention to make sustainable choices

However, higher levels of trust can also imply a belief that the green transition is not necessary

Promoting the green transition is therefore a question of both promoting motivation and trust

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Thank you for your attention!

mEAT quality

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