

## EXTENSIVE HUSBANDRY AND ANIMAL WELFARE ARE IMPORTANT FOR ACCEPTANCE OF RABBIT MEAT PRODUCTION AMONG SWEDISH YOUTH

Saga Gunnarsson, Carl-Gustaf Thulin<sup>1</sup>

Department of Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Sciences (SLU), Box 7011, 750 07 UPPSALA, Sweden.

**Abstract:** Global meat production and consumption are increasingly unsustainable. One way to counteract this development is to change the type of meat consumed. Rabbit meat has relatively lower climate impact than many other types of meat, but consumer acceptance is crucial for a socially sustainable production. In this study we examine the acceptance of industrial, extensive and urban rabbit production among Swedish senior high school youth, 17 to 19 yr old. An electronic survey was sent to ten randomly selected senior high school classes with 17 to 19 year-old students. The survey included inquiries about background, scaled responses and open-end questions with the opportunity to comment. A total of 111 students completed the survey, of which 62 were women, 74 from rural areas and 91 with previous animal experience. Extensive production was more accepted than industrial and urban production, while no difference was observed between industrial and urban production. Thus, the results advocate a farming system with more animal movement, less productivity and higher space requirements. In general, male respondents were more accepting of all production systems than women, while no difference could be detected between rural and urban citizens. The scaling shows that animal welfare, local production and meat quality was given priority over climate impact, biodiversity and price. Our study suggests useful prerequisites to consider for the meat industry in general, and for the development of Swedish rabbit production.

**Key Words:** *Oryctolagus cuniculus*, production system, consumer, marketing, Sweden.

### INTRODUCTION

Food causes 20-30% of human environmental impact, of which products of animal origin stand out as the most influential (Tukker and Jansen, 2006; Notarnicola *et al.*, 2017). Consumption is increasing globally and is, thus, increasingly unsustainable (Fiala, 2008; Alexandratos and Bruinsma, 2012; Notarnicola *et al.*, 2017). Since few consumers are willing to alter their consumption patterns, new production forms or animals, such as rabbits, may be sustainable alternatives (McNitt *et al.*, 2013).

Rabbits are better roughage converters than ruminants, with as much as 20% of the protein intake converted into meat (Dalle Zotte, 2014) compared to 8% for beef (Broderick, 2018). A life cycle analysis of Swedish meats show that rabbit emits around 3.4 kg CO<sub>2</sub>e/kg (kg carbon dioxide equivalents per kg boneless meat) compared to 6.0 kgCO<sub>2</sub>e/kg for pork and 28.3 kgCO<sub>2</sub>e/kg for beef (Nilsson, 2017). The average for European rabbit production is 11.5 kg kgCO<sub>2</sub>e/kg, which is similar to pork, but still lower than beef (Cesari *et al.*, 2018). According to Nilsson (2017), the difference is due to a higher proportion of soy in European rabbit production. In addition, rabbit meat

**Correspondence:** C.-G. Thulin, [carl-gustaf.thulin@slu.se](mailto:carl-gustaf.thulin@slu.se). Received February 2023 - Accepted May 2023.  
<https://doi.org/10.4995/wrs.2023.19316>

**Cite as:** Gunnarsson S., Thulin C.-G. 2023. Extensive husbandry and animal welfare are important for acceptance of rabbit meat production among Swedish youth. *World Rabbit Sci.*, 31: 263-276. <https://doi.org/10.4995/wrs.2023.19316>

include higher level of proteins with essential amino acids and lower cholesterol level compared to meat from other species (Dalle Zotte and Szendrő, 2011).

The short generation cycle and high reproductive potential of rabbits enable high production capacity (Varga, 2014; Gidenne *et al.*, 2010). Although semi-intensive reproductive rhythm is used to avoid overexploitation of productive females (Trocino and Xiccato, 2006), they may still have 8-9 litters in a year, with slaughter maturity reached at 9-13 wk of age (Dalle Zotte, 2014). In addition, the rabbit is a non-ruminant that can assimilate feed of low protein quality and vitamin content thanks to caecotrophy (Carabaño *et al.*, 2010).

Rabbits can be raised in industrial and extensive production systems (Saxmose Nielsen *et al.*, 2020), as well as urban production systems (Medenou *et al.*, 2021), all of which have different advantages and disadvantages. In industrial rabbit production, the animals are kept indoors in smaller mesh cages with automatic water nipples and feeding systems (Daszkiewicz *et al.*, 2021; Mondin *et al.*, 2021). Feed is generally given ad libitum (Maertens, 2010; Saxmose Nielsen *et al.*, 2020; Daszkiewicz *et al.*, 2021) and production intensity is kept high all year round by artificial lighting programmes (Trocino and Xiccato, 2006; Gerencsér *et al.*, 2008).

Extensive production systems use fewer resources and technical aids, and rabbits are typically kept in cages with bedding material with access to both indoor and outdoor facilities (Saxmose Nielsen *et al.*, 2020; Daszkiewicz *et al.*, 2021). The feeding is usually done manually (Saxmose Nielsen *et al.*, 2020), and feed is produced on the farm and largely contains of pasture or hay (Daszkiewicz *et al.*, 2021). Finally, the neat size, quiet feature and relatively low smell of rabbits makes them well suited for urban animal production (Mutsami and Karl, 2020). Production forms can vary between intensive, extensive or combined (Specht *et al.*, 2016; Medenou *et al.*, 2021), take place in residential gardens (Blecha and Davis, 2014), vertical production in skyscrapers (Mancebo, 2018) or more large-scale production on the outskirts of cities (Specht *et al.*, 2016). The environmental footprint of production forms depends on factors such as feed efficiency, form of feed, energy consumption and areal needs (Cesari *et al.*, 2018).

Consumer acceptance is a prerequisite for any form of production (Specht *et al.*, 2016), and Fortun-Lamothe *et al.* (2012) state that the sustainability of a rabbit production depends on whether it meets the demands of the public and consumers. Socio-demographic aspects can influence people's opinions about food production and priorities when choosing food (Boogaard *et al.*, 2006; Blanc *et al.*, 2020; Szendrő *et al.*, 2020). It is therefore necessary to study consumer requirements and acceptance. Currently, however, there is a lack of research on young Swedish consumers' views on rabbit meat production.

Here we investigate youth acceptance of industrial, extensive and urban rabbit meat production, respectively, in relation to different socio-demographic backgrounds, to address the development potential for rabbit meat in Sweden. Basic questions asked are: 1) Which form of production for rabbit meat do young people find most acceptable? 2) What are the differences in acceptance of the different production systems related to urban or rural childhood and own experience with animals? 3) What do young people base their acceptance on?

## MATERIALS AND METHODS

The electronic survey was designed in Netigate (version 2.37.0) and sent to senior high school youths (17 to 19 yr old). The questions were formulated with the intention of being free of values and took about five minutes to answer (Appendix 1). In accordance with Swedish regulation on data protection (GDPR), all respondents gave consent to the handling of personal data before the survey.

Multiple-choice one-option questions on background information included gender (woman, man, undisclosed), urban or rural childhood, animal experience (farm/pet, pet only, none) and dietary preferences (meat or not). The three production systems "industrial", "extensive" and "urban" were presented briefly, with a response scale from 0–10, where 0= not at all acceptable and 10= very acceptable, followed by voluntary, open-ended questions that enable reflections or justifications. The survey ended with a summary question about the preferred form of rabbit production, priorities for general meat production (ranked 1-3) and the opportunity to leave other comments.

Target schools were randomly selected digitally (slumpgenerator.nu/) and approached based on recruitment area (cities) of <10 000 (small), 10 000-99 999 (medium) or ≥100 000 (large) inhabitants (following SCB, 2021). If a

school was missing, a new area was randomly selected until 50 schools from each category were identified. In larger cities, schools were chosen randomly from Gymnasieguiden ([www.gymnasieguiden.se](http://www.gymnasieguiden.se)). A total of 150 schools were contacted via email between March 21-24, 2022, of which ten offered to help distribute the survey to their students. The survey was sent out on 2022-04-01 and was open until 2022-04-22 (thus, three weeks). A reminder was sent at the beginning of the second week.

Basic descriptive statistics (means and standard deviation) were compiled directly by Netigate (version 2.39.0). For other statistical calculations Minitab (version 19.2020.1) was used. Responses from participants who did not complete the questionnaire were excluded from the analyses. Since acceptance was not normally distributed, non-parametric analysis methods were used. Differences between the acceptance mean for the three production systems were examined using the Kruskal-Wallis test, followed by pairwise Mann-Whitney tests to identify differences between production system (industrial, extensive or urban), gender (man or woman), childhood (urban or rural) and animal experience (farm/pet, pet only or none) (Table 1).

Free text responses were sorted according to the acceptance level (0–10) for different production systems. The responses were then read through, and overarching themes were recorded by studying recurring words and concepts. In order to analyse priorities for general meat production, an average score was calculated for each parameter based on the most important (3), second most important (2), third most important (1) and unranked (0). The average values generated (on a scale of 0–3) were then used to rank the parameters. The percentage of respondents who ranked each aspect as one of their three most important priorities was also calculated.

## RESULTS

A total of 111 students completed the survey, of which 31 (28%) did so after the reminder (Table 1). Ratio of women/men was 62/47, urban/rural 37/74 and 91 had experience from farm and/or pet animals (Table 1). Thus, the gender distribution was relatively even, while a majority grew up in rural areas and had previous experience with animals.

On average, industrial rabbit production received a rating of 3.47 ( $\pm 2.90$ ), extensive 6.32 ( $\pm 2.68$ ), and urban 3.66 ( $\pm 2.97$ ) (Table 2). Thus, extensive production was more accepted than industrial and urban production ( $P < 0.001$ ), while there was no difference between industrial and urban production. Males had a more positive attitude towards industrial ( $P = 0.004$ ), extensive ( $P < 0.001$ ) and urban ( $P = 0.002$ ) production, respectively (Figure 1). Urban or rural childhood had no influence on the responses (Figure 2).

Respondents without animal experience ranked all production systems higher than those with animal experience, but only significantly so for urban production ( $P = 0.037$ ) (Figure 3). There, the difference was greater between no animal experience and farm and pet animal experience ( $P = 0.005$ ) compared to no experience and pet only animal experience ( $P = 0.028$ ). No difference was found between respondents with farm and pet, and pet only animal experience.

**Table 1:** Demography of first dispatch, reminder and total respondents (N) and in percentage.

	Dispatch		Reminder		Total	
	N	%	N	%	N	%
Gender						
Female	43	(54%)	19	(63%)	62	(57%)
Male	36	(46%)	11	(37%)	47	(43%)
Childhood						
Urban	22	(28%)	15	(48%)	37	(33%)
Rural	58	(73%)	16	(52%)	74	(67%)
Animal experience						
Pet only	28	(35%)	18	(58%)	46	(41%)
Farm & pet	39	(49%)	6	(19%)	45	(41%)
No animal experience	13	(16%)	7	(23%)	20	(18%)
Total	80		31		111	

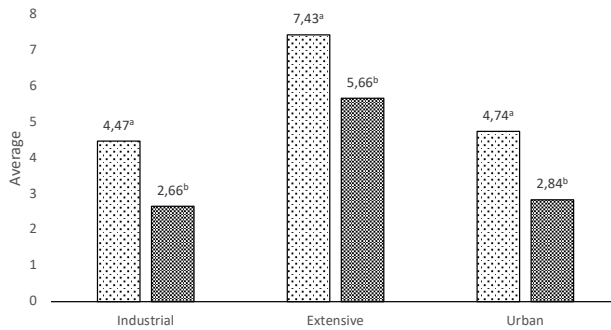


Figure 1: Gender difference acceptance of three different rabbit production systems; industrial, extensive and urban. Males showed a generally more positive attitude towards all production systems. Means within the same production system, with different letters (a, b) are significantly different at  $P < 0.005$ . Male: ; female: .

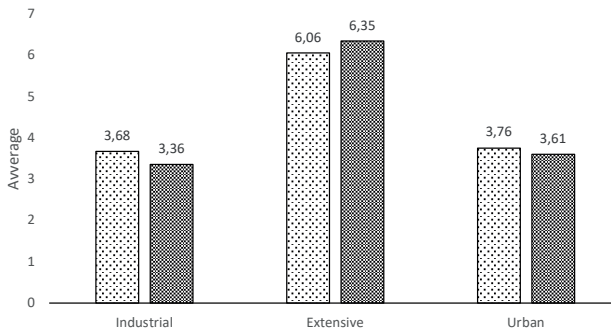


Figure 2: Childhood difference of acceptance of three different rabbit production systems; industrial, extensive and urban. Urban: ; rural: .

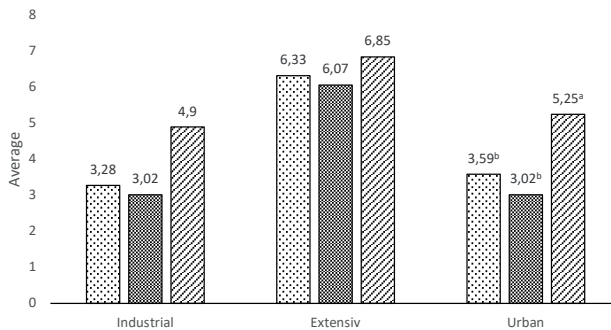


Figure 3: Animal experience difference in acceptance of three different rabbit production systems: industrial, extensive and urban. Means within the same production system, with different letters (a, b), are significantly different at  $P < 0.05$ . Pet only: ; farm and pet: ; none: .

A total of 75 free text responses were received (Appendix 2). Those positive about industrial rabbit production point out that it is an efficient method of sustainable meat production, while those in opposition raised issues such as “unnatural”, “inhumane”, “cruel” and “animal cruelty” and concerns about rabbits being kept in small cages without companions. Those in favour of extensive production point out that rabbits are given more freedom and “treated with

**Table 2:** Respondent acceptance of three different rabbit production systems, industrial, extensive and urban, after first dispatch, reminder and total (0=not acceptable, 10=very acceptable).

	0	1	2	3	4	5	6	7	8	9	10	$\bar{x}$
Industrial												
Dispatch	12	8	10	11	10	14	5	2	2	2	4	3,61
Reminder	8	5	4	6	1	1	0	1	0	1	4	3,10
Total	20	13	14	17	11	15	5	3	2	3	8	3,47
Extensive												
Dispatch	1	3	3	5	4	16	4	10	15	7	12	6,46
Reminder	3	0	0	2	3	5	5	4	3	1	5	5,94
Total	4	3	3	7	7	21	9	14	18	8	17	6,32
Urban												
Dispatch	8	12	10	10	8	15	1	4	4	1	7	3,93
Reminder	7	6	2	7	2	3	0	0	1	0	3	2,97
Total	15	18	12	17	10	18	1	4	5	1	10	3,66

great respect”, but also expressed concerns about financial constraints for the producer. The opponents argued that it is “not really natural” and that it is never humane to keep animals in cages.

Those with a more positive attitude towards urban production described the rabbits as pets, while others preferred to keep human settlements and food production separate. They mention things like allergy risk and claim that there is no reason to have production in cities. As with industrial production, a negative attitude towards cages was also raised in urban production, and some point out that rabbits thrive best in the wild.

Animal welfare was given the highest priority for meat production ( $\bar{x}$  1.60), followed by locally produced meat and good quality meat (Table 3; Figure 4).

## DISCUSSION

In this study, a majority of the responding Swedish youths of 17-19 yr age preferred extensive rabbit meat production, where rabbits are kept indoors or outdoors in larger cages, pens or enclosures, with relatively little use of resources or technical aids, over industrial or urban (i.e., in cities) production methods (see inquiry definitions in Appendix 1). This is consistent with Szendrő (2016), who showed that Hungarian consumers were prepared to pay more for rabbit meat produced under extensive conditions. A general preference for extensive production has also been found for

**Table 3:** Respondent average priori value for meat production (scale 0-3). Value in parentheses is the percentage of respondents who indicated the value as one of three priorities.

	High animal welfare	Price	Low climate emissions	Biodiversity	High meat quality	Local production
Female	1,76 (77%)	0,47 (21%)	0,77 (45%)	0,77 (45%)	0,76 (39%)	1,47 (73%)
Male	1,45 (70%)	1,04 (51%)	0,83 (47%)	0,36 (21%)	1,38 (62%)	0,93 (49%)
Urban	1,73 (78%)	0,78 (32%)	0,41 (35%)	0,86 (46%)	1,08 (51%)	0,95 (57%)
Rural	1,54 (72%)	0,70 (35%)	0,92 (51%)	0,46 (30%)	0,99 (47%)	1,35 (65%)
Pet only	1,78 (76%)	0,65 (30%)	0,70 (41%)	0,85 (50%)	0,70 (35%)	1,33 (67%)
Farm & pet	1,44 (67%)	0,73 (38%)	0,93 (51%)	0,40 (27%)	1,29 (58%)	1,20 (60%)
No animal experience	1,55 (85%)	0,90 (35%)	0,75 (45%)	0,45 (20%)	1,20 (60%)	1,15 (55%)
Average	1,60 (74%)	0,73 (34%)	0,80 (46%)	0,59 (35%)	1,03 (49%)	1,24 (62%)

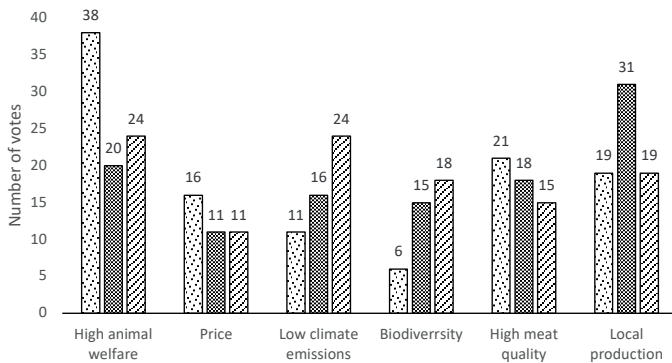





Figure 4: Respondent *a priori* value for meat production (three votes/respondent). First priority: ; second priority: ; third priority: .

other farm animals (Schröder and McEachern, 2004; Morales *et al.*, 2013; Musto *et al.*, 2015). The respondents in Schröder and McEachern (2004) associated intensive production with suffering and deficiencies leading to poor quality of life for the production animals. This result agrees with the concerns expressed by the respondents in this study, who described industrial production as “*inhumane*” and likened it to “*animal abuse*”. Thus, a strategic shift towards more extensive production regimes and routines might be worthwhile to consider for future consumer acceptance.

The lower acceptance of urban production may be related to the brief conceptual descriptions provided in the survey, indicated by respondent comments such as “*should they be eaten?*” Although urban production is described as “*rabbits are raised in apartments, houses or premises inside cities*” in the inquiry (Appendix 1), the idea of producing and commercialising rabbits for meat consumption under urban conditions is relatively novel (Sanyé-Mengual *et al.*, 2018) and mostly applied under poor conditions (Mutsami and Karl, 2020). An additional explanation is a concern about odour (cf. Specht *et al.* 2016), or urban environment being considered an “unnatural” place to raise animals. Interestingly, respondents also expressed a desire to separate the production from the people, e.g. “*Animals should be in their designated areas, not in cities*”, “*There is no reason to have such production in the cities*” and “*Keep places of residence and food production separate*”. We believe, on the contrary, that an increasing contact between primary producer/-production and end consumer/-consumption facilitates a more sustainable society, and that it is worthwhile to explore the concept of ‘urban production’ further, not least in relation to civil preparedness

Gender influenced acceptance significantly, with men expressing higher acceptance for all production systems compared to women. This is in line with other studies that show that women often care more about animal welfare and decent animal husbandry (Spain *et al.*, 2018; Szendrő *et al.*, 2020). In a study by Blanc *et al.* (2020), 55% of females ranked ‘great importance’ on welfare when it comes to meat choices compared to 27% of males. In our study the difference was less marked, with 77% of women and 70% of men having good animal welfare as one of top three priorities. In addition, approximately twice as many women as men become vegans/vegetarians (Modlinska *et al.*, 2020), a decision that is often based on ethical dilemmas concerning animal production and welfare (Fox and Ward, 2008). The rabbit is also increasingly seen as a pet rather than a food-producing animal (Hoffman *et al.*, 2005; Cullere and Dalle Zotte, 2018). This view has been shown in several studies to be stronger in women (González-Redondo and Contreras-Chacón, 2012; Petrescu and Petrescu-Mag, 2018; Sanah *et al.*, 2020). The view of the rabbit as a pet has also been described as contributing to an attitude on the part of consumers regarding the need for higher animal welfare (Sims *et al.*, 2007; Cullere and Dalle Zotte, 2018). Taken altogether, women have a higher threshold for animal welfare in relation to rabbit production.

Urban rabbit production was more accepted among respondents without animal experience, possibly as a result of anthropomorphism (e.g. McNitt *et al.*, 2013). Thus, since humans have been shown to be able to live in cities, the same is expected for rabbits. That respondents with animal experience in general would consider rabbit meat production as less acceptable was expected, since pet experience has been shown to influence attitudes towards

husbandry and farming (Boogaard *et al.*, 2006). On the other hand, we expected that experience from farm animals would increase acceptance, but no such relationship could be observed. The majority, 74% of the students in this study, ranked animal welfare as one of the top three most important priorities for rabbit production. Szendrő *et al.* (2020) found the same result in an international study on rabbit meat consumption. Animal welfare was followed by local production and meat quality in the ranking. Thus, we suggest that animal welfare, local production and meat quality altogether are fundamental for future acceptance of an extended, extensive, rabbit meat production system in Sweden.

**Acknowledgements:** We are grateful to all respondents that took time to answer the inquiry, and to school personnel that facilitated the study. We also thank two anonymous reviewers whose comments improved the manuscript.

**Authors contribution:** Gunnarsson S.: conceptualization, methodology, data curation, statistical analysis, writing – original draft; Thulin C.-G.: conceptualization, methodology, writing – original draft.

**Conflict of interest:** Authors declare no conflict of interest.

## REFERENCES

- Alexandratos N., Bruinsma J. 2012. *World agriculture towards 2030/2050: the 2012 revision*. ESA Working Paper. No. 12-03. Rome, FAO, pp. 154. <https://www.fao.org/3/ap106e/ap106e.pdf>. Accessed February 2023.
- Blanc S., Massaglia S., Borra D., Mosso A., Merlino V.M. 2020. Animal welfare and gender: a nexus in awareness and preference when choosing fresh beef meat? *Italian J. Anim. Sci.*, 19: 410-420. <https://doi.org/10.1080/1828051X.2020.1747952>
- Blecha J., Davis A. 2014. Distance, proximity, and freedom: Identifying conflicting priorities regarding urban backyard livestock slaughter. *Geoforum*, 57: 67-77. <https://doi.org/10.1016/j.geoforum.2014.08.010>
- Boogaard B.K., Oosting S.J., Bock B.B. 2006. Elements of societal perception of farm animal welfare: A quantitative study in The Netherlands. *Livestock Sci.*, 104: 13-22. <https://doi.org/10.1016/j.livsci.2006.02.010>
- Broderick G.A. 2018. Review: Optimizing ruminant conversion of feed protein to human food protein. *Animal*, 12: 1722-1734. <https://doi.org/10.1017/S1751731117002592>
- Carabaño R., Piquer J., Menoyo D., Badiola, I. 2010. The digestive system of the rabbit. In: *De Blas J.C. and Wiseman J. (ed). Nutrition of the Rabbit, (2nd ed.)*. CABI Publishing, Wallingford, UK, 1-18. <https://doi.org/10.1079/9781789241273.0001>
- Cesari V., Zucali M., Bava L., Gislón G., Tamburini A., Toschi I. 2018. Environmental impact of rabbit meat: The effect of production efficiency. *Meat Sci.*, 145: 447-454. <https://doi.org/10.1016/j.meatsci.2018.07.011>
- Cullere M., Dalle Zotte A. 2018. Rabbit meat production and consumption: State of knowledge and future perspectives. *Meat Sci.*, 143: 137-146. <https://doi.org/10.1016/j.meatsci.2018.04.029>
- Dalle Zotte A. 2014. Rabbit farming for meat purposes. *Anim. Front.*, 4: 62-67. <https://doi.org/10.2527/af.2014-0035>
- Dalle Zotte A., Szendrő Z. 2011. The role of rabbit meat as functional food. *Meat Sci.*, 88: 319-331. <https://doi.org/10.1016/j.meatsci.2011.02.017>
- Daszkiewicz T., Gugolek A., Kubiak D., Kerbaum K., Burczyk E. 2021. The fatty acid profile of meat from new zealand white rabbits raised under intensive and extensive production systems. *Animals*, 11: 3126. <https://doi.org/10.3390/ani11113126>
- Fiala N. 2008. Meeting the demand: An estimation of potential future greenhouse gas emissions from meat production. *Ecol. Econ.*, 67: 412-419. <https://doi.org/10.1016/j.ecolecon.2007.12.021>
- Fortun-Lamothe L., Litt J., Coutelet G., Gidenne T. 2012. A participatory approach to define objectives, criteria and indicators for evaluating the sustainability of rabbit rearing units. In Proc.: *10th World Rabbit Congress, 3-6 September 2012, Sharm El Sheikh, Egypt, 821- 825*. <http://world-rabbit-science.com/WRSA-Proceedings/Congress-2012-Egypt/Papers/04-Management/M-Fortun-Lamothe-02.pdf>. Accessed February 2023.
- Fox N., Ward K. 2008. Health, ethics and environment: A qualitative study of vegetarian motivations. *Appetite*, 50: 422-429. <https://doi.org/10.1016/j.appet.2007.09.007>
- Gerencsér Z., Matics Z., Nagy I., Princz Z., Orova Z., Bíró-Németh E., Radnai I., Szendrő Z. 2008. Effect of light stimulation on the reproductive performance of rabbit does. In Proc.: *9th World Rabbit Congress, 10-13 June 10-13, 2008, Verona, Italy, 371-374*. <http://world-rabbit-science.com/WRSA-Proceedings/Congress-2008-Verona/Papers/R-Gerencser2.pdf>. Accessed February 2023.
- Gidenne T., Lebas F., Fortun-Lamothe L. 2010. Feeding behaviour of rabbits. In: *De Blas J.C. and Wiseman J. (ed). Nutrition of the Rabbit, (2nd ed.)*. CABI Publishing, Wallingford, UK, 254-274. <https://doi.org/10.1079/9781789241273.0254>
- González-Redondo P.A., Contreras-Chacón G.M. 2012. Perceptions among university students in Seville (Spain) of the rabbit as livestock and as a companion animal. *World Rabbit Sci.* 20: 155-162. <https://doi.org/10.4995/wrs.2012.1147>
- Hoffman L.C., Vosloo C., Nkhabutlane P., Schutte D.W. 2005. Associations with rabbits and rabbit meat of three different ethnic groups in Stellenbosch, South Africa. *Journal of Family Ecology and Consumer Sciences*, 33: 63-72. <https://doi.org/10.4314/jfec.v33i1.52866>. Accessed February 2023.
- Maertens L. 2010. Feeding systems for intensive production. In: *De Blas J.C. and Wiseman J. (ed). Nutrition of the Rabbit, (2nd ed.)*. CABI Publishing, Wallingford, UK, 275-288. <https://doi.org/10.1079/9781789241273.0275>

- Mancebo F. 2018. Urban agriculture for urban regeneration in the sustainable city. In: *Grifoni R.C., D'Onofrio R., and Sargolini M. (ed). Quality of Life in Urban Landscapes. The Urban Book Series. Springer, Cham, 311-317.* [https://doi.org/10.1007/978-3-319-65581-9\\_26](https://doi.org/10.1007/978-3-319-65581-9_26)
- McNitt, J.I., Lukefahr, S.D., Cheeke, P.R., Patton, N.M. 2013. *Rabbit Production, (9th ed.)*. CABI Publishing, Wallingford, UK, pp. 300. <https://doi.org/10.1079/9781780640129.0000>
- Medenou E.H., Koura B.I., Dossa L.H. 2021. Typology and sustainability assessment of rabbit farms in the urban and periurban areas of Southern Benin (West Africa). *World Rabbit Sci.*, 28: 207-219. <https://doi.org/10.4995/wrs.2020.13368>
- Modlinska K., Adamczyk D., Maisson D., Pisula W. 2020. Gender differences in attitudes to vegans/vegetarians and their food preferences, and their implications for promoting sustainable dietary patterns – A systematic review. *Sustainability*, 12: 6292. <https://doi.org/10.3390/su12166292>
- Mondin C., Trestini S., Trocino A., Di Martino G. 2021. The economics of rabbit farming: A pilot study on the impact of different housing systems. *Animals*, 11: 3040. <https://doi.org/10.3390/ani11113040>
- Morales R., Aguiar A.P.S., Subiabre I., Realini C.E. 2013. Beef acceptability and consumer expectations associated with production systems and marbling. *Food Qual. Prefer.*, 29: 166-173. <https://doi.org/10.1016/j.foodqual.2013.02.006>
- Musto M., Cardinale D., Lucia P., Faraone D. 2015. Influence of different information presentation formats on consumer acceptability: The case of goat milk presented as obtained from different rearing systems. *J. Sens. Stud.*, 30: 85-97. <https://doi.org/10.1111/joss.12140>
- Mutsami C., Karl S. 2020. Commercial rabbit farming and poverty in urban and peri-urban Kenya. *Front. Vet. Sci.*, 7: 353. <https://doi.org/10.3389/fvets.2020.00353>
- Nilsson K. 2017. *Livscykalanalys av kaninkött – med fokus på klimatpåverkan*. RISE Research Institutes of Sweden. 6P05942, pp. 42. [In Swedish] <https://kaninproducenterna.se/lca.html>. Accessed February 2023.
- Notarnicola B., Tassielli G., Renzulli P.A., Castellani V., Sala S. 2017. Environmental impacts of food consumption in Europe. *J. Clean. Prod.*, 140: 753-765. <https://doi.org/10.1016/j.jclepro.2016.06.080>
- Petrescu D.C., Petrescu-Mag R.M. 2018. Consumer behaviour related to rabbit meat as functional food. *World Rabbit Sci.*, 26: 321-333. <https://doi.org/10.4995/wrs.2018.10435>
- Sanah I., Becila S., Djeghim F., Boujdjellal A. 2020. Rabbit meat in the east of Algeria: motivation and obstacles to consumption. *World Rabbit Sci.*, 28: 221-237. <https://doi.org/10.4995/wrs.2020.13419>
- Sanyé-Mengual E., Specht K., Krikser T., Vanni C., Pennisi G., Orsini F., Gianquinto G.P. 2018. Social acceptance and perceived ecosystem services of urban agriculture in Southern Europe: The case of Bologna, Italy. *PLoS ONE*, 13(9): e0200993. <https://doi.org/10.1371/journal.pone.0200993>
- Saxmose Nielsen S., Alvarez J., Bicout D.J., Calistri P., Depner K., Drewe J.A., Garin-Bastuji B., Gonzales Rojas J.L., Gortázar Schmidt C., Michel V., Miranda Chueca M.A., Roberts H.C., Sihvonen L.H., Spoolder H., Stahl K., Velarde Calvo A., Viltrop A., Buijs S., Edwards S., Candiani D., Mosbach-Schulz O., Van der Stede Y., Winckler C. 2020. Health and welfare of rabbits farmed in different production systems. *EFSA Journal*, 18(1): 5944. <https://doi.org/10.2903/j.efsa.2020.5944>
- SCB. 2021. Statistics Sweden. <https://www.scb.se/en>
- Schröder M.J.A., McEachern M.G. 2004. Consumer value conflicts surrounding ethical food purchase decisions: a focus on animal welfare. *Int. J. Consum. Stud.*, 28: 168-177. <https://doi.org/10.1111/j.1470-6431.2003.00357.x>
- Sims V.K., Chin M.G., Yordon R.E. 2007. Don't be cruel: Assessing beliefs about punishments for crimes against animals. *Anthrozoös*, 20: 251-259. <https://doi.org/10.2752/089279307X224791>
- Spain C.V., Freund D., Mohan-Gibbons H., Meadow R.G., Beacham L. 2018. Are they buying it? United states consumers' changing attitudes toward more humanely raised meat, eggs and dairy. *Animals*, 8, 128. <https://doi.org/10.3390/ani8080128>
- Specht K., Weith T., Swoboda K., Siebert R. 2016. Socially acceptable urban agriculture businesses. *Agron. Sustain. Dev.*, 36, 17. <https://doi.org/10.1007/s13593-016-0355-0>
- Szendró K. 2016. Consumer perceptions, concerns and purchasing practices of rabbit meat in Hungary. *J. Food Prod. Mark.*, 22: 683-693. <https://doi.org/10.1080/10454446.2015.1121437>
- Szendró K., Szabó-Szentgróti E., Szigeti O. 2020. Consumers' attitude to consumption of rabbit meat in eight countries depending on the production method and its purchase form. *Foods*, 9(5): 654. <https://doi.org/10.3390/foods9050654>
- Trocino A., Xiccato G. 2006. Animal welfare in reared rabbits: a review with emphasis on housing system. *World Rabbit Sci.*, 14: 77-93. <https://doi.org/10.4995/wrs.2006.553>
- Tukker A., Jansen B. 2006. Environmental impacts of products: A detailed review of studies. *J. Ind. Ecol.*, 10: 159-182. <https://doi.org/10.1162/jiec.2006.10.3.159>
- Varga M. 2014. *Textbook of Rabbit Medicine*. New York, Elsevier, pp. 494. <https://doi.org/10.1016/C2011-0-05821-0>



## APPENDIX 1: QUESTIONNAIRE DESIGN

### 1. Basic information

First, you have to answer a few short questions about who you are.

How do you identify yourself?

- Man
- Woman
- Other/ Do not want to specify

What kind of city or community did you grow up in?

- Big city (Stockholm, Göteborg, Malmö, Uppsala)
- Small city (less than 200 000 inhabitants)
- Countryside

Do you eat meat and/or fish?

- Yes
- No (I am a vegetarian/vegan)

Do you have any experience with animals? Either from own animals in the family or via e.g. riding school, volunteer work or internship.

- I have experience with pets (e.g. horse, dog, cat, guinea pig, snake, bird)
- I have experience with farm animals (e.g. cows, pigs, sheep, chickens)
- I have experience with both pets and farm animals
- I lack experience with animals

### 2. Introduction

On the following three pages, three different forms of production for rabbit meat will be presented. After a brief description of the production method, you are asked to answer whether you think it seems to be an acceptable way of producing meat.

### 3. Industrial rabbit production

The rabbits are usually raised in smaller cages with automated feeding and water nipples. The food mainly consists of energy-rich pellets. The breeding females are usually kept alone and fertilized artificially.

Based on your current knowledge. Would you say this is an acceptable form of production?

- Not acceptable at all
- 1
- 2
- 3
- 4
- 5
- 6
- 7

- 8
- 9
- Very acceptable

**VOLUNTARY**

Why do you think that?

---



---



---

**4. Extensive rabbit production**

The rabbits can be kept indoors or outdoors in larger cages, pens or enclosures, with relatively little use of resources or technical aids. Breeding can also be a combination of indoors and outdoors. The animals are then raised on a large proportion of pasture or hay. Fertilization occurs by natural mating.

Based on your current knowledge. Would you say this is an acceptable form of production?

- Not acceptable at all
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- Very acceptable

**VOLUNTARY**

Why do you think that?

---



---



---

**5. Urban rabbit production**

The rabbits are raised in apartments, houses or premises inside the cities. It is possible because rabbits are small in stature, smell very little and are quiet animals. Feeding and animal husbandry can vary greatly.

Based on your current knowledge. Would you say this is an acceptable form of production?

- Not acceptable at all
- 1
- 2

- 3
- 4
- 5
- 6
- 7
- 8
- 9
- Very acceptable

**VOLUNTARY**

Why do you think that?

---



---



---

**6. Summary**

Now only a couple of summary questions remain.

Which of the production forms for rabbit meat do you think works best?

- Industrial rabbit production
- Extensive rabbit production
- Urban rabbit production

Rank the three things you generally think are most important when choosing meat to consume, so that 1 is most important followed by 2 and 3. (Even if you don't buy or eat meat yourself, you can answer what you think people who do should think about.)

	1	2	3
Low emissions of greenhouse gases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Positive impact on biological diversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locally produced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cheap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good animal welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meat quality (including taste and texture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**VOLUNTARY**

If you have any other comments, you can leave them here.

---



---



---

Thank you so much for taking the time to help me with my thesis and contribute to further research in the subject!  
[translated from Swedish to English with Google Translate]

## APPENDIX 2. RESPONDENT MOTIVATIONS

---

### Respondents' motivations for acceptance (ranked 0–10) for industrial rabbit production [translated from Swedish to English with Google Translate].

---

- Thinks that animals should live freely under tolerable conditions. Prefer vegetarian if I don't know that the animals had a good time (e.g. venison feels okay) (0)
  - It is not humane to raise and slaughter rabbits for food. It is also not worthwhile as there is too little meat on a rabbit compared to a cow, therefore many more rabbits must be slaughtered to get as much meat as on a cow. (0)
  - Clearly shows that the animals are not treated in an acceptable way as they neither move nor are allowed to socialise with others (0)
  - It is unnatural, inhuman and cruel behaviour. You play with other creatures and mass produce life in a disgusting way. (0)
  - This is not acceptable because they are kept captive during their upbringing and the food they get is not a good and healthy food which in turn leads to animal abuse (0)
  - No (0)
  - Because it is animal cruelty (0)
  - I understand that it is effective, but it does not work. That's the reason I buy organic. (0)
  - Involuntarily born into this world to be held captive for the purpose of being euthanized and become food. In contrast to cows, pigs and other mammals that are allowed to live freely until their last day even if their purpose is to become food. Only eats moose meat that we shot ourselves, but the moose live completely freely. "fertilized artificially" turns even where nature's own path goes in the wrong direction solely for the sake of the environment. We still cannot save the environment, at best slow down. Not an environmental gnome, but mostly curious about the survey, less about everything to do with the environment. +-0 on everything no matter what happens. (0)
  - Shit (1)
  - Does not feel good that they are in small cages and alone, think they are better together somewhere they can move more freely (1)
  - Animals should be allowed to live freely, this is animal abuse. (1)
  - They should be allowed to be free in an area and not in a cage, regardless of the size of the cage (1)
  - They get food, but not much more than that (2)
  - Smaller cages are not acceptable. Preferably not artificial humidification (2)
  - Since there are better methods, you shouldn't do it this way (3)
  - Not okay for the rabbits in that way, but sometimes you need to mass produce in these ways to be able to make money for the day. These ways are most common in poor countries, so I don't think we would have come across this way of production in Sweden either. (4)
  - They live only to do it (7)
  - We need protein and produce it sustainably (9)
  - They get food (10)
  - An efficient way to produce meat (10)
- 

### Respondents' motivations for acceptance (ranked 0–10) for extensive rabbit production [translated from Swedish to English with Google Translate].

---

- Not humane keeping rabbits in cages in the manner described. (0)

---

**Respondents' motivations for acceptance (ranked 0–10) for extensive rabbit production**

[translated from Swedish to English with Google Translate].

---

- Don't think we humans should play gods. It is still unnatural, no matter how much you want to describe it as natural. (0)
  - No (0)
  - I don't really know (1)
  - More free but still absurd. To meet the "need" compared to the slaughter of a cow, there are absurd amounts of slaughtered rabbits. (2)
  - Better treatment of the animals, the LIVING creatures. Less funds, more security. (3)
  - I think it is a great method as it has more freedom and can move within larger areas (3)
  - Better but still (5)
  - More okay than the previous option, prefer game meat (5)
  - Better way but can be very expensive for the "farmer" (6)
  - A pretty good way to keep track of the rabbits and as long as you don't do anything else shady, this sounds okay. (7)
  - You must not pressure the animals (8)
  - More freedom, even though they are caged, they probably have quite a lot of space. (8)
  - Feels good as a good and reasonable method that is similar to other types of meat production in Sweden. (10)
  - They grow up in a more natural way (10)
  - Yes (10)
  - They can live as they want (10)
  - Also a good way to produce meat (10)
  - Natural (10)
  - It feels like the animals are treated with great respect. (10)
  - This method is great for the rabbits, but if you look at the financial aspects, it is not so good as it almost decides over themselves. (10)
- 

**Respondents' motivations for acceptance (ranked 0–10) for urban rabbit production**

[translated from Swedish to English with Google Translate].

---

- As I said, rabbits should not be bred indoors, either as pets or as food. (0)
- Strange:/ (0)
- They should grow up in nature (0)
- Shit (1)
- Not optimal. As a human being, I would not have wanted to be born and grow up in a small cage. I understand that this method may seem easy to get away with as the rabbit does not require much. But at the same time, it is not normal to let a rabbit live so limited, there must be security, knowing when you get food and that you actually get food. Proximity and see more of the world than just walls. (1)
- Absolutely not, I think the rabbits should be outside, in which case have a much larger area
- Rabbits must be allowed to be in nature where they are meant to be (1)
- Animals should be in there designated areas, not in cities. Allergy risk (1)
- No! There is no reason to have such production in the cities. (1)

---

**Respondents' motivations for acceptance (ranked 0–10) for urban rabbit production**  
[translated from Swedish to English with Google Translate].

---

- It may sound shady, but I think you should keep places of residence and food production separate. The rabbit also learns not to try. (2)
  - Bad then few people I know, incl. me, want to eat their pets. Emotional ties should not be attached to the animal one is going to eat. This will probably make it difficult to achieve large-scale production. The only positive is that the rabbit gets company and also people, but does it feel so good indoors? It is also a question (3)
  - This is not e. Better method than the others because the animals are not allowed to be outdoors but are raised indoors and kept there for a long time. Then it is probably a family that has that rabbit indoors and if there are small children maybe they feed them things they shouldn't ingest or maybe the family does not care about the rabbit (3)
  - Should they be eaten? (3)
  - Trapped (3)
  - It depends entirely on how the animals are kept. If the rabbit is allowed a lot of freedom in the home, it is good, but otherwise not. (5)
  - It is ok to have it as a pet, as long as it feels good in the environment. (8)
  - And therefore (10)
  - They get good lives (10)
  - Good, the children can take care of the rabbits when they are small, then when the rabbits are big, you can cook rabbit stew (10)
- 

**Other comments (refined for anonymity)** [translated from Swedish to English with Google Translate].

---

- I wouldn't buy rabbit meat if it came on the market. If meat production is a problem in the future, I can imagine eating vegetarian.
  - If rabbit meat production is to become an established commodity in the business, people should differentiate between rabbits for meat production and pets. I think all animals should be happy but I think people feel sorry for the rabbit because it is cuter than a pig.
  - The meat is most important because it is the one I buy.
  - We shouldn't eat rabbits.
  - Industrially may be most efficient, but they are still animals.
  - Don't eat meat, only fish, so don't like either option.
  - No. Rabbit meat good.
  - It does not feel so bad to eat rabbit meat. In addition, it is difficult to obtain. They are never sold in stores.
  - I think they are very tasty with rabbit meat, however, they are a bit sad considering that I am a vegetarian and that I really shouldn't eat meat, but since I am quite bad at sticking to what I say, I eat meat anyway but still choose to identify as a vegetarian as it is very hip and 'down with the kidz'.
  - I know that many people have a sceptical attitude towards eating rabbit meat, just like eating meat from, for example, horses. I myself haven't really thought about rabbit as an alternative for today's meat consumption, so it was good that you brought it to my attention.
  - Rabbit meat is super tasty.
  - The questionnaire is broken. Can only answer with one of each number.
-