



The acceptance of crickets as food source



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Introduction

Two hundred grams of crickets and three water bugs please. In the future there is a big chance that insects will be sold as common as other traditional types of meat in the western civilization. Insects can be produced in a far more sustainable way than regular livestock, and contain around the same nutritive values. The production of traditional meat requires a lot of resources like water, feed, land space and the production produces a lot of emissions. To improve the food system entomophagy (the practice of eating insects) could play a big role.

So far in most places of western society, and so in Amsterdam, it is not seen as 'normal' to do entomophagy even though it has benefits and is common in other places worldwide.

Most people in the civilized world do not accept insects as a food source, this is a big bottleneck for implementing insects in the food market. This research is done to get an insight on acceptance of eating insects in Amsterdam and how this could possibly be improved. Experience and education are tested to see if these factors influence the acceptance of crickets as a food source.

The goal is to see if education and experience, or a combination of both, influence the acceptance of eating crickets. This information could be used to start selling cricket containing products in Amsterdam. Eighty participants from Amsterdam collected at three different food events are divided into four groups, each group represents a factor: experienced, educated, experienced and educated, or baseline group. All participants are served crickets and their reaction and opinions are registered.

In the first chapter the relevance of the study is made clear, followed by the problem statement. The next two chapters describe the method and results. As last the discussion, conclusion and recommendations are given.

Summary

Compared to other livestock, insects contain the same essential nutritional value, but can be produced in a far more sustainable way. Insects could therefore play an important role in food security and improvement of the current non-renewable food system.

Generally, in the westernized world, including the progressive Amsterdam, insects are not accepted as a food source. As acceptance improves, insects could be implemented in the food system. Crickets are an appropriate insect type for testing the acceptance of the consumption of insects, as they are more accepted than other species to begin with.

This research explores the influence of experience and education on the acceptance of the practice of eating crickets. During three food events in Amsterdam, 80 participants were asked to eat crickets. 20 participants functioned as the control group. 20 participants were part of the educated group, which were told the benefits of eating cricket before the test. 20 participants were part of the experienced group; these persons already ate insects before the test. The last 20 persons were part of the combination group (both educated and experienced). The participants were asked to give the crickets a score on taste from 1 to 5, and not eating the crickets was counted as 0. To see if there were differences between these groups, the scores of each group were compared. A significant difference between the control group and the other three groups was found, suggesting that experience and education influenced the acceptance of the event visitors.

After serving the participants the crickets, they were asked about their opinions. This revealed that grinding and processing the crickets into products could lead to more acceptance. Opinions of others also influence the acceptance of food, as does the way the crickets are presented. Most participants would eat crickets again.

This information could be used to improve the acceptance of crickets as food source by food event visitors in Amsterdam.

Dutch summary

Insecten zijn een voedingsbron die vergelijkbaar is qua voedingswaarden met andere soorten vlees, alleen kunnen insecten in een veel duurzamere manier geproduceerd worden. Ook kunnen insecten een bijdrage leveren aan het verbeteren van de voedselzekerheid, en het huidige niet hernieuwbare voedselsysteem.

In het algemeen zijn insecten in de westerse samenleving, inclusief het vooruitstrevende Amsterdam, nog niet geaccepteerd als voedsel. Wanneer de acceptatie wordt vergroot, kunnen insecten als voedselbron benut gaan worden. Omdat krekels doorgaans worden beschouwd als minder vies dan andere insecten, is dit de juiste soort om mee te beginnen. Voor dit onderzoek worden er dus krekels gebruikt om de acceptatie te onderzoeken.

In dit onderzoek is onderzocht of ervaring en educatie invloed hebben op de acceptatie van het eten van krekels doormiddel van smaak. Op drie verschillende voedsel evenementen in Amsterdam zijn in totaal 80 participanten benaderd, welke werden gevraagd krekels te proeven. 20 participanten representeerden de controle groep. 20 participanten representeerden de educatie groep; deze participanten zijn ingelicht over de positieve aspecten van het eten van krekels voor deze de krekels voorgeschoteld kregen. 20 participanten representeerden de ervaren groep; deze personen hadden al eerdere ervaring met het eten van insecten voor de test. De laatste 20 participanten representeerden de combinatie groep (zowel ervaren als geëduceerd). Elk persoon werd gevraagd hoe lekker ze de krekels vonden op een schaal van 1 tot en met 5, en het niet eten van de krekels gaf een score van 0. De gemiddeldes van de groepen zijn vergeleken en er was een significant verschil tussen de controle groep en de andere 3 groepen. Dit indiceert dat onder de gasten van de evenementen ervaring en educatie de acceptatie van voedsel heeft beïnvloed.

Ook werd naar verdere meningen van de participanten gevraagd. Hieruit bleek dat het vermalen en verwerken van krekels tot een ander product kan leiden tot meer acceptatie. Verder zouden meningen van andere personen en de manieren van het presenteren van de krekels de acceptatie kunnen vergroten. De meeste participanten zouden nogmaals krekels eten.

Deze informatie zou gebruikt kunnen worden om de acceptatie van het eten van krekels op Amsterdamse voedsel evenementen te vergroten.

Relevance

Insects seem to be a very good alternative protein source compared to regular large livestock. Van Huis et al. (2013) found that water and feed usage, greenhouse gas emissions and land space for the production are far less, and with this the environmental impact. Van Huis et al. (2013) also found that the risk of transmittable infections is lower in insects compared to other animals, and that there are possibilities to use organic side streams in the production. The pollution and impact are way less when eating insects instead of other more traditional meats, and nutritive values of insects are comparable (Mlcek et al. 2014). With the growing world population and accompanying rises in pollution, the food systems of these days need to be changed (Metabolic, 2015). According to Van Huis et al. (2012) it is time for insects to enter the food market in the Netherlands.

In a recent study, Metabolic (2015) found that the worldwide food system is a non-renewable system with many problems like loss in biodiversity and pollution. One way of improving the current food system is using waste streams to produce food in a circular way. And for this Metabolic is looking for innovative closed loop food production systems. By using insects waste streams could possibly be reused in food production systems. This won't be discussed further in this rapport.

Mlcek, Rop, Borkovcova, And Bednarova (2014) found that eating insects has health benefits for humans because of the nutritional values. Feed and water use, and also greenhouse emissions are minor compared to other livestock. T Dossey (2015) found that crickets need only 2kg of feed for 1kg of weight gain. This is way more efficient as for instance regular cow meat production, which needs 24kg of feed for 1 kg of meat (Van Huis et al. 2013).

D'Costa described that we as humans from Western society don't like eating. The main problem is that insects are always associated with bad aspects and most people are disgusted by them. This is why most people generally do not eat insects. Even though there are many obvious positive aspects, like mentioned above.

In 2013, Riggi, Veronesi, Verspoorn, and Macfarlane found that entomophagy (the practice of eating insects by humans) and big scale rearing could as well play a big role in food security. The separation of wealth, and the increasing world population lead to lack of food in some parts of the world. Entomophagy is one of the solutions the research above found. So when entomophagy is applied more in the Netherlands, lack of food elsewhere could decreased. But before most people will finally eat cultivated insects as normal food, small steps need to be taken.

Crickets are not associated with negative aspects like most other insects, which is why they are a good choice for one of the first insect- based foods in the Netherlands. Even compared to mealworms and locusts CO² emissions are less (Van Huis et al. 2012). The difference between the CO² emissions of a cricket (2grams/kg of growth) and the cow (2850grams/kg of growth) is immense. Therefore dirty air problems and other issues associated with global warming, won't be such a big issue in comparison with traditional meat production.

The regulation in the European Union allows only ten types of insects to trade and/or breed for human consumption (Duurzaamsecteneteten, 2013). Because of this regulation only these ten

insects species could be used in a food system that produces insects for humans consumption. Two of these insects are crickets, The Band cricket/Tropical house cricket and the House cricket (J. Walker, 1999). Crickets look more like shrimps (a delicatessen) and many humans are reminded of the tweeting sounds of the sweet summer nights, which is a positive phenomenon (De Jong, 2013). This makes crickets a good start in the transition to eating insects by humans.

Crickets are currently not commonly eaten in western countries, even though there are benefits related to eating them. Why this is not happening is not entirely clear, there are many factors that could have an influence. For instance, crickets are rarely available at shops and restaurants, crickets are too expensive, eating crickets is not part of the western culture, crickets are not accepted as food, it is not known that crickets are edible etc.

In 2011, Derkzen Dries and Pascucci found that Insects are good meat replacers, and with this eating insects could improve the problems that come with eating meat. However, acceptance in western countries is lacking. Acceptance seems to be the bottleneck in western countries. And therefore, in Amsterdam as well. How to improve the acceptance will be tested in this research with crickets.

With all the positive aspects mentioned above, I personally would like to play a role in the market improvement of insects as a food source. This could be done by starting a new company, by working for Metabolic or working together with Metabolic. One way of how I would like to do this, is by making a truck/trailer where products containing crickets are promoted and sold at events in and around Amsterdam.

The research results of this analysis could possibly improve the likelihood of doing this successfully. But before producing any food out of crickets or entering the market, it should be known when people will actually accept to eat crickets.

The rapport is written on behalf of Metabolic, an innovative company that focuses on systems consulting and cleantech development.

The target group consists of innovative food consumers in Amsterdam, which are one of the first to try the newest food trends. The rest of the consumers in Amsterdam could hopefully follow their example later on. By implementing crickets in the daily diets of consumers the benefits of eating crickets will be obtained.

Problem statement

In order to transition towards a more sustainable food system, the replacement of livestock with other protein sources as crickets is likely to be essential. However, acceptance of eating crickets is one of the bottlenecks in western countries (Derksen, Dries and Pascucci, 2011). Meaning that when the acceptance is improved, more people will eat crickets and a bigger market could be created. This is why this research is done to see when food festival visitors from Amsterdam will eat them instead of other resources.

Boechx and Van Der Borght (2014) already indicated that: "The inclusion of insects is accepted by western consumers when they are unrecognizably processed into ready-made snacks, and when the appearance, flavor, mouthfeel and texture of the snack are experienced as "normal"".

Van Huis et al. (2013) think: "The question of whether edible insects can be accepted as a food item and become a part of food habits in Western societies depends on at least two crucial factors: availability and learning". This hypothesis is tested on a random selected group of participants in Amsterdam during three different food events with crickets as insect species. The goal is to give an indication of the truth of this hypothesis. Generalization on bigger groups will not be possible with the results. But the result could give an indication on how to improve acceptance in Amsterdam even more, besides processing crickets in the right way. Availability is represented by eating insects for the second time by the participants, and learning is represented as the participants are explained the benefits of eating insects. The information given to the participants is shown in the appendix. The more the taste is appreciated, the more the crickets are accepted as a food source.

Perreau (2014) described the four factors that influence the behavior of consumers. 'Cultural factors' are the factors that determine the cultural environment a consumer grows up in; 'Social factors' are the social groups consumers are member of; 'Personal factors' are the factors that are influenced by the personality, and 'Psychological factors' are factors such as motivation, perception, learning, beliefs and attitudes.

In 2005 Bellisle described five factors that influence food choice, 'Biological determinants' such as hunger, appetite and taste; 'Economic determinants' such as cost, income and availability; 'Physical determinants' such as education, skills and time; 'Social determinants' such as culture, family, peers and meal patterns; and 'Psychological determinants' such as mood, stress and guilt.

Both cases could be used to improve the acceptance of food by influencing the consumers' food choice. Both found that education/knowledge plays an important role in influencing consumer behavior and food choice. In Perreau's case it is a part of the Psychological factor and in Bellisle's case a part of the Physical determinant, they described that by learning something about the food, the knowledge influences the food choice. Perreau found in 2014 that culture is of value in consumer behavior, one part of culture is the environment around a person and this influences this person.

In the case of food acceptance, the food that you see, experience and know is your culture, which is why you accept it. Bellisle (2005) found as well that culture is an important factor influencing food choice. And the availability is part of the Economic determinant. Availability could come also together with experiencing.

The research results of this analysis could possibly be one step closer to successfully implementing entomophagy in Amsterdam. But before producing any food out of crickets or entering the market, it should be known when people will accept eating insects. In order for the Amsterdam people to eat crickets, acceptance needs to be improved, as this is currently lacking.

Main question;

- How does education and experience influence the acceptance of the practice of eating crickets regarding to taste?

Sub questions;

- What is the effect of explanation of the benefits of eating crickets on acceptance of the practice of eating crickets regarding to taste?
- What is the effect of eating crickets for the second time on the acceptance of the practice of eating crickets regarding to taste?
- What is the effect of the combination of both on the acceptance of the practice of eating crickets regarding to taste?

Hypothesis;

- When people eat insects for the second time, acceptance regarding to taste will be improved. If the benefits of eating crickets is explained, acceptance regarding to taste will be improved. If both benefit explanation and eating crickets are there prior to tasting, acceptance regarding to taste will be improved even more as just one standing alone.

Method

This combination of qualitative and quantitative research is done with in total eighty randomly selected participants from Amsterdam that were present during three different food events. These eighty participants form in total four groups. The four groups are defined as the baseline group (#1), the educated group (#2), the experienced group (#3) and the experienced and educated group (#4). Each participant was served some crickets and was asked to eat them, after this three questions were asked.

- For group #1 nothing else happened.
- For group #2 the benefits of eating insects was explained before offering them to taste the crickets. The information that was given before the tasting session is shown in the appendix.
- Group #3 ate insects before, and was offered to taste the crickets.
- For group #4 the benefits of eating insects were explained and the participants ate insects before. The information that was given before the tasting session is shown in the appendix.

The three questions that were verbally asked to the participants;

1. How did you like the crickets in a Scale of 1 to 5 (1=dirty and 5=very tasty)? If a participant refuses to try eating the crickets the participant still counts but the score will be 0, completely not accepted.
2. Would you eat crickets again?
3. What did or didn't you like about eating the crickets?

The answers were written down by the interviewer.

The influence of experience was tested by seeing how previous experience of eating insects has effect on the acceptance. The influence of education was tested by seeing how explanation of the benefits of the practice of eating crickets has effect on the acceptance.

The scores of question 1 were analyzed in SPSS, a predictive analytics-software, and a oneway Anova analysis was done to see if there was a significant difference between the four groups. In this way opinion changes after participants are educated, experienced or both on the practice of eating crickets was found out.

Fresh crickets were used, as fresh crickets contain more flavor (Van Huis, 2012). Before consuming, the crickets were exposed to heat so health risks were limited (Bureau risicobeoordeling & onderzoeksprogrammering, 2014).

For this research information about why humans should insects was necessary. This information was given to group #3 and #4 before tasting, to see if education (learning) influences their opinion and with this the acceptance. The information that was given before the test is shown in the appendix and is obtained from; <http://www.hopperatx.com/why-eat-insects/>

Nielsen (2006) found that for a quantitative research at least twenty participants need to be observed. Because of the lack of time and resources the minimum for each group was used, but which ensured a relevant indication.

Notes;

The acceptance was measured by looking at the taste rating.

To count as an experienced participant, the participants were supposed to have eaten insects at least one week before the test

The participants were visitors during three different food events in Amsterdam: 'rock out with your food out', 'guerrilla kitchen' and 'food market west'. The total amount of visitors of these three events was approximately six hundred. Food festival visitors were the target group because they are the frontrunners in food trends.

The acceptance was evaluated as tasty (dirty is no acceptance and tasty is acceptance).

The participants ate the crickets and were interviewed individually to avoid influences from each other. The interviewer was objective as well.

Even though time and resources are limited, this analysis will effectively give a good indication of the acceptance of eating crickets in the target group. |

results

Taste rating

The ratings of the baseline group (#1)

- 12 participants didn't eat the crickets,
- 2 participants rated 2 out of five,
- 3 participants rated 3 out of five,
- and 3 participants rated 4 out of five.

The ratings of the educated group (#2);

- 3 participants didn't eat the crickets,
- 9 participants rated 3 out of five,
- 7 participants rated 4 out of five,
- and 1 participant rated 5 out of five.

The ratings of the experienced group (#3);

- 2 participants didn't eat the crickets,
- 1 participant rated 2 out of five,
- 10 participants rated 3 out of five,
- 7 participants rated 4 out of five.

The ratings of the experienced and educated group (#4);

- 3 participants didn't eat the crickets,
- 3 participants rated 2 out of five,
- 10 participants rated 3 out of five,
- 3 participants rated 4 out of five,
- and 1 participant rated 5 out of five.

To analyze this data the scores were processed in SPSS, a predictive analytics-software. In the tables below (figure 1) the results of a oneway Anova comparison of the four groups is shown. In the bottom part of figure 1 (ANOVA) it shown that sig. is .000, which can be interpreted as .001. A significance <0.05 means that there is a significant difference in the scores between the groups.

When looking at the differences of the mean scores of the four groups in the upper part of figure 1 (Descriptives, a clear difference between the baseline group and the other three groups is seen. Group #2 and group #3 scored approximately the same, group number #4 scored a bit lower as group #2 and group #3.

Descriptives

| Rating | | | | | | | | |
|------------------------|----|--------|----------------|------------|----------------------------------|-------------|---------|---------|
| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
| | | | | | Lower Bound | Upper Bound | | |
| Baseline group | 20 | 1,2500 | 1,65036 | ,36903 | ,4776 | 2,0224 | ,00 | 4,00 |
| Experienced | 20 | 3,0000 | 1,16980 | ,26157 | 2,4525 | 3,5475 | ,00 | 4,00 |
| Educated | 20 | 3,0000 | 1,41421 | ,31623 | 2,3381 | 3,6619 | ,00 | 5,00 |
| Experienced & Educated | 20 | 2,6500 | 1,34849 | ,30153 | 2,0189 | 3,2811 | ,00 | 5,00 |
| Total | 80 | 2,4750 | 1,55876 | ,17428 | 2,1281 | 2,8219 | ,00 | 5,00 |

| ANOVA | | | | | |
|----------------|----------------|----|-------------|-------|------|
| Rating | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 41,650 | 3 | 13,883 | 7,020 | ,000 |
| Within Groups | 150,300 | 76 | 1,978 | | |
| Total | 191,950 | 79 | | | |

Figure1; oneway anova analysis.

Would the participants eat crickets again?

Almost everybody would eat crickets again. Except for the few vegans/vegetarians, and some others that didn't want to eat for the reason that they were disgusted by the idea. Some of the participants that didn't eat for the reason that they were disgusted by the crickets would have eaten them if the crickets were processed and grinded.

The information retrieved from the opinions of the participants

All information given in this section is included because at least three participants shared the same opinion.

The crickets were served plain grilled, a lot of the participants think crickets taste really nice with salt, herbs or processed in a dish.

Most participants thought the crickets tasted better as expected. Most people where positive.

Some things that the participants did like about eating the crickets; they taste like nuts, they have a nice crunch, they could be served as chips/peanuts with drinks, they have a nice fatty flavor, there is a long after taste.

Some things that the participants didn't like about eating the crickets; they taste like flour, the smell is not attractive, not very rich in flavor as how the crickets are served now, body parts like legs get stuck in throat and teeth, there is a long after taste, the visual aspect of complete crickets is not nice.

The question if other people ate the crickets before them was asked a lot by the participants. When replied yes; they tried as well. This means opinions of others could influence acceptance of the practice of eating crickets.

The way of presenting the food is important not just the food, because the crickets were kept in Tupperware and this is not a nice way of presenting. Participants would like to see the crickets presented in a more appealing way.

Notable was that the participants that were vegans/vegetarians could be divided into three groups with a different opinion. The one's that didn't want to try because of their point of view not eating meat at all. Some of them just tried for the research. And the others would even eat crickets again besides the research.

Discussion

Uncertainties

First of all the results just give an indication on the acceptance of eating crickets by food event visitors in Amsterdam; eighty participants can't fully represent all food event visitors but give just an idea. Some participants were colleagues of Metabolic, for this reason they might have been more open to the idea of eating crickets as other visitors.

Group #2 and group #4 used participants that ate crickets before and are seen as experienced. The problem with these participants is that they ate crickets before with a reason. This reason could be that the benefits were explained already. And with this there could be some overlap between these groups. Finding experienced participants was as well the toughest part of finding participants.

The results of this research are based on opinions. Extrapolating conclusions for a bigger group is not possible, because every person is unique. So are the moment, mood, stress, and external factors like the weather etc. which all influence the opinion.

Literature compared with the results

Looking at the scores described in paragraph "Taste ratings" (chapter "Results"), there is a distinct difference notable. The baseline group has a lot more participants that didn't want to try the crickets compared to the other three groups. J Pilgrim (n.d.) found that the acceptance of food appears when the food is consumed and so the criteria for food acceptance is in fact the consumption itself. This means education about the benefits of eating crickets, having eaten crickets before or a combination of both have influence on the acceptance of the practice of eating crickets.

Some of the participants didn't want to eat the crickets, but would have, if the crickets were served processed into a product. In other words, these participants would have accepted the practice of eating crickets if the crickets were processed. This is in line with the findings of Boeckx and Van Der Borgh (2014) that indicated that "The inclusion of insects is accepted by western consumers when they are unrecognizably processed into ready-made snacks, and when the appearance, flavor, mouthfeel and texture of the snack are experienced as "normal"".

The question if other people ate the crickets before them was asked frequently by the participants. When replied yes; they tried as well most of the time. This means opinions of others could influence acceptance of the practice of eating crickets. This matches with Bellisle's (2005) findings. In 2005 Bellisle described that social factors influence food intake, the opinions of other persons has impact on the food choice of one's.

In 2006, Imram found that the eyes could have the first taste of food, and with this influence the acceptance of it. Some participants mentioned that the way of presenting the crickets was not the best way. They thought when the visual aspect of the crickets was improved, the acceptance would be improved as well. This shows that simply correcting the way of presenting the crickets makes the rate of acceptance higher.

Conclusion

The hypothesis is semi-approved and semi-rejected. Between the baseline group and the other three groups a significant difference was found, therefore education and experience influence the acceptance of the practice of eating crickets in a positive way. However, a significant difference between group (#4) and group (#2) and group (#3) was not found. According to this finding, a combination of experience and education doesn't improve the acceptance of eating crickets more than just one of these influencing factors.

Grinding and processing crickets into products is also a good way of improving the acceptance of crickets as food source. In this way the negative aspects, like the visual aspect of complete crickets, and the problem of getting body parts stuck between teeth and in the throat, could be resolved.

From the research can be concluded that the visual aspects of crickets, and the opinions of others influence the acceptance of the practice of eating crickets. These factors; visual aspect and the opinion of another individuals can be used to improve the acceptance.

Recommendations

Recommendations for change

When selling or promoting crickets for food consumption, the proven factors that influence the acceptance could be used. Grinding and processing the crickets into a good-looking product would be the first step, as well as serving this product in a delightful way. The acceptance of possible consumers could be improved even more by educating them about the positive benefits of the practice of eating crickets. Finding people experienced in the practice of eating insect could help as well, since they might eat crickets faster as others. As last, it would be smart to show that more different people are eating the crickets, as opinions of others influence the acceptance.

Crickets seem to be nu- like; this knowledge can be used when trying out recipes. Existing recipes containing nuts could be used as example for new cricket containing recipes through replacing the nuts with crickets.

Recommendations for future research

This research found that the acceptance of Amsterdam civilians could be improved by education and experience from the past. Future research could focus on how to get more people educated about the benefits of eating crickets, and how to get more possible consumers experienced in the practice of eating crickets.

Experienced individuals scored better as participants that where not educated or experienced, but one difficulty during the process was finding the experienced participants in Amsterdam. It might help to see why and where these persons ate insects to make it easier to get more experienced consumers, and with this improve the acceptance.

This research and research of Bellisle (2005) found that other individuals influence the opinion of one's food choice. When someone around reports being positive about eating crickets, the chances are higher that a person will be more positive about it. How this could help improving the acceptance could be examined in future research.

Another way of improving acceptance is the visual aspect; making the crickets look more attractive could lead to a higher acceptance. To use this information, it is necessary to find the way of influencing consumers with the visual aspects that makes crickets even further accepted as food source.

To check if grinding and processing the crickets really works, the same research could be repeated with grinded and processed crickets. To compare the results with the results of this research and see if this makes a difference in acceptance.

It Is interesting to see why some vegans/vegetarians do want to eat crickets and some don't, to create a bigger market. However, improving the acceptance of vegans/vegetarians is not necessary when implementing crickets as food source is done for sustainability reasons, since vegans/vegetarians already don't accepts meat in their diet with the positive aspects with it.

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Appendix

The information given to be educated about the benefits of eating crickets;

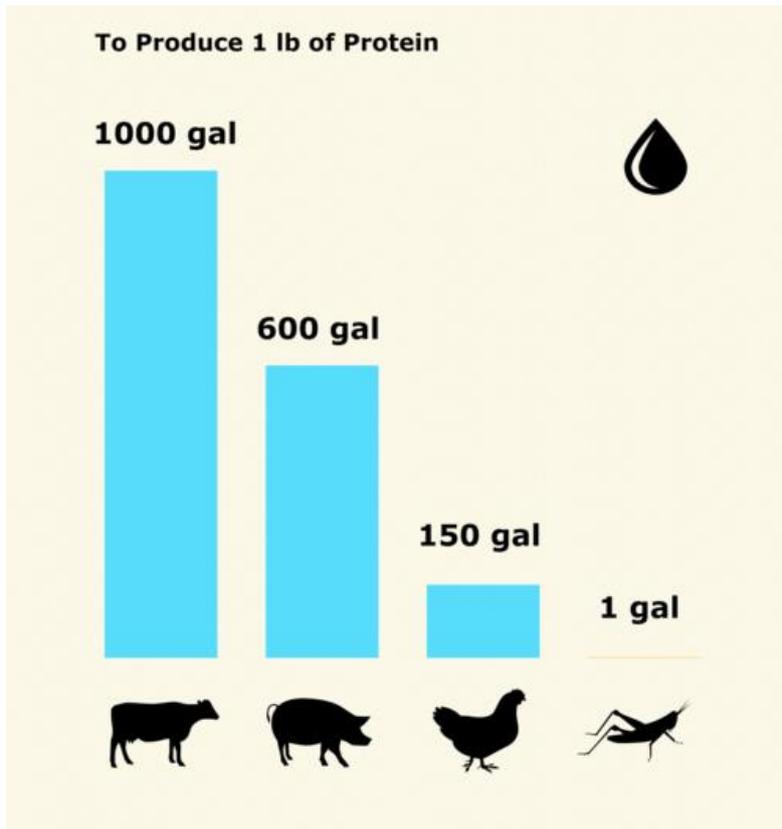
Crickets exist with marginal environmental impact. Insects are extremely efficient. They require very little feed, water and space and they mature and reproduce rapidly. They are packed with nutrients, low in saturated fat and they taste great.

CRICKETS ARE HEALTHY

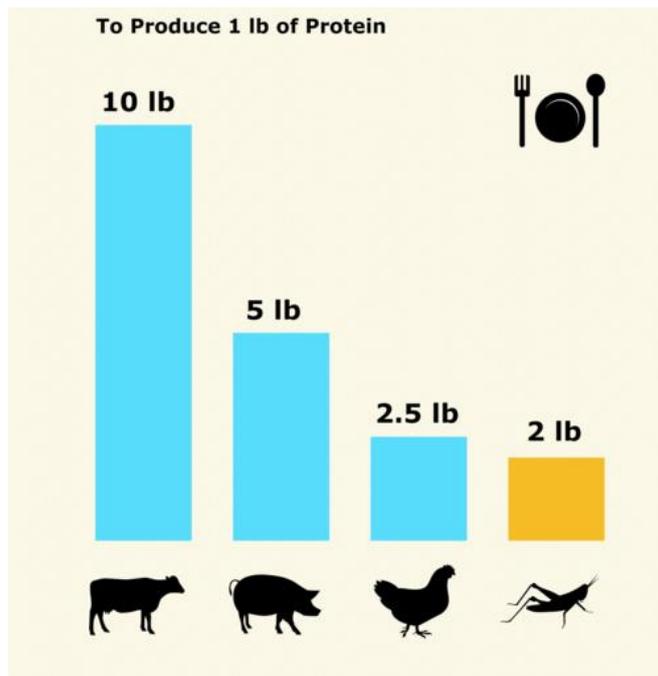
Crickets are rich in high quality protein, containing all 9 essential amino acids. Essential amino acids are those which cannot be synthesized by our bodies. They are also low in saturated fats and contain omega 3 fatty acids ("good fats"). They are also rich in micronutrients such as iron magnesium, zinc, calcium and vitamin B6 and B12.

CRICKETS ARE SUSTAINABLE

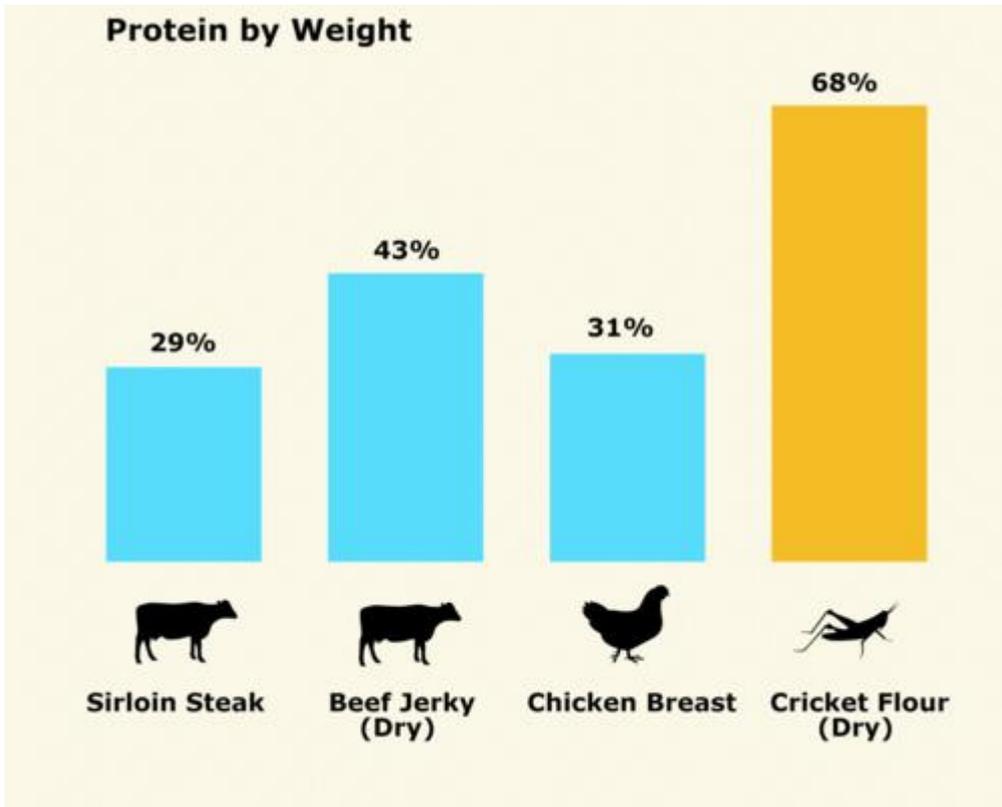
Cows require 10 lb of feed to produce 1 lb of protein, crickets only require 2 lb. They have a food conversion ratio that puts all livestock to shame and is also superior to chicken. Crickets are also extremely water efficient. To produce 1 lb of protein from cattle you need 1000 gallons of water. To produce 1 lb of protein from crickets you only need a single gallon of water. Crickets also produce 80x less methane than cattle. Methane is a greenhouse gas which is 20x more potent than carbon dioxide.



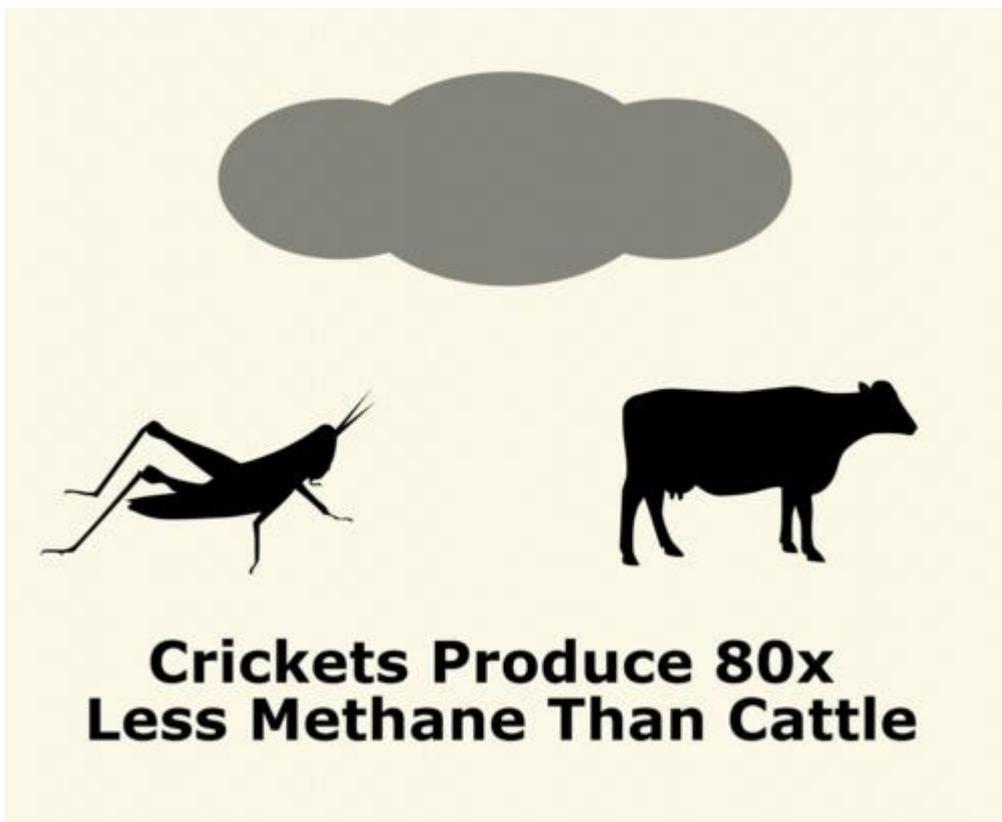
Water Requirements



Feed Requirements



Protein by Weight



Methane Emissions(Retrieved from: <http://www.hopperatx.com/why-eat-insects/>)

