

# Cost-Effectiveness Analysis of Challenge 22 by Animals Now

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# 1. Executive summary

## Introduction

This report analyzes [Challenge 22](#), an international program carried out by the Israeli charity [Animals Now](#). The program promotes veganism and reduction in meat consumption by encouraging individuals to take a pledge to change their diet for 22 days. Throughout the challenge and afterwards, participants have access to social support through Facebook groups aimed at helping them to follow through with the pledge, and to sustain their dietary changes in the long run.

## Cost-effectiveness estimates

The primary evidence we rely on for evaluating the cost-effectiveness of the program is a survey study published in 2019 (following participants who had signed up to the program during 2018). By integrating the results of this study with estimates on the scale and budget of the program (provided by Animals Now), we estimate that every 1 ILS of funding going into the program corresponds to a reduction in meat consumption of somewhere between 1 to 12 portions of meat for an average participant in the program over the course of the first 7 months after taking the pledge. In US dollars, we estimate that every \$1 corresponds to somewhere between 3 to 40 portions of meat (based on the exchange rate of October 2020 - 1 ILS for 0.29 USD).

While we only have solid evidence for dietary changes of participants following the first 7 months after taking the pledge, there are positive indications that these changes are robust and could persist for substantially longer time periods. Specifically, there is no significant difference between the dietary change observed after 7 months to that observed after 1 month. This suggests that the reduction in meat consumption could actually be substantially larger than the aforementioned estimate. If we assume, for example, that dietary changes following the program last 5 years on average, we would get that every 1 ILS of funding going into the program corresponds to a reduction in meat consumption of 9 to 100 portions of meat.

## Limitations and uncertainties

These cost-effectiveness estimates are subject to some important limitations of our analysis, which should be kept in mind when judging the impact of the program:

1. The numbers above describe the estimated change in meat consumption for participants who have joined the program, not direct causal effects. As the underlying study is observational, we don't have sufficient evidence to prove a causal link. However, we believe that the results look encouraging, and causal effects seem plausible.
2. The underlying study surveyed only Israeli participants, which comprise only about 10% of the program. As stated in the report, there are marked differences distinguishing the Israeli program. Our lower-bound estimate incorporates the assumption that the average magnitude of dietary change for non-Israelis is no less than 35% of the change for Israelis.



Much of the wide uncertainty range in our final estimate (with a 12-fold factor between the lower to the upper bound) is due to this limitation.

3. The report assesses the total magnitude of dietary changes per ILS based on data observed in the past. An important aspect of the program is that it is rapidly changing and evolving. While these changes are generally positive (reflecting attempts to scale the program and make it more cost-effective, with some indications of success), it also means that it is hard to extrapolate what the future cost-effectiveness of the program will be. Also, this report does not thoroughly tackle the question of how much room for more funding the program has.
4. There are some important limitations of the survey study on which our estimates for reduction in meat consumption are based. Most substantial is its reliance on self-reports from participants, which might be prone to social desirability or memory biases. Other, more minor potential limitations are detailed in the report.

On top of these limitations, there are other uncertainties which we have already factored into our analysis, and which have led to the wide uncertainty range in our final estimate. A more exhaustive summary of the limitations of our analysis can be found at the 8th chapter of the report.

Another point that should be kept in mind is that Challenge 22 is only one of several other activities pursued by Animals Now. In terms of budget, it comprises about 20% of the charity. We haven't analyzed the cost-effectiveness of the other programs.

As a result of all the many limitations of the analysis mentioned above, we encourage the reader not to take the numbers we have come up with too literally. Rather, this cost-effectiveness analysis should be interpreted as a rough estimate pointing at a general order of magnitude for the potential impact of the program.

## Conclusion

Despite all of the mentioned limitations and uncertainties, in the context of Israeli philanthropy this program is quite exceptional in terms of measurement and transparency standards and evidence for positive impact.

## 2. Challenge 22: program overview

Challenge 22 is an international campaign promoting veganism by encouraging participants to try a vegan or vegetarian diet for 22 days. The challenge is organized by Animals Now, an Israeli non-profit operating since 1994. The program's [website](#) (accessible in three languages: English, Spanish and Hebrew) allows users to sign up and take a pledge for a 22-day dietary change. After signing up, participants are automatically redirected and encouraged to join a Facebook group shared with other participants. They also start receiving a series of 11 emails with content related to the program and tips for vegetarian diet.



The program launched in 2013-2014 as a result of growing concerns in the animal rights movement about the problem of vegan and vegetarian recidivism, namely that individuals who turn vegetarian tend to resort back to their original diet and resume eating meat after a while (see for example [this report from 2014](#)). Animals Now decided to launch a new program that would not only encourage people to take a pledge, but also give them social support that would allow them to sustain the changes to their diet.

The Facebook groups that participants are encouraged to join are partitioned into cohorts of individuals speaking the same language who have signed up at approximately the same time, such that newcomers are generally not mixed with old members. This aims to make participants more comfortable sharing their experience, asking questions, interacting with each other and forming friendships. Within the groups, participants can also consult with nutritionists. Some statistics on the interaction of participants with the emails they receive and their activity on the Facebook groups are available in Appendix B.

Hebrew speaking Israeli participants, unlike the English and Spanish speakers, are also required to provide their phone number in the pledge form. After signing up, they receive a short phone call from a volunteer, and are sometimes also texted on WhatsApp. Similar attempts within the English program were deemed incompatible with the different culture and abandoned.

At the time of writing this report (October 2020), the development of an app for the program is underway. When the development is complete, most of the program's activity is planned to move to the new app, including the social groups (that are currently on Facebook). According to Animals Now, the Facebook platform has become less suitable for managing the groups. For example, Facebook has updated its algorithms to give less exposure to group posts on the news feed (as a general trend to give higher priority to content from friends), and it tends to block personal messages sent to users. It is hoped that the new app will foster a more continuous social interaction.

The daily operation of the program is mostly based on volunteers, with the most common role being a leader/mentor of a group (of one of the many cohort groups on Facebook). Leaders are responsible to directly assist participants, answering their questions, and giving them social support. Group leaders are trained in mentor schools (available in the three languages of the program). Mentor schools are themselves organized by another set of volunteers of a higher rank, called training supervisors. Training supervisors are senior leaders, and they are tutored in a one-on-one fashion. The nutritionists who give dietary advice to participants are also, for the most part, volunteers. There is one full-time employee responsible for the operation, which is the program's manager, and four part-time workers that receive a modest stipend. Animals Now reports that many former members of the program find it very fulfilling to volunteer and help new participants, and the more participants there are the more volunteers there will be to come from their ranks. Therefore, it is very plausible that recruiting volunteers won't become a bottleneck for the growth of the program.

### 3. Scope and costs of the program

Animals has provided us with the following data about the number of participants and costs of the program.

**Table 1: Number of participants and costs**

	January-May 2019	June-December 2019	January-May 2020
# of new participants in Israel	5,065	12,619	7,747
# of new participants in Spanish	0	19,572	37,238
# of new participants in English	31,873	59,552	38,515
Total # of new participants	36,938	91,743	83,497
Costs (ILS)	305,160	498,827	318,424
Costs (ILS) per new participant	8.26	5.44	3.81

The numbers of new participants refer to the overall website users who have taken the pledge by filling the online form with their personal details (see chapter 2).

According to financial statements that Animals Now showed us, the vast majority of the program's costs are fixed and don't directly depend on the scale of the program. Specifically, nearly 90% of the costs are for salaries and other human-resource payments (including social benefits) of Animals Now's employees. The rest of the budget goes to advertising (about 5-10%) and one-time projects. Of these costs, only advertising grows linearly with the number of participants in the program.

Notably, future costs for the development of the forthcoming app are not reflected in these costs. Animals Now believes it will be able to fundraise the necessary money for the app from other sources, namely from donors who are willing to donate specifically for this purpose, meaning that none of the regular donations will be allocated to the app development. We have decided to exclude future costs and potential benefits of the app development from this report, focusing on the cost-effectiveness of the program in the past.

According to [Guidestar Israel](#), the overall budget of Animals Now (in 2018) was 3,496,618 ILS (see the relevant [financial report](#)). Animals Now estimates that its budget in 2019 was about 4 million ILS, and its 2020 budget will end up at about 5.7 million ILS (although none of these figures are official). Taking the numbers for 2019, we estimate that the percentage of the budget dedicated towards Challenge 22 is about 20%.

Notably, the per-capita costs are quite volatile, ranging from 3.81 ILS per participant in January-May 2020 to 8.26 ILS per participant in January-May 2019. This could suggest a positive trend in the efficiency of operating the program. When we spoke with Animals Now about this volatility and apparent trend, we were told that it is indeed likely that the program is becoming more cost-effective (in per-capita costs). As most of the costs of the programs are fixed and don't substantially grow with the number of participants (due to Animals Now mostly relying on volunteers for its operation, rather than paid employees; see chapter 2), it is expected that the more participants there are the cheaper it will get per participant.



Since we believe there is a compelling explanation for the reduction in per-capita costs, our estimates for the future costs of the program gravitate towards the lower bound, and we estimate it to be somewhere between 3.8-6 ILS per participant.

## 4. Reduction in meat consumption

### The Horn & Katzir impact study

To estimate the reduction in meat consumption of participants in Challenge 22, we rely on a study published in Faunalytics (Horn & Katzir, 2019 [1]), which surveyed 1,431 Challenge participants from Israel who signed up to the program during 2018. Of the 1,431 surveyed, 720 study participants (50.3%) responded. Overall, we judge the study design and analysis to be rigorous. We encourage the reader to look at the [original report in Faunalytics](#), which is concise and well written.

The main conclusions reported in the Horn & Katzir study (that are relevant to this report) are:

- “A calculation of the number of portions of meat saved resulted in the conclusion that the average Challenge participant reduces 86 portions of meat per year.”
- “The only found significant predictor of diet change was diet prior to the Challenge. The time passed after completing the Challenge (one month or seven months) and the number of times a participant signed-up for the Challenge had no influence on diet change.”

### Limitations of the study

Before moving forward to using the results of the study to estimate the impact of the program, we first consider some issues and limitations of these results (we will then address these problems and derive our final estimates in the following sections).

Our main concerns about the study and the published report, when attempting to apply their findings for estimating the cost-effectiveness of Challenge 22, are:

1. Since this is an [observational study](#) and not a controlled experiment, one should avoid unjustified interpretations of causal effects based on these results. While we can estimate the reduction in meat consumption of participants from the gathered data, it doesn't tell us whether this reduction is a result of participation in the challenge. It could be, for example, that people who decided to participate had already been inclined to making dietary changes.
2. The study surveyed only Israeli participants, which comprise only ~10% of the program (see chapter 3), so these results might not be representative for the other ~90% of the members worldwide. There could be important differences between Israel and other countries, as Animals Now is an Israeli organization and as the program originally started



in Israel. It is also stated in the original report of Horn & Katzir: “Other than the obvious differences in culture and in the staff between the programs, Israeli Challenge participants also receive a personal phone call from their mentor when they begin the Challenge. Currently, this is not the case for the other programs, and it can have an effect on the impact of the program, as well as on response rates”.

3. We have some reservations about the way Horn & Katzir used the data to estimate the average meat reduction. Specifically, we find the following assumptions objectionable:
  - a. Even though the survey listed 6 different dietary categories, they decided to merge some of the categories and treat them as indistinguishable. For example, both category #1 (“daily”) and category #2 (“up to five times a week”) were treated as “Frequent meat-eaters [...] who consumed meat at least five times a week”. This decision introduces unnecessary inaccuracies into the calculations.
  - b. Instead of acknowledging some amount of uncertainty when trying to give exact numeric interpretation to these 6 broad categories (for example by setting lower and upper bounds for each of the categories), it appears that Horn & Katzir chose somewhat arbitrary values to represent each category (and it appears to lead to somewhat over-optimistic estimates of meat reduction).
  - c. The original analysis also estimates greater-than-zero reduction for participants who haven’t changed their diet. They write: “Participants who were veg\*n prior to taking the Challenge and remained that way were counted as if they were saving one portion per week. This was done because many veg\*ns have difficulties maintaining a veg\*n diet, and go back to consuming meat. For similar reasons, participants who reported being almost vegetarian prior to the Challenge and remained so were counted as if they were saving 0.5 portions per week”. We don’t think this is justified, and the study design (observational) doesn’t allow strong causal and counterfactual conclusions anyway. To assess the counterfactual contribution of the challenge for participants who haven’t changed their diet, an experimental study design is required.
4. As participants were surveyed only one or seven months after completing the challenge, it is possible that the reported reduction in meat consumption diminishes after longer time periods. On the other hand, the fact that no significant difference was found between the one-month and seven-month groups provides some reassurance that the reported changes don’t wear off quickly, so there is some evidence for long-term changes.
5. The report also acknowledges potential social desirability issues. They write: “There is a risk that social desirability had an effect on the results, as the study was conducted in the name of the project. Not only that, it was sent from the project manager herself. Our request to answer the survey honestly and the promise to keep the answers confidential may have balanced this effect.”





In our personal communication with Animals Now, another limitation of the study was brought to our attention:

6. The study participants were randomly selected out of the entire pool of Israelis who had taken the pledge (in Israel, participants are also requested for their phone/WhatsApp number in addition to their email address), but they weren't chosen completely independently. All study participants were selected from only six cohort groups (that had joined at the relevant timeframe for the study). This is probably not a source of bias, but it is a source of increased variance (under the very plausible assumption that the success of individuals within a group is correlated). As a result, this increases the total uncertainty of the estimates (even if it doesn't introduce a bias one way or the other). While we don't think it is likely that this selection protocol has led to significant errors, this fact is important to mention.

## Addressing the problems and adjusting the estimates

As a result of our reservations about the original calculations made in the Horn & Katzir study (as expressed in point (3)), we decided to reevaluate the reduction in meat consumption of participants. Details of that calculation can be found in Appendix A. According to our revised estimates, an average participant in the study reduces their meat consumption by 0.84-1.52 portions of meat per week. We view this estimate interval as more reliable than Horn & Katzir's estimate of 1.65 weekly portions of meat (86 per year) reported in the original report (which is too optimistic in our view). It should be noted that our estimate considers only reduction in meat consumption while ignoring the consumption of other animal products (as current data doesn't provide this information).

As the study provides direct evidence about the first 7 months after the pledge, we adjust our estimates to a 7-month period, translating 0.84-1.52 portions of meat per week into 25.6-46.3 portions of meat within 7 months. As noted, it is highly plausible that the true dietary changes following the program last substantially longer.

Since only about 50% of the study participants responded to the survey, and it seems very plausible that the respondents could be the 50% with the more favorable outcomes, it is necessary to adjust for that. At the best-case scenario, outcomes for the other 50% are just as positive as the results for the respondents. At the worst case, the other 50% have had no success whatsoever in changing their diet, meaning that the meat reduction estimates need to be cut in half. Overall, to account for this we multiply the estimate by a factor of 0.5-1, bringing it to an estimated range of 12.8-46.3.

About 10% of the program's participants are Israelis (see chapter 3), for which we feel that these estimates are reliable (with the aforementioned caveats). For the other ~90% of non-Israelis, there is significant uncertainty about their expected outcome. As a result of all the differences between Israeli and non-Israeli participants mentioned in this report, it seems very plausible that the program is substantially less effective for non-Israelis. Unfortunately, we don't have any direct data on differences in meat consumption changes between these groups, so we resort to indirect





evidence comparing other aspects of engagement with the program between Israeli and non-Israeli participants. Specifically, we compare the percentages of participants who engage with the automatic emails they receive from the program after taking the pledge, and the percentages joining Facebook groups and their patterns of activity on these groups. Details of this comparison are in Appendix B. Our general conclusion from this indirect comparison is that Israeli participants do generally seem slightly more engaged, but order-of-magnitude differences are unlikely. Based on our subjective judgement, we feel it is conceivable that outcomes for non-Israelis could be as low as 35% than those reported for Israelis, but it is unlikely to be much lower than that. In other words, we assume that the average magnitude of dietary change for non-Israelis is no less than 35% of the change made by Israelis. We therefore estimate that while reduction in meat consumption is 12.8-46.3 portions of meat for Israelis, for non-Israelis it is only 0.35-1 as much, namely it could be anywhere between 4.48 to 46.3. Overall (with about 10% Israelis and about 90% non-Israelis), we calculate an estimated range of 5.3-46.3. Note that the lower bound of our estimate is sensitive to the assumption that the change ratio between the two populations is lower-bounded by 35%. This very wide interval reflects our substantial uncertainty about many aspects of the program and the study used to estimate its outcomes, yet it doesn't account for all of the analysis limitations (see chapter 8).

## 5. Cost-effectiveness analysis

Throughout 2019-2020, more than 200,000 individuals have participated in Challenge 22. The costs of the program are estimated at between 3.8 to 6 ILS per participant (see chapter 3), and it is estimated that participants reduce their meat consumption by 5.3 to 46.3 portions of meat within the 7-month period following their pledge (see chapter 4). This leads to the estimate that every 1 ILS of the program's budget (0.29 USD as of October 2020) translates to somewhere between 1 to 12 reduced portions of meat over this time period.

Note that these estimates are subject to some important unaddressed issues, which will be summarized in chapter 8. Due to all of the lingering concerns and uncertainty reflected in the estimate interval, and due to the dynamic nature of the program, we think that these numbers are better not taken at face value. Rather, these figures point at the order of magnitude for the potential impact of the program.

## 6. Room for more funding

It is important to keep in mind that the cost-effectiveness analysis carried out in this report refers to costs and outcomes of the program in the past. As this is a rapidly evolving program, and as the costs of the program do not scale linearly with its scope, it is very hard to extrapolate what the cost-effectiveness of the program will be in the future, were it to receive more funding. This report (and the evidence it relies on) focuses exclusively on past costs and impact, and therefore we cannot make strong claims about the future cost-effectiveness of the program. However, we



believe that the positive track record of Animals Now leaves room for some optimism that future donations may also be used cost-effectively.

In discussions with Animals Now about how future donations might be used to increase the program's impact, they mentioned a few options:

1. Substantially expanding advertising. Many participants find out about the challenge through ads, and it seems likely that more advertising could bring in many more participants. Currently only about 5-10% of the costs of the program go into advertising (see chapter 3). Animals Now sees a potential in increasing it by up to 4-5 times the current amount.
2. Accelerating the development of the app (aimed at improving social interactions with participants and within participant groups).
3. Expanding the program into more geographic locations, cultures and languages. China, for example, could potentially have vast potential for reducing worldwide meat consumption.

Further interrogation of this matter and better assessment of future cost-effectiveness is left open for future inquiry (see chapter 7).

## 7. Recommendations for future studies

We think that the most reliable way to strengthen the results of this report and reduce uncertainties would be to conduct a [randomized controlled trial](#) (RCT). Designing such an RCT will present some challenges, as participants arrive at the program's website from a variety of sources, but we believe that most of the pitfalls of such study can be avoided with careful planning. Regardless of the exact details of the study design, an RCT is essential for proving causal effects for participation in the program.

In such a follow-up study it would be advisable to also remedy some of the limitations of the original study, including:

1. Sampling participants from all over the world (ideally in a fully representative way). As evident from our cost-effectiveness analysis, this issue has introduced a lot of uncertainty into our estimates.
2. Asking participants to estimate their meat consumption more accurately (by exact quantities, rather than broad categories).
3. Considering to ask participants to report their meat consumption in higher resolution (for example, to distinguish between fish, chicken, beef, etc.). Also consider asking them to report non-meat animal products (including eggs and dairy products). Cost-effectiveness estimates measured by averted deaths of animals would likely be more compelling to

donors than the current estimates measured by generic portions of meat. On the other hand, while asking more questions would provide us with more fine-grained details on people’s dietary changes, it might also have the adverse effect of reducing motivation to answer the survey. It is also uncertain how it would affect the ability of participants to report truthful and accurate information.

Other than the issue of causality, we feel that the most serious gap in our understanding of the program’s potential effects is the unrepresentativeness of Israelis with respect to the other participants of the program (point 1 above). In the absence of an RCT, running a new study that would fix that should be the second highest priority in our view.

It would also be very beneficial to follow up with the 720 respondents of the Horn & Katzir study, and try to find out whether they still follow through their diet changes. Validating this matter would substantially strengthen claims about long-term diet changes in the program.

Another matter that we think could gain from more analysis is the question of room for more funding. This could be addressed by examining detailed plans of how Animals Now would redirect future potential funding and how these funding allocations would scale the impact of the program.

## 8. Summary of analysis limitations

The following table summarizes the main limitations in the analysis presented in this report, whether and how we addressed them, and how substantial we judge the remaining gap to be for our final conclusions.

**Table 2: Analysis limitations**

Limitation	How we addressed it	How substantial we judge the remaining gap to be	Relevant chapters	How future studies can better address it
The Horn & Katzir study is observational and doesn't prove causal effects.	<b>Not addressed.</b> It is left for readers of the report to judge.	<b>Major.</b> We don't know what fraction of the estimated changes are a causal effect of the program.	Chapter 4	An RCT can prove causal effects.
The Horn & Katzir study only sampled Israeli participants.	<b>Partially addressed.</b> It is accounted for in our cost-effectiveness estimates, but in a way that relied on our subjective judgment. We multiplied the estimates by a factor of 0.35-1 for the 90% non-Israelis (meaning a factor of 0.315-1 overall).	<b>Moderate.</b> Our assumption that the change ratio between the two populations is lower-bounded by 35% substantially affects the final lower bound estimate.	Chapter 4, Appendix B	Future studies should sample all participants uniformly, worldwide.



Our report analyzes the cost-effectiveness of the program in the past, and cannot make definite claims about the program in the future or how much room for more funding it has.	<b>Not addressed.</b> The question of room for more funding is addressed only very partially. It is left for readers of the report to judge.	<b>Moderate.</b>	Chapter 2, Chapter 6	Examine concrete future plans of Animals Now.
Potential social desirability or memory biases in participant reporting.	<b>Not addressed.</b> It is left for readers of the report to judge.	<b>Moderate.</b>	Chapter 4	Asking participants about their diet at the time of taking the pledge, instead of asking them to recall it later.
The Horn & Katzir study made questionable assumptions when estimating reduction in meat consumption.	<b>Addressed.</b> We re-calculated the reduction in meat consumption as 0.84-1.52 portions of meat per week instead of the original estimate of 1.65 weekly portions of meat made by Horn & Katzir.	<b>None.</b>	Chapter 4, Appendix A	Asking participants to provide accurate numeric estimates of their meat consumption before and after taking the pledge.
The Horn & Katzir study had a ~50% response rate.	<b>Addressed.</b> We multiplied the estimates by a factor of 0.5-1.	<b>None.</b>	Chapter 4	
Past costs of the program are volatile.	<b>Addressed.</b> There are compelling reasons to accept that the costs of the program should go down, so we adjusted the estimates of future costs towards the present-day costs (3.81 ILS per participant), taking an estimated range of 3.8-6 ILS per participant.	<b>Minor.</b> While accounted for, this extrapolation involved some subjective judgement.	Chapter 3	
There's no information about long-term dietary changes beyond the 7 months of the Horn & Katzir study.	<b>Partially addressed.</b> We take a conservative approach and consider dietary changes only for the first 7 months, leaving it for readers of the report to judge to what extent they trust longer-term changes (for which there is promising evidence).	<b>None.</b> The report's conclusions don't assume lasting changes beyond 7 months (the worst-case scenario).	Chapter 4	Tracking participants for longer timeframes.
The Horn & Katzir study was based on only 6 cohort groups.	<b>Not addressed.</b>	<b>Minor.</b> We don't see it as a significant issue.	Chapter 4	



## References

[1] Reut Horn & Nicole Katzir. Challenge 22+ Pilot Impact Study, Faunalytics (2019):  
<https://faunalytics.org/challenge-22-pilot-impact-study/>

Reut Horn is the Executive Director of Animals Now, and the founder of Challenge 22+. Nicole Katzir is the financial manager of Animals Now.

## Appendix A: Estimating the reduction in meat consumption

Participants in the Horn & Katzir study reported their diet before and after their participation, as one of the following 6 categories:

**Table A1: The six diet categories reported in the Horn & Katzir study**

Code	Description (frequency of meat consumption)
1	Daily.
2	Up to five times a week.
3	Between 2 and 4 times a week.
4	Once a week or less.
5	Not at all.
6	Vegan

According to this coding, the 720 study participants partition as follows:

**Table A2: Distribution of diet codes in the Horn & Katzir study**

Diet after	1	2	3	4	5	6
Diet before						
1	23	7	30	33	19	8
2	1	4	18	14	2	2
3	1	0	54	75	23	2
4	0	1	2	84	36	6
5	0	0	2	2	154	29
6	0	0	1	1	0	86

Summing the rows and columns of the table will give the number of participants following each diet category before and after the study, and subtracting these values will give the differences in number of participants:

**Table A3: Differences in diet codes in the Horn & Katzir study**

Diet code	# participants before	# participants after	Difference
1	120	25	95
2	41	12	29
3	155	107	48
4	129	209	-80
5	187	234	-47
6	88	133	-45

We want to quantify the total reduction in meat consumption of all 720 participants, but our information is given only by those 6 broad categories, not absolute numbers, so we have to perform some uncertainty estimation.

Let us denote by  $x_1, x_2, x_3, x_4, x_5, x_6$  the average weekly meat consumption of people in each of the 6 dietary groups (so  $x_1$  would be the average weekly portions of meat for participants who reported daily consumption,  $x_2$  would be the same metric for those who reported “up to five times a week”, etc.). By multiplying these numbers with the calculated differences and summing up, we

get that the overall number of weekly portions of meat reduced through all of the study's participants is  $95x_1 + 29x_2 + 48x_3 - 80x_4 - 47x_5 - 45x_6$ .

As stated, we don't know the exact values of  $x_1, x_2, x_3, x_4, x_5, x_6$ . Reasonable lower and upper bounds would be:

**Table A4: Lower and upper bounds for average weekly meat consumption across diet categories**

Diet code	Description (frequency of meat consumption)	Average weekly meat consumption - lower bound	Average weekly meat consumption - upper bound
1	Daily.	5	8*
2	Up to five times a week.	4	5
3	Between 2 and 4 times a week.	2	4
4	Once a week or less.	0	1
5	Not at all.	0	0
6	Vegan	0	0

\* The upper bound for the "daily" category is the most arbitrary. We don't really know how many portions of meat these participants consume per day. As we will see, our estimates are actually quite sensitive to this upper bound.

Since we are only interested in meat consumption (and not other animal products), we do not distinguish between category 6 (vegan) and 5 (vegetarian), assigning both with  $x_5 = x_6 = 0$ . Looking at the remaining of the equation,  $95x_1 + 29x_2 + 48x_3 - 80x_4$ , higher estimates will be obtained when  $x_1, x_2$  and  $x_3$  are high, and  $x_4$  is low. So an upper bound for our overall estimate will be obtained when  $x_1, x_2$  and  $x_3$  get their upper-bound values (8, 5 and 4, respectively) and  $x_4$  gets its lower bound value (0), leading to an upper-bound estimate of 1,097 weekly portions of meat. Likewise, the overall lower-bound estimate will be obtained when  $x_1, x_2$  and  $x_3$  get their lower-bound values (5, 4 and 2, respectively) and  $x_4$  gets its higher bound value (1), leading to a lower-bound estimate of 607 weekly portions of meat.

To get the number per individual, we divide the estimated 607-1,097 range by the total number of participants (720), leading us to estimate that the average participant reduces their weekly meat consumption by 0.84-1.52 portions of meat.

Importantly, this estimate is quite sensitive to how we interpret the six diet categories, and specifically to their lower and upper bounds. For example, if we took the upper bound for category #1 to be 10 instead of 8, that would result an overall increase of  $2 \cdot 95 / 720 = 0.26$  weekly portions of meat in the upper bound of our final estimate, making it 0.84-1.78 instead of 0.84-1.52.



## Appendix B: Comparison of engagement with the program between countries

Since the Horn & Katzir study provides direct information on meat consumption changes only for Israeli participants, while the majority of the program’s participants are non-Israeli, we used other parameters related to the level of engagement with the program as a proxy for estimating relative impact between these groups. Specifically, we consider how participants interact with the automatic emails they receive after taking the pledge, and with the Facebook groups (see Chapter 2).

Animals Now had tracked engagement with emails between May and August 2020, and provided us with this information. This data includes the percentage of participants who opened the emails, and those who clicked on links inside them. Each participant receives a series of 11 emails over a period of time, and it is sufficient for a participant to open just one of the emails or click on one link within any of the emails to be considered engaged in the statistics below.

**Table B1: Engagement with the automatic emails sent to participants after taking the pledge**

	Israel	USA	UK	Spanish speaking	Other English speaking
<b>Participants who opened an email</b>	42.4% (7,774)	22.2% (17,201)	28.1% (10,257)	17% (35,760)	23.3% (14,941)
<b>Participants who clicked on a link in an email</b>	14% (2,568)	4.2% (3,234)	4.9% (1,778)	2.3% (4,753)	3.7% (2,354)

Relevant time period: May-August 2020.

Animals Now manually collected data on participants joining the Facebook groups between July and December 2019. This data is somewhat sparse and includes only some of the relevant months for each of the country groups. Since records were collected manually by a volunteer, some entries were missing, and in other cases there seemed to be errors in the data, leading to the removal of suspicious entries (for example when the number of counted Facebook members was larger than the overall number of participants who took the pledge during the same period).

**Table B2: Participants who joined a Facebook group among all pledge takers**

	Israel	USA	UK	Spanish speaking	Other English speaking
<b>July A</b>	-	-	65.49% (260)	56.17% (660)	38.16% (400)
<b>July B</b>	-	53.90% (690)	48.61% (280)	79.96% (970)	62.57% (540)
<b>August A</b>	-	31.97% (550)	-	-	22.51% (700)
<b>August B</b>	-	40.37% (640)	25.82% (470)	-	53.12% (900)
<b>September A</b>	-	-	49.95% (550)	-	-
<b>September B</b>	60.06% (200)	-	77.46% (440)	-	46.12% (630)
<b>October A</b>	75.39% (190)	52.57% (490)	44.28% (380)	63.43% (1,270)	61.41% (740)
<b>October B</b>	66.92% (520)	25.07% (330)	55.64% (350)	-	29.42% (500)

<b>November A</b>	70.33% (844)	51.59% (680)	62.34% (649)	60.95% (935)	68.23% (1,128)
<b>November B</b>	75.92% (596)	48.34% (643)	63.67% (680)	80.82% (1,543)	39.98% (806)
<b>December A</b>	53.75% (394)	30.82% (139)	-	-	-
<b>December B</b>	-	-	-	-	-
<b>Overall</b>	<b>67.25% (2,744)</b>	<b>41.90% (4,162)</b>	<b>50.37% (4,059)</b>	<b>68.66% (5,378)</b>	<b>43.29% (6,344)</b>

Relevant time period: July-December 2019.

Finally, we also considered data on activity within the Facebook groups (among members who had joined them), based on admin reports downloaded directly from Facebook. Animals Now provided us such reports for December 2019. It is unclear what are the exact criteria that Facebook uses to define whether a group member is active or not, but given that the same metric is used throughout all country groups, we see this comparison as meaningful.

**Table B3: Active Facebook members**

	<b>Israel</b>	<b>USA</b>	<b>UK</b>	<b>Spanish speaking</b>	<b>Other English speaking</b>
<b>December A</b>	64.6% (383)	70.2% (392)	78.8% (294)	66.8% (930)	72.4% (422)
<b>December B</b>	67% (376)	67.1% (355)	81.6% (418)	-	74.8% (470)

Relevant time period: December 2019.

Before we interpret these results, we would like to highlight a few important limitations of this data:

- The data we have is quite sparse and covers only specific time periods. Specifically, the data on email and Facebook engagement is from different time frames. The reason for this discrepancy is that Animals Now has shifted to a new mailing service in 2020, which is considered to provide more reliable user statistics.
- As mentioned, the data on participants joining the Facebook groups (Table B2) was collected manually and potentially contains errors. However, as far as we know there is no reason to expect that these errors would lead to a systematic bias, and there seem to be sufficient independent entries to provide a reasonable view of the trends.
- The statistics on Facebook activity (Table B3) refer to all group members, including a handful of moderators of Animals Now who are not actual participants. Since moderators are necessarily active members and contributors, this could lead to slight overestimation of the reported Facebook activity.

In terms of engagement with the automatically sent emails (Table B1), there are substantial differences between the Israeli participants and the rest of the program. Israelis are much more likely to open emails (42% compared to 17-28%) and to click on links inside them (14% compared to 2.3-4.9%). On the other hand, while Israelis appear to join Facebook groups more than non-Israelis, these differences are much narrower (Table B2). During the examined time period, 67% of the Israelis joined a Facebook group, compared to 42-69% of the rest of the program. In terms of activity on Facebook among members who have already joined the groups (Table B3), there doesn't appear to be a substantial difference between Israelis and non-Israelis.



We consider both email and Facebook engagement to be relatively weak evidence for reduction in meat consumption. Nonetheless, we give slightly more weight to the evidence from the Facebook groups (Table B2 and B3) compared to the emails (Table B1), for two reasons. First, Facebook is a platform that encourages more active engagement than email newsletters. And second, it appears that engagement with the sent emails is quite low across all countries. Even among Israelis, only 14% have clicked on any of the links spread across the 11 different emails. In terms of activity on Facebook on the other hand, ~45% of the Israelis appear to be active (64-67% of the 67.25% who have joined the platform). We observe that 28-46% of the program participants are active on Facebook across all countries, a dramatically higher engagement rate than that observed with respect to the emails.

We conclude there likely exists some variance in the level of engagement between countries, and that Israel exhibits higher levels of engagement compared to other countries. As mentioned in Chapter 2, there are a-priori reasons to expect differences between Israel and the rest of the program, such as the fact that Animals Now is an Israeli charity and the fact that only Israeli participants receive phone calls from program staff. This is in addition to potential cultural differences. On the other hand, based on the results we observe here and the presented line of reasoning, we think it is very unlikely that changes in meat consumption are different by orders-of-magnitude between countries. To set concrete numbers, we think it is possible that meat consumption changes in other countries could be as low as 1/3 of the changes measured for Israelis, but are probably not substantially lower than that. In other words, we set a lower bound of 35% for the ratio between the programs. Evidently, this lower bound reflects our own subjective judgement, made by qualitative interpretation of the limited data we have. If readers of the report feel that this chosen lower bound does not reflect their own intuition in light of the presented evidence, we encourage them to choose their own lower bound and update the cost-effectiveness estimates accordingly (for example taking a lower bound of 15% instead would roughly correspond to cutting the final cost-effectiveness estimates by half).

As for an upper bound to the ratio between the programs, this can be set in a more principled way. Both reason and evidence suggest that the other programs are unlikely to be more effective than the Israeli program, so we choose the natural upper bound of 100%.

To conclude, we assume that the reduction in meat consumption for non-Israelis is 35-100% of that measured for Israelis.