How Much Matza Must We Eat at the Seder?

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1. THE MITZVA TO EAT MATZA NOWADAYS

 The Gemara (Pesachim 120a) notes that the Torah's requirement that the korban Pesach (Paschal offering) be eaten "with matzot and marror" appears to suggest that this obligation relates to the mitzva of korban Pesach. One would perhaps conclude, then, that in the absence of the Mikdash (Temple), when the Paschal sacrifice is not offered, no Biblical requirement to eat matza and marror exists. The Gemara notes, however, that although this conclusion is correct insofar as marror is concerned, it is untrue regarding matza, for the word "matza" is repeated - "In the evening you shall eat matza." This additional verse obligates the consumption of matza "in the evening" of Pesach, regardless of the offering of the korban Pesach. Therefore, the Gemara in several places posits that the obligation to eat matza on the first night of Pesach constitutes a Biblical mitzva, even in the post-Temple period.[1]

 The Chatam Sofer writes (Responsa, CM 196, "hashmatot"):

The positive requirement to eat "matza shemura" on Pesach night is the only remaining mitzva requiring eating! We have no Pesach, sacrifices, teruma or ma'aser sheni - only one mitzva [of eating] that applies annually. And if even this one is not fulfilled completely... will this be pleasing in God's eyes, Heaven forbid?

In other words, the mitzva of eating matza is the only mitzva involving eating that remains obligatory on the Biblical level nowadays, and as such one must be particularly scrupulous in its observance.

1. THE AMOUNT OF MATZA REQUIRED FOR THE MITZVA

 The Rosh writes:

One places the broken piece [of matza] between the two whole pieces. He recites the blessing of "ha-motzi" on the whole piece and breaks it; then he recites "al akhilat matza" over the broken piece and breaks it, and then he eats from both of them, a ke-zayit (olive-sized portion) of each. One who wishes to fulfill all opinions recites "ha-motzi" and "al akhilat matza" and then breaks both of them... [2]

 The Rosh maintains that after reciting "ha-motzi" and "al akhilat matza," one should eat an amount of two "ke-zeitim" - one ke-zayit from the whole matza, and another ke-zayit from the broken piece. This view is codified by the Tur (475) and Shulkhan Arukh (475:1). What is the reason behind this halakha? Why must one eat two "ke-zeitim"?

 The Bach answers that all year round one must optimally eat a ke-zayit of bread after reciting "ha-motzi." Therefore, on Pesach night one must eat twice this amount - one ke-zayit for the recitation of "ha-motzi," and another for the special mitzva of eating matza. But the Acharonim questioned this explanation in light of the fact that we never find any obligation to eat a ke-zayit after reciting "ha-motzi." In defense of the Bach, the Perisha answers that in fact one is not required to eat a ke-zayit from the matza upon which he recited "ha-motzi," but only from the matza upon which he recited "al akhilat matza" (which is the matza through which he fulfills the special mitzva of eating matza on Pesach night). However, we are unsure whether the berakha "al akhilat matza" applies to the whole matza or the broken matza. Therefore, one must eat a ke-zayit from each piece.

 This answer also raises considerable difficulty. Firstly, the overwhelming majority of Rishonim rule conclusively that the berakha "al akhilat matza" refers to the broken piece.[3] Furthermore, as the Biur Halakha (475:1) asks, once the berakha is recited on both pieces of matza, then it applies to both; as such, only one ke-zayit from both pieces of matza should be required.

 In any event, the Shulkhan Arukh (475:1) rules, in accordance with the Rosh's view, that one must eat two "ke-zeitim." Despite his questioning of this ruling in Biur Halakha (as cited), the Mishna Berura also concludes that one should preferably follow this view. He adds, however, that if one ate only one ke-zayit, he has certainly fulfilled his obligation. We will return to the practical ramifications of this issue after we first clarify the precise measurement of a ke-zayit.

1. THE MEASUREMENT OF A KE-ZAYIT

 There are several different aspects to this issue; we will deal with them one at a time.

A) The Relationship Between a "Ke-zayit" and a "Ke-beitza"

 An apparent contradiction within the Gemara seems to emerge regarding the size of a ke-zayit in proportion to a ke-beitza (size of an egg). The Gemara in Yoma (80a) establishes that the human throat cannot swallow more than a single egg of a hen, and the Gemara in Keritut (14a) states that the human throat cannot contain more than two olives. The implication is, therefore, that a ke-beitza is twice the size of a ke-zayit. Other Gemarot, however, indicate otherwise. The Gemara in Eruvin (82b) concludes that the size of two average "meals" amounts to eighteen gerogerot (dates). From the mishna there in Eruvin it emerges that two average "meals" contain five and one-third ke-beitzim. Thus, we must conclude that five and one-third eggs contain eighteen dates, and therefore one date equals .296 of an egg, or a little less than a third.

 Herein lies the problem. The Gemara in Shabbat (91a) records that Rava asked Rav Nachman, "What is the law if one threw an olive-sized piece of teruma into a house that was impure?" He replied: "[The law in regard] to what? If in regard to Shabbat, [a minimum of] the size of a date is required." The implication here is that a ke-zayit is smaller than a gerogeret. Thus, if a date is around one-third of an egg, then an olive must be even smaller than that!

In other words, while this calculation renders a ke-zayit less than a third of a ke-beitza, the conclusion we reached based on the Gemarot in Yoma and Keritut is that a ke-zayit equals one-half a ke-beitza.

The Halakhic Ruling

 One view in the Rishonim is that of Rabbenu Tam (Tosafot in Eruvin 80b, Yoma 80a, and Chullin 103b), the Ra'avya (Pesachim 525), Terumat Ha-deshen (1:139), Maharil ("Seder Ha-haggada") and others. They maintain that a ke-zayit is half a ke-beitza, and the aforementioned Gemara in Eruvin dealt with a different, smaller type of date (such as one without a pit).

 The second opinion is that of the Rambam, who indicates that a ke-zayit equals around a third of a ke-beitza (see Hilkhot Eruvin 1:9), as understood by several Acharonim (Magen Avraham 486:1, Peri Chadash). To resolve the aforementioned Gemara in Keritut according to this view, the Gra (O.C. 486) suggests that the Gemara there refers to eggs without the shells, while the Yeshuot Yaakov (O.C. 301) explains simply that the Gemara in Keritut disagrees with the Gemara in Eruvin.[4]

 The Shulchan Arukh (486) states, "The measurement of a ke-zayit - some say that it equals half a beitza." At first glance, it appears that the Shulchan Arukh rejects the Rambam's view. It may be, however, that he actually viewed the Rambam's position - that a ke-zayit equals less than a third of ke-beitza - as the most instinctively obvious opinion, since this amount corresponded with the size of olives in his day. He therefore felt the need to cite the dissenting view, that empirical evidence notwithstanding, a ke-zayit equals one-half a ke-beitza.[5]

 The Mishna Berura (486:1, 190:10, 456:2) rules that regarding Torah obligations one should follow the more stringent view and eat the size of half a ke-beitza, while for issues involving rabbinically ordained requirements one may be lenient and use only a third of a beitza. One should recite a berakha acharona only on the consumption of half a beitza, since we never recite a berakha when its obligation is in doubt. Likewise, since a berakha must be recited on the mitzva of marror, we should avoid a doubtful situation and follow the stringent view (despite the fact that the obligation of maror nowadays is rabbinic), unless one is ill and finds it difficult to eat a half-beitza of marror.

 All this regards the proportion of a ke-zayit to a ke-beitza. We now turn our attention the size of a ke-beitza itself.

B) The Measurement of a "Ke-beitza"

 Two basic questions surround the measurement of a "ke-beitza" - whether or not to include the shell in the measurement, and the precise measurement of an average-sized egg with its shell.

1. Whether to Include the Shell in the Measurement of a Ke-beitza

 The Noda Bi-Yehuda (mahadura kama, O.C. 38) claims that this depends upon the aforementioned dispute regarding the relationship between a ke-zayit and a ke-beitza. According to the view that a ke-zayit amounts to half a beitza, a beitza is determined without taking the shell into account. If, however, a ke-zayit is only one-third a ke-beitza, then the shell must be included when calculating the size of a ke-beitza. Why? As we saw in the previous section, the position that a ke-zayit is half a ke-beitza is derived from the Gemara's comments regarding the quantity of food that can be contained in the human mouth at one moment. Clearly, this calculation does not take the shell into account, as it considers the case of a person eating an egg. The dissenting view, by contrast, emerges from the discussion in Eruvin regarding certain measurements that depend upon the Biblical standard of a "kav." A "kav" is determined with eggs still in their shells.

 The Mishna Berura (486:1), however, disagrees, contending that according to all views a ke-beitza is determined by the measurement of an egg with its shell. The Chazon Ish takes strong issue with the Mishna Berura's ruling in this regard (Kuntras Ha-Shi'urim, O.C. 39:17). Indeed, many Acharonim - including the Vilna Gaon (486) - seem to understand differently than the Mishna Berura.

1. The Measurement of an Average-Sized Egg

 The Rambam writes in several places [6] that he measured as precisely as he could and found that a revi'it mentioned throughout the Torah amounts to 26 Arab drams (silver coins) of wine and 27 drams of water. Therefore, since a revi'it equals a beitza and a half, a ke-beitza amounts to two-thirds of 27 drams (=18). Based on this calculation, Rav Chayim Na'eh proceeded to measure a dram at 3.2 grams, and thus concluded that the volume of a ke-beitza is 57.6 cubic centimeters. The problem is that Rav Chayim Na'eh measured according to the Turkish dram of recent times, while the dram at the Rambam's time was most likely a smaller measurement, 2.83 grams. (See Midot Ve-shi'urei Torah, 13:7 and 30:6.) According to this standard, a beitza amounts to 50 cubic centimeters.

C) Are Modern Eggs Smaller?

 Generally speaking, the Torah's standards of measurement of length are determined by the length of human body parts (amma, tefach, agudal, etzba) while volume measurements are determined by the volume of various foods (se'a, beitza, gerogeret, zayit, etc.). In certain instances, however, Chazal defined measurements according to the size of a food and a body part. The measurement of a revi'it is such an instance. It has been defined as both one and one-half beitza, as well as 2x2x2.7 etzba (see Pesachim 109a-109b). Over the course of the generations, however, the poskim have noted the discrepancy between these two measurements.[7]

 The first among the Ashkenazic authors to address this issue was the Noda Bi-Yehuda (in his commentary, Tzelach, to Pesachim 116). He writes that we have no choice but to conclude that either people's body parts became larger, or the eggs and fruits of contemporary times are smaller than those of the Talmudic sages. He concludes,

It is well known that the generations continue to grow smaller, and it is [therefore] inconceivable that our thumbs are larger than the thumbs during the times of the Talmudic sages. We have no choice, then, other than concluding that the eggs in our times have become smaller.

 Based on this analysis, he rules that a ke-zayit, which equals half a ke-beitza, is equivalent to an entire modern-sized egg. He adds that he himself follows this measurement of a ke-zayit regarding all relevant halakhic issues, such as consumption of matza and marror.

 In other words, in the view of the Noda Bi-Yehuda, we must double all measurements dependent upon foods. This position was adopted - albeit with some modification - by the Vilna Gaon (Ma'aseh Rav 105), Rabbi Akiva Eger (Shut Ha-chadashot 39) and the Chatam Sofer (Responsa, O.C. 127 & 181).

 Rav Chayim Na'eh composed a work entitled "Shi'urei Torah" in which he seeks to disprove this stringency of the Noda Bi-Yehuda. Among his proofs is his calculation according to the dram measurement of the Rambam that concludes that a ke-beitza amounts to a modern-sized egg, not more. He adds that this has been the common practice throughout the generations.

 The Chazon Ish, however, wrote a pamphlet called "Kuntras Ha-shi'urin" to dispute the view of Rav Chayim Na'eh. He writes that since the measurement is determined by the sages of each generation and a contradiction exists between the two standards, we must assume the larger measurement. He adds that once the Noda Bi-Yehuda arrived at this ruling, which then became widespread and accepted, it assumes the status of a decree issued by a Bet Din for the entire nation. However, he continues, these larger measurements may be employed only as a stringency - not as a leniency. Thus, an ill patient on Yom Kippur, for example, who may eat less than a minimum amount of food at certain intervals, should follow the smaller - in this case more stringent - measurement.

 The Mishna Berura (486:1 and Biur Halakha 271:13) addresses the question of whether or not to double the Talmudic measurements, and poses a serious challenge to the position of the Noda Bi-Yehuda. As we have seen, the Gemara posits that the human throat can contain a full ke-beitza, and the Gemara also comments (Yoma 80) that both cheeks can simultaneously contain more than a revi'it. If we double the measurements, and a halakhic ke-beitza amounts to two of our eggs, then this is realistically impossible! His challenge notwithstanding, the Mishna Berura rules that one should follow the stringent view of the Noda Bi-Yehuda regarding mitzvot of Biblical origin, such as the consumption of matza and kiddush Friday night.[8]

INTERIM SUMMARY: Even nowadays, in the absence of the Bet Ha-mikdash, there exists a Biblical obligation to eat matza at the seder. The accepted - albeit puzzling - ruling is that of the Rosh, that one must eat two ke-zeitim of matza, but the consumption of the second ke-zayit is on a lower level of obligation. We then proceeded to examine the measurement of "ke-zayit," and we found a difference of opinions on various levels: whether a ke-zayit is a half or a third of a ke-beitza, whether the size of a ke-beitza in this regard is determined with or without the eggshell, and whether or not we assume that our eggs and olives are half the size of those used in Talmudic times. If we are to adopt this assumption, as the Noda Bi-Yehuda contends, then for practical purposes we must double all halakhic measurements. Now we will translate this discussion into practical terms, in an attempt to determine how much matza one must eat at the seder.

1. THE MEASUREMENTS ACCORDING TO MODERN-DAY STANDARDS

A) Ke-beitza (with its shell)

 According to Rav Chayim Na'eh, a ke-beitza amounts to 57.6 cubic cm (according to the Rambam's calculation of a ke-beitza, but based on the Turkish dram), while according to the Chazon Ish it equals 100 cubic cm (for, as we noted, one egg equals 50 cubic cm, and the Chazon Ish maintains that the measurements must be doubled).

B) Ke-zayit

 As we have seen, the Rishonim dispute whether a ke-zayit is a half a ke-beitza (Tosafot) or only a third (Rambam). We also saw that if a ke-zayit is a full half of a ke-beitza, then we do not include the egg's shell - which is estimated as 1/20 of the egg's entire volume - for the purposes of this calculation. Thus, it turns out that according to Rav Chayim Na'eh an egg without its shell equals 54 cubic cm, and thus a ke-zayit - according to Tosafot's opinion that a ke-zayit is half a ke-beitza - is 27 cubic cm. According to the Chazon Ish, however, an egg without its shell amounts to 95 cubic cm, and thus Tosafot's ke-zayit would equal 47.5 cubic cm.

 Within the Rambam's view, that a ke-zayit is only one-third of a ke-beitza, the shell must be considered when figuring a ke-beitza. Thus, for Rav Chayim Na'eh, who calculates the egg's volume with its shell at 57.6 cc, the Rambam's ke-zayit is one-third of that, or 19.2 cubic cm. In actuality, however, Rav Chayim Na'eh was even more lenient and estimated a ke-zayit as 17.3. Recall that the position that maintains that a ke-zayit is one-third of a ke-beitza argues its case based on the Gemara's assessment of a gerogeret as one-third of a ke-beitza, and a gerogeret is somewhat larger than a ke-zayit. Therefore, a ke-zayit is even less than one-third of a ke-beitza. According to the Chazon Ish, who maintains that an egg with its shell amounts to 100 cubic cm, the Rambam's ke-zayit equals 33.3 cubic cm.

C) Volume or Weight?

 The Rambam (Hilkhot Chametz U-matza 5:12) defines "shi'ur challa" (the minimum amount of dough that requires the separation of a portion called challa) as approximately 43.5 eggs, and he adds, "like the body of an average egg - not its weight." As the Maggid Mishneh explains, the Rambam here establishes that these measurements are determined by volume, not weight, a principle that seems to emerge as well from the mishnayot (Keilim 17:6 and elsewhere) and many other sources. This is also the view of the Mishna Berura (486:3). However, the Kaf Ha-chayim (168:46) observes that common practice was to calculate according to weight, seemingly against the straightforward reading of all the poskim. We may perhaps attribute this practice to the difficulty involved in constantly measuring volume.

 Today, Ashkenazim calculate volume, in accordance with the aforementioned ruling of the Mishna Berura, and this is also the oft-cited view of Rav Yosef Shalom Elyashiv. The Sefardic authorities dispute the issue: Rav Ovadya Yosef (Yechaveh Da'at 1:16) writes that the weight measurement should be used, while Rav Shalom Messas (Tevu'ot Shemesh) maintains that we determine measurements based on volume.

 If we measure based on volume, a question arises regarding the empty spaces in the matza. Generally speaking, when measuring the volume of a hollow mass for halakhic purposes, the empty space is not taken into account. When there is swelling in the given item, the empty space of the swelling is the subject of a controversy surrounding the mishna in Uktzin 2:8. The Mishna Berura (486:5) rules that regarding natural swelling, one can be lenient and include in his measurement even the empty air-pockets.

1. THE BOTTOM LINE - THE MEASUREMENT OF "KE-ZAYIT" FOR MATZA AT THE SEDER

 A machine matza generally weighs 30 grams, and its volume is 60 cubic cm, meaning, its specific weight is 0.5 (Midot Ve-shi'urei Torah, chapter 17, p. 277). Many people eat specifically hand-made matza (at least for the first ke-zayit), whose weight differs substantially from machine matza. Its specific weight, however, is similar to that of machine matza, and thus one may calculate the required amount based on the measurements of machine matza.

 Based on our discussion, there emerge three possible amounts for a ke-zayit of matza:

1) The largest amount: half a ke-beitza according to the position of the Chazon Ish - three-quarters of a matza.

2) The medium amount: half a ke-beitza according the position of Rav Chayim Na'eh - half a matza.

3) The lowest amount: one-third of a ke-beitza according to the position of Rav Chayim Na'eh - one-third of a matza.

 Now let's go one by one through the various points at the seder when matza must be eaten, and see how much matza must be consumed each time:

THE FIRST KE-ZAYIT: This consumption of matza fulfills the Torah obligation of eating matza on Pesach night. Therefore, it is proper to follow the stringent view and eat three-quarters (or at least a half) of a matza.

 One should bear in mind that this first ke-zayit must be eaten within a time frame called "kedei akhilat peras" from the moment he recites the berakha. Although there is much discussion surrounding the definition of this time frame, the most accepted view is four minutes. It would seem, however, that this discussion is irrelevant for practical purposes, so long as one eats at his normal rate of consumption without any interruptions, bearing in mind that the one "goal" before him at this moment is the consumption of a ke-zayit of matza.

THE SECOND KE-ZAYIT (eaten together with the first): As we saw earlier, this second ke-zayit is eaten only as an added stringency, and its level of obligation is therefore even less than that of a rabbinic enactment. As such, we may be lenient with regard to its size, and eat only one-third of a matza. We may add a further leniency, to view the three-quarters of a matza eaten for the first ke-zayit as consisting of two ke-zeitim (one-third of a matza each), and thus eat three-quarters of a piece of matza for both ke-zeitim. This view is cited in the name of Rav Elyashiv and Rav Nissim Karelitz (Siddur Pesach Ke-hilkhato, chapter 8, note 24).

KOREKH: This obligation is mi-derabbanan (of rabbinic origin), and is designed to commemorate the manner in which the korban Pesach was eaten in the Mikdash. Therefore, we may adopt the middle position (which assumes that the measurements have not decreased in size) and eat half a matza. One for whom even this involves difficulty may eat one-third (see Mishna Berura 486:1).

AFIKOMAN: Although, strictly speaking, even one ke-zayit suffices for eating the afikoman (Shulchan Arukh 477:1), one should optimally eat two ke-zeitim (Mishna Berura ad loc.). Therefore, what we said earlier regarding the second ke-zayit applies here, as well. Namely, one may eat three-fourths (or at least two-thirds) of a matza and view it as consisting of two ke-zeitim. If, however, one feels that such an amount would constitute excessive eating ("akhila gassa"), he may eat half a matza, or at least one-third of a matza (see Mishna Berura 486:1).

FOOTNOTES

[1] Other derivations of this obligation appear in Pesachim 28b and Kiddushin 37b. Tosafot in Kiddushin and Maharam Challawa in Pesachim 28b address the issue of why the Gemara needs multiple sources for this single halakha.

[2] Rosh, Hilkhot Pesachim, printed at the end of Masekhet Pesachim, towards the bottom of 135 in the Vilna edition; also in Responsa of the Rosh, 14.

[3] These Rishonim include Rashi, Tosafot, Rabbenu Chananel, Rambam, Ran, Maharam Challawa, Rabbenu David, the Chinukh, Ramban, Rashba and Ba'al Ha-maor, among others.

[4] Other answers have been offered, as well. A particularly intriguing view is that of the Rashba (Mishmeret Ha-bayit 96a), who maintains that a ke-zayit is even smaller - less than a quarter of a ke-beitza!

[5] See Rav Chayim Na'eh, Shi'urin Shel Torah, p. 190, note 24.

[6] Commentary to the Mishna, Eduyot 1:2 and Keilim 2:2, and introduction to Menachot.

[7] One particularly early mention of this problem appears in the Tashbetz (3:33).

[8] Editor's note: Here is a fascinating solution to the six hundred year old riddle of 2x2x2.7 etzba vs. 1.5 beitza. If you place your thumb on a ruler, it will indeed measure 2.3~2.5cm in width. This corresponds to the measurement of the Tashbetz, and all those Acharonim (Noda Bi-Yehuda, Chatam Sofer and Chazon Ish, to name a few) who doubled the shiur of an egg on this basis - a revi'it thus being approximately 150 cc.

 However, it was once pointed out to me that artisans of old, when wishing to measure quickly, and without a ruler, would use their thumbs, by placing one next to another and then alternatively lifting the far thumb and placing it next to the near one. They thus "inched" their thumbs along the surface while counting, much as one would do today with his feet when lacking a tape measure.

 Try this at home along a centimeter ruler and you will find that because of the flexibility of the fleshy sides of your thumbs, they become compressed slightly and thus 10 thumbs = 20 cm or 1 thumb = 2 cm. 4x 4 x 5.4 = 86.4 cc, or Rav Chayim Na'eh's and the Rambam's calculation based on 1.5 modern eggs!

 Another point: The Noda Bi-Yehuda's assumption that "the generations continue to get smaller" MIGHT have been true from the biblical period until the time of the mishna. However, hundreds of sets of Roman armor that have survived until today testify to the fact that, if anything, we are presently considerably larger than the people at that time.

 We must bear in mind, however, the Chazon Ish's point that once the Noda Bi-Yehuda's view became widespread, it took on the status of a decree of Beit Din. - Rav Mordechai Friedman, ed.