

Picture this: a world where cheeseburgers are kosher, bacon finds its way into our grocery stores' kosher section, and lab-grown meat emerges as a potential reality. As cutting-edge food technologies advance, Israeli companies like SuperMeat and Aleph Farms have pioneered the cultivation of chicken and steak, respectively, from just a few stem cells. Lab-grown meat not only sparks curiosity about its taste, but also raises numerous *halachic* questions for kosher observant Jews. Mainly, can this cell-based, *in vitro* meat truly be kosher and would it be classified as *halachic* meat? More practically, will we finally achieve an (almost) authentic cheeseburger experience, a dream harbored by many Jews? Can pork finally find a place on a kosher shabbat table? While lab-grown meat emerges as a tempting option, the process of sourcing stem cells and cultivating these products merits a very complex dissection of *halacha* to determine its kosher status.

First, we must examine the main *halachic* issues regarding the general process of lab-grown meats. Lab-grown meat companies are committed to reducing animal suffering and the amount of animals slaughtered for human consumption. Therefore, stem cells used in the process are intended to be sourced from a living animal. However, in accordance with Jewish dietary laws, Jews are forbidden from eating from any animal that is not kosher or that has not been ritually slaughtered [1]. Most importantly, Jews are also forbidden from eating directly from the limb of a living animal [2], or from meat that has been severed from a living animal [3].

Furthermore, the nutrient broth typically used by lab-grown meat companies to grow the stem cells usually contain fetal bovine serum, a blood derivative. As Jews, we are forbidden from consuming blood whether it be from a kosher or non-kosher animal [4].

With these stringent prohibitions that seem to undermine all aspects of the process of cultivated meat, how can Israeli companies like SuperMeat and Aleph Farms even receive a kosher certification? In fact, SuperMeat has even recently received kosher certification from the Orthodox Union, the largest and most kept kosher certification authority, validating its product as kosher, *fleishig* [5]. However, the Orthodox Union expressed reservations about certifying Aleph Farms, even though Israel's Chief Rabbi, Rabbi David Lau, announced their cultivated meat to be kosher, *parve* [6]. This discrepancy highlights the complicated nature of producing lab-grown meat that complies with all *halachic* prohibitions and dietary laws necessary to obtain kosher certification.

To understand the *halachic* rulings for these companies, we must first understand why lab-grown meat should even require a *hechsher*, since the stem cells taken from the animal are microscopic in size. We know that, "the Torah was not given to ministering angels," and therefore, we are not held accountable for aspects beyond our perception and according to *halacha*, microscopic entities do not exist [7]. Accordingly, these microscopic stem cells should have no *halachic* status according to Jewish law. This implies that it would be

permissible to take the original stem cells from a non-kosher animal and it would still be considered kosher since they lack *halachic* value. However, Rabbi Shlomoh Zalman Auerbach explained the argument of claiming stem cells are *halachically* nonexistent similar to the argument of grafting, the process of mixing species, *kilayim*, of plants which is forbidden according to Jewish law [8]. Similar to this example of grafting, the stem cells used in lab-grown meat are recognized in their eventual development into the visible food product. As a result, they cannot be considered an invisible, nonexistent entity according to Jewish law. If the cells were taken from a live or unslaughtered animal, the resulting meat would be considered *treif*, while if they were extracted from a slaughtered kosher animal, they would be considered kosher, *fleishig*.

Rabbi Shlomoh Zalman Auerbach presented a very reasonable argument that would classify lab-grown meat as *halachic* meat, so how did Rabbi David Lau conclude that it was *parve*? A substance can only have the *halachic* status of being meat if it comes from an animal, which only gains its status as an animal by virtue of its ancestry. However, because lab-grown meat is created through unnatural means, through a unique process of cultivation, *halachically*, one can consider this “unnatural meat” as not being an animal product and not being meat. There is even the opinion among contemporary rabbis that the unnatural growth of the lab-grown meat gives it the same status as “heavenly meat,” which is not *fleishig* and can be eaten with dairy [9].

Malbim’s commentary on the pasuk, “וְאֶל־הַבָּקָר רָצָה אַבְרָהָם וַיִּקַּח בְּוֶרְקָר רֶדֶ וְטוֹב וַיִּתֵּן:” (Genesis 18:7) explains that when it says, “לַעֲשׂוֹת” – “to make”, it is implying that Avraham had *made* the calf he served to the angelic guests that visited him after his circumcision. The Bible then proceeded to say that he prepared cream and milk from the calf that he “*made*” and served them together to his guests. But how can this be? We know that Avraham kept all of both written and oral law even before the Torah was given [10]. Avraham actually created the calf by using a combination of Hashem's Divine Names. This calf was considered “heavenly meat” and did not have the *halachic* status of meat, and consequently, Avraham was able to serve it to his guests alongside dairy. Since Rabbi Lau has labeled lab-grown meat as “heavenly meat,” he considered it as kosher, *parve*. Under this opinion, Jews can finally have their long awaited cheeseburger. The more recognized opinion, held by the Orthodox Union, is that lab-grown meat is not created through miraculous means and certainly is not “heavenly”. Lab-grown meats should be considered “meat” and *halachically* as *fleishig*. Unfortunately, the dream of an authentic kosher cheeseburger remains just out of reach.

Next, it is worthwhile to explore the considerations surrounding lab-grown pork. The discussion about creating lab-grown pork revolves around determining whether these stem cells have the *halachic* status of the animal they were taken from or as something completely detached from its

origin. If they are considered completely neutral, it would be safe to say that they would be allowed to be taken from not only kosher animals, but also non-kosher.

The Gemara (*Sanhedrin 59b*), related Rabbi Shimon ben Chalafta was traveling and came across hungry lions. He then proceeded to recite Psalms 104:21 and two pieces of meat descended from heaven. Feeding one piece to the lions, he took the other to a group of Rabbis inquiring if the meat was kosher. The Rabbis explained that even if the meat were to have descended clearly resembling a non-kosher animal, it would still be considered kosher due to its heavenly origins. From here we learn “a non-kosher item does not descend from heaven”. According to those who *paskin* that lab-grown meat was considered “heavenly meat”, it would not matter if the stem cells came from either a kosher or non-kosher animal. Under this perspective, kosher pork is a definite possibility [9].

While it may seem obvious, we learn from Leviticus 11:8, “of their flesh you shall not eat” that all parts of a non-kosher animal, including tissue grown from the animal that was not present at birth, is not kosher. This natural growth and maturation process of tissue is what *halachically* categorizes a living animal and its descendants. This may seem to imply that if we take stem cells from a non-kosher animal, then the resulting meat has the *halachic* status of that animal and similarly, is non-kosher. However, because the artificial reproduction and division of the cells in lab-grown meat is considered to be synthetic and not of “natural growth”, there

is room to argue that the meat would not have the status of the non-kosher animal and instead be given a completely new, neutral status [11].

Contrarily, the Gemara (*Bekhorot 5b*) elaborates that if the offspring of a kosher animal has the phenotype of a non-kosher animal it is considered kosher and if the offspring of a non-kosher animal has the phenotype of a kosher animal it is considered non-kosher. This is because an animal is not specifically defined as kosher or not kosher simply based on the characteristics of split hooves and chewing cud, but rather by virtue of its ancestry. Therefore, if the stem cells were taken from a kosher animal, then the resulting meat would be kosher and alternatively, if they were taken from a non-kosher animal then the resulting meat would be non-kosher [11].

It is more widely accepted that stem cells are actually considered a product, like eggs and milk, of the animal from which they originated. According to the Gemara (*Chullin 64b* and *Bekhorot 6b*) we concluded that non-kosher animal products are also non-kosher. Cultivated meat using stem cells taken from a non-kosher animal would be considered non-kosher and consequently, forbidden. However, there is the concept of *zeh va-zeh gorem* learned in the Gemara, *Avodah Zarah 49a*. This concept stated that the product of two distinct causes, one permissible and the other prohibited, is considered permissible. This can only be applied when the prohibited substance is at most one-sixtieth of the total product, rendering it null within the mixture.

Regarding cultivated meat, the two distinct causes would be the stem cells and the nutritional culture broth used to support and maintain cell growth. Meaning, if the stem cells came from a non-kosher source but the culture broth was kosher, the resulting grown meat would technically be considered kosher. As previously mentioned, the serum used in the culture broth typically contains a blood derivative, which is forbidden for Jews to consume even if it were to be produced from a ritually slaughtered kosher animal. However, there is a factor that prevents the concept of *zeh va-zeh gorem* from being applied: the stem cells are deemed a *davar ha-ma'amid*. A *davar ha-ma'amid* is a factor in a mixture which acts as a catalyst, changing the perceivable physical properties of a food product and is not subject to nullification. The stem cells, which are undoubtedly essential to the growth and physical development of the meat, are considered a *davar ha-ma'amid* and cannot be nullified. Therefore, it is *paskined* that if the stem cells were taken from a non-kosher source, the resulting product would also be non-kosher. In order to prevent a transgression of Jewish law, it does not seem likely that lab-grown pork will ever make it onto our kosher shopping lists [11].

With a better understanding of the technical *halachic* issues regarding lab-grown meat, we can understand the *halachic kashrut* rulings of Israeli companies SuperMeat and Aleph Farms. Evidently, there are noticeable differences in how these companies source their stem cells which becomes important when determining their kosher status.

SuperMeat uses stem cells from chicken eggs which are in the early stages of fertilization, before the vascular system forms [5]. In contrast, Aleph Farms sources its stem cells from the fertilized egg of a living cow, named Lucy [12]. Despite this significant distinction, both companies cultivate their stem cells in a plant-based nutrient broth within a bioreactor. In the bioreactor, the cells undergo replication and differentiation as they transform into muscle and fat tissue, identical in taste, smell, and appearance to the actual meat from the sourced animal culture.

Since SuperMeat sources its stem cells from fertilized chicken eggs in their early stages of development, they completely bypass the concern of sourcing stem cells from a living animal. By sourcing their stem cells from the eggs before they develop a blood supply and by using a plant-based nutritional broth they can ensure that no blood is involved in the cultivation process. In line with all *halachic* concerns, the Orthodox Union was able to certify SuperMeat to be kosher, *fleishig* [5]. Despite Aleph Farms also using a plant-based nutritional broth, they source their stem cells from a living animal, therefore the Orthodox Union is reluctant to grant the company a kosher certification. In contrast, Rabbi David Lau claimed that Aleph Farm's steak should be recognized as kosher *parve*, asserting that lab-grown meat undergoes "unnatural growth" and should not be categorized as traditional meat [6].

Ultimately, both companies' cultivation processes fulfill the promise of reducing animal suffering and potentially minimizing

the amount of animals slaughtered for human consumption. As food technologies advance in the realm of lab-grown meats, the intricate and difficult process of granting a kosher certification will inevitably evolve alongside this groundbreaking technology. This intersection of science and Jewish tradition presents the ongoing dynamic relationship of adapting age-old tradition to the innovations of the modern world, and who knows, maybe an authentic cheeseburger is just around the corner.

Acknowledgments

I would like to express my deepest gratitude to my parents for their unwavering support, encouragement, and belief in me. Special appreciation to my sisters and brother-in-law who have consistently encouraged and inspired me, and specifically to Yael for reviewing the drafts of my article. Lastly, I would also like to express my gratitude to Dr. Harvey Babich for his support and motivation throughout the writing process of this article.

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