



Should We Really Eat Human-Pig Chimeras? A Reply to Bobier

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Introduction

Human-pig chimeras may be created to produce organs for human transplantation in future (Kano et al. 2022). Bobier (2020) argues that in such situations, we should consume the meat of human-pig chimeras after transplantation. The idea of eating human-animal chimeras has been identified to cause “a significant public concern” (Greely 2011, p. 689); however, it has not received much attention. We commend Bobier for addressing this issue. However, here we argue that his argument is insufficient by showing that we have good reasons for not eating the meat of human-pig chimeras.

Bobier’s Argument

The argument in Bobier (2020) is divided into two sections. In the first, Bobier argues that there is a good moral reason for eating chimera flesh. In the second, he addresses the possible reasons against eating chimera flesh. The argument in the first section is as follows (Bobier 2020, p. 4).

1. People should, all things considered, adopt the diet that results in the least amount of harm to animals.
2. Adopting a diet that includes the flesh of genetically altered pigs will result in less amount of animal harm compared to other diets.
3. Thus, we should consume chimeras.

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This argument has two major features. First, premise 1, a version of the least harm principle, is with the “all things considered” proviso. In other words, the principle does not apply to those with morally good reasons against eating chimera flesh (Bobier 2020, p. 6). Therefore, for the validity of this argument, the possible reasons against eating chimeras must be rejected, which Bobier tries to show in the second section of the paper. Second, while Bobier acknowledges the moral importance of animal welfare, he assumes that meat-eating and chimera research are somehow morally justified, and suggests that related current practices can continue (Bobier 2020, pp. 2–3). Thus, from Bobier’s perspective, various human concerns and rights surpass animal welfare, at least to the extent that meat consumption and chimera research are justified. This point, as demonstrated below, makes it difficult for Bobier to dismiss the reasons against eating chimeras.

For the sake of argument, we admit that eating chimera flesh will reduce regular meat consumption, leading to improvements in animal welfare (premise 2). Furthermore, we agree that all things considered, we should adopt a diet that results in the least animal harm (premise 1). However, improvements in animal welfare caused by eating chimera flesh are minimal, and this leads to a good reason for not consuming chimera flesh. This criticism means that the range of individuals for whom the least harm principle applies is much smaller than Bobier thought.

Impact of Eating Chimeras

We begin by estimating the impact of eating chimera flesh on animal welfare (Table 1). If all human deaths owing to organ shortage can be prevented by human-pig chimera transplantation in the US, 5,840 chimeras/year would be necessary and sufficient. If we consider that eating these chimeras can stop the rearing of 5,840 ordinary pigs under poor conditions, it indicates that eating chimera flesh, if all other considerations are ignored, leads to a reduction of 5,840 pigs under poor conditions. Notably, 5,840 human-pig chimeras can provide approximately 292,000 kg of flesh, amounting to 0.000006% of the annual meat supply in the US. Thus, we can safely conclude that the impact of eating human-pig chimera flesh on animal welfare is relatively small, given the current trend of meat consumption. The situation is similar in the EU and Japan.

This minor impact on animal welfare does not refute Bobier’s argument directly. The least harm principle commands that chimera flesh should be eaten even if it slightly decreases animal suffering. However, as discussed below, the minor impact can lead to a reason against eating chimera flesh.

In addition, to reduce animal suffering in factory farming, options such as painless animals or cultured meat can also be beneficial. If all meat can be supplied from alternatives rather than from factory farming, the problem to be solved by eating chimeras should disappear. Therefore, it is not evident that such alternatives are less effective than eating chimera flesh in improving animal welfare. However, as Bobier explained, such alternatives are irrelevant for producing human-pig chimeras, which would be produced for organ transplantation, independent of what we eat (pp. 4–5). One of Bobier’s points is that eating their flesh, rather than throwing it away, is economically rational (chimera flesh is “free”).

However, this claim is valid only if there is no good reason to oppose the consumption of chimera flesh. Even economically rational methods cannot be justified if they are morally wrong. For example, even if it is economically rational to consume human corpses as food

Table 1 Estimated annual supply and consumption of human-pig chimera flesh

	US	EU	Japan
Chimeras required (=deaths owing to organ shortage)	5,840	7,300	352
Chimera meat supply (kg)	292,000	365,000	17,600
Overall meat supply (kg)	49,000,000,000	60,000,000,000	4,000,000,000
Percentage replaced by chimera meat	0.000006	0.000006	0.000004
Meat consumption per capita (kg)	126	75	53
Number of people who consume chimera meat by only eating them	2,317 (0.000007% of the population)	4,867 (0.00001% of the population)	332 (0.000003% of the population)

Assumptions: (1) All deaths caused by organ shortage are prevented by organ transplants from human-pig chimeras. (2) One chimera is used per organ transplant. (3) One human-pig chimera provides 50 kg of flesh (50% of edible portion out of 100 kg body weight). The number of deaths caused by organ shortage is for the year 2023 in the US, 2022 in the EU, 2016 in Japan. Meat consumption is for 2020 for each country.

Sources: <https://www.americantransplantfoundation.org/about-transplant/facts-and-myths/>; <https://www.edqm.eu/en/eodd>; <https://www.jotnw.or.jp/datas/databook/>; https://ourworldindata.org/grapher/meat-supply-per-person?tab=chart&country=OWID_EUR~JPN~USA

instead of burying them, it is wrong if cannibalism is morally wrong. Therefore, the claim based on economic rationality assumes that there is no morally good reason against eating chimera flesh or at least no stronger reason than that against other alternate diets.

Considering this, we examined the second section of Bobier's paper, in which Bobier raised several counterarguments for the possible reasons against eating chimera flesh; however, some reasons stand up to the counterarguments.

Reasons Against Eating Chimera Flesh

In the second section, Bobier addresses and refutes four possible reasons against eating chimera flesh. The first is that eating chimera flesh is disgusting. In response, Bobier points out that disgust is not a morally good reason for opposing something. Additionally, Bobier notices that it is unclear whether people will be really disgusted by the idea of eating chimera flesh, and even if they are, a proper understanding of chimera meat would dismiss their aversion to eating chimera flesh. This is because it is theoretically possible to control the differentiation of human cells in chimeric pigs, such that the edible part of the pig does not contain human cells.

The second possible reason relates to human dignity: to eat human-like creatures will violate human dignity. In response, Bobier claims that it is difficult to imagine a situation in which human-pig chimeras have developed cognitive abilities for human dignity. The third is that eating chimera flesh is cannibalism. Bobier replies to this point by arguing that eating chimera flesh is not similar to eating human meat and thus the usual criticisms against can-

nibalism does not apply to eating chimera flesh. The fourth appeals to moral caution. While there is moral disagreement around eating chimera flesh, not eating them is morally neutral. Therefore, it is morally cautious not to eat. In reply, Bobier reminds us that eating chimera flesh can improve animal welfare. Thus, not eating it is *pro tanto* wrong, not neutral.

Among these counterarguments, we particularly focus on disgust. As Bobier suggests, citizens may not feel disgusted about eating chimera flesh; if they do, it may be owing to misunderstandings. Here, for the sake of argument, we assume that citizens have a strong, widespread, and well-informed disgust toward eating chimera flesh. Even on this assumption, Bobier argues that disgust for eating chimera flesh is not a morally good reason against it. However, we believe that disgust is morally and legally important in this context in at least two ways.

First, the production of human-pig chimeras for human organ production requires cell donation, as in standard biomedical research. At present, many people disapprove of chimera research. Therefore, appropriate consent should be obtained from potential cell donors. Furthermore, if human-pig chimeras are going to be used for consumption after transplantation, this must be informed to the donor in the consent process. If many people feel disgusted about eating chimeras (this is an empirical matter), a few would agree that chimeras with their cells could be eaten. In this case, unless there are good reasons to use donated cells against the will of the donors, many chimeras should not be consumed. Of course, some donors will agree with this point. Furthermore, if available, induced pluripotent stem cells of sufficient quality for the clinical application of related research (e.g., HLA-universal induced pluripotent stem cells), whose donors agree to their use *for any purpose*, can be used to produce chimeras for consumption. However, even under such circumstances, the number of chimeras we may eat will decrease, with their impact on animal welfare also accordingly decreasing. This relates to our next point.

Second, those who feel strong disgust about eating chimeras will experience great mental or moral distress when consuming them. Such distress is morally relevant, at least *pro tanto*. Can it be said from Bobier's position that such human suffering is morally less important than animal suffering? If one defends vegetarianism, one can claim that significant improvements in animal welfare surpass human distress associated with dietary changes. However, as stated above, Bobier commits to the position that human interests are morally more important than animal interests, to the extent that meat-eating and chimera research are morally justified. In addition, as we estimated, improvements in animal welfare caused by eating chimera flesh compared with a regular meat diet are very small. In other words, from Bobier's standpoint, the considerations against human mental distress associated with eating chimera flesh are slight improvements in animal welfare. Thus, it remains unclear whether moral importance of animal suffering surpasses the importance of the concern for human suffering. If human disgust associated with eating chimera flesh is strong, it can be a good moral reason against such consumption, at least from Bobier's standpoint.

Conclusion

Bobier addresses an important issue that has not received much attention in the field of ethics of chimera research, and we appreciate his novel argument for eating chimera flesh. Indeed, we agree with his basic ideas. However, what we indicate in this letter is that *all*

things considered, there may only be a small population that should consume human-pig chimeras.

Our criticism has two limitations. First, it does not undermine the *practical* value of Bobier's argument. According to our estimation, the supply of chimera flesh will be considerably small; therefore, even if only a few are morally obligated to eat it, they may be able to consume the entire supply. Second, our argument that disgust can be a good reason against eating chimera flesh depends on empirical assumptions about how people feel disgusted. If there may be advances in human-pig chimera research, social discussions should include the issue of their consumption.

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Declarations

Conflict of interest The authors declare that there is no conflict of interest.

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