

令和2年度 AO入試問題集 (農学部)

公表期限：2023年3月末

東北大学入試センター

※ 以下の(1), (2)の場合を除き、複製、転載、転用することを禁じます。

- (1) 受験予定者が自主学習のために使用する場合
- (2) 学校その他の教育機関(営利目的で設置されているものを除く。)の教職員が教育の一環として使用する場合



東北大学

令和2年度（2020年度）東北大学農学部

アドミッションズ・オフィス入学試験（AO入試）Ⅱ期

小作文（午前）

試験期日 令和元年11月16日（土）

試験時間 9:00～9:30

注意

- 1 問題冊子及び解答用紙は指示があるまで開かないこと。
- 2 問題冊子は1ページからなっている。試験開始後、直ちに確認すること。
- 3 ページの落丁・乱丁及び印刷不鮮明の箇所等に気づいた場合には、監督者に申し出ること。
- 4 解答用紙には、忘れずに受験記号番号及び氏名を記入すること。
解答用紙の裏面には、何も記入しないこと。
- 5 問題冊子は、試験終了後に持ち帰ること。

令和2年度東北大学農学部 AO入試Ⅱ期 小作文問題（午前）

人類の食料確保と自然との共生について、農学が果たすべき役割を述べてください。

（800字程度）



東北大学

令和2年度（2020年度）東北大学農学部

アドミッションズ・オフィス入学試験（AO入試）Ⅱ期

小 作 文（午 後）

試験期日 令和元年 11 月 16 日（土）

試験時間 13:00～13:30

注意

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- 5 問題冊子は、試験終了後に持ち帰ること。

令和2年度東北大学農学部 AO入試Ⅱ期 小作文問題（午後）

食料増産のために求められる技術革新について、あなたの夢を述べてください。

（800字程度）



東北大学

令和2年度（2020年度）東北大学農学部

アドミッションズ・オフィス入学試験（AO入試）Ⅱ期

筆記試験

試験期日 令和元年11月17日（日）

試験時間 10:00～12:00

注意

- 1 問題冊子は指示があるまで開かないこと。
- 2 問題冊子は6ページからなっている。試験開始後、直ちに確認すること。
- 3 ページの落丁・乱丁及び印刷不鮮明の箇所等に気づいた場合には、監督者に申し出ること。
- 4 すべての解答用紙に、忘れずに受験記号番号を記入すること。
- 5 解答は、問題ごとに別の解答用紙に記入すること。
- 6 問題冊子は、試験終了後に持ち帰ること。

(このページは白紙)

問題1 次の英文(A)、(B)を読み、設問に答えなさい。

(A)

Efforts to curb greenhouse-gas emissions and the impacts of global warming will fall significantly short without drastic changes in global land use, agriculture and human diets, leading researchers warn in a high-level report commissioned by the United Nations.

The special report on climate change and land by the Intergovernmental Panel on Climate Change (IPCC) describes plant-based diets as a major opportunity for *mitigating and adapting to climate change — and includes a policy recommendation to reduce meat consumption.

Deforestation concerns

Researchers also note the relevance of the report to tropical rainforests, with concerns mounting about accelerating rates of deforestation. The Amazon rainforest is a huge carbon sink that acts to cool global temperature, but rates of deforestation are rising, in part because of the policies and actions of the government of Brazilian President Jair Bolsonaro.

(1) Unless stopped, deforestation could turn much of the remaining Amazon forests into a degraded type of desert, and could release more than 50 billion tons of carbon into the atmosphere in 30 to 50 years, says Carlos Nobre, a climate scientist at the University of São Paulo in Brazil. “That’s very worrying,” he says.

“Unfortunately, some countries don’t seem to understand the *dire need of stopping deforestation in the tropics,” says Hans-Otto Pörtner, an ecologist who co-chairs the IPCC’s working group. “We cannot force any government to interfere. But we hope that our report will sufficiently influence public opinion to that effect.”

Paris goals

Although the burning of fossil fuels for energy and transport *garners the most attention, activities relating to land management, including agriculture and forestry, produce almost one-quarter of heat-trapping gases resulting from human activities. The race to limit global warming to 1.5°C above pre-industrial levels — the goal of the international Paris climate agreement made in 2015 — might be a lost cause unless land is used in a more sustainable and climate-friendly way, the latest IPCC report says.

The report highlights (the need to preserve and restore forests, which soak) up carbon from the air, and *peatlands, which release carbon if dug up. Cattle raised on *pastures created by clearing woodland are particularly emission-intensive. (2) This practice often

comes with large-scale deforestation, as seen in Brazil and Colombia. Cows also produce large amounts of methane, a *potent greenhouse gas, as they digest their food.

The report states with high confidence that balanced diets featuring plant-based and sustainably produced animal-sourced food “present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health”.

By 2050, dietary changes could free up several million square kilometers of land and reduce global CO₂ emissions by up to eight billion tons per year, relative to business as usual, the scientists estimate.

(Reprinted from "Eat less meat: UN climate-changer report calls for change to human diet" by Quirin Schiermerier, Nature. Copyright ©2019, Springer Nature.一部改变)

(B)

The *lush Amazon rainforest of northeastern Peru lost most of its trees when it was logged and converted to pastures for water buffalo in 1990. But after humans abandoned the area about 10 years later, the forest slowly began to regrow. Now, scientists have an explanation for how it revived so quickly: the *foraging activities of tamarins, squirrel-size monkeys native to the area.

Scientists long suspected the tamarins had played a role. So, for more than 20 years, researchers used GPS tracking devices and field observations to measure how much time the monkeys spent in the previously logged forest. The researchers also tracked how often and where the monkeys *excreted seeds they ate from fruit trees—most of which came from a nearby forest.

(3) During the first 3 years, the monkeys spent less than 1.5% of their time in the previously logged forest, but by 2016, this increased to about 12%. Of the hundreds of seeds researchers tracked, 15 survived and grew into trees that were taller than 2 meters. Researchers collected their leaves and analyzed their genes; more than half of the trees *sprouted from seeds that originally came from the nearby forest. This confirms that the monkeys play a critical role in bringing deforested areas back to life, the researchers report today in Scientific Reports.

("From 217 word excerpt (out of 266 words) from ""These squirrel-size monkeys helped bring Peru's Amazon back to life"" by Katie Camero SCIENCE Jul. 25, 2019 (doi:10.1126/science.aay8688) .Reprinted with permission from AAAS.")

mitigating : 軽減する dire : 差し迫った garner : 集める
peatlands : 泥炭地 pasture : 牧草地 potent : 強力な
lush : 青々と茂った foraging : 採食の excrete : 排泄する
sprout : 芽を出す

- 問 1 下線部(1)、(2)、(3)を和訳しなさい。
- 問 2 英文 (A) に関し、global warming を防止するために特に重要だと述べている方策はどのようなことか述べなさい (日本語で 50 字程度)。
- 問 3 問 2 の方策を進めることで、将来どのような効果が得られると予想しているか述べなさい (日本語で 80 字程度)。
- 問 4 英文 (B) に関し、tamarins が果たした役割について述べなさい (日本語で 80 字程度)。
- 問 5 英文 (A) と (B) に共通して論じられている人間の行為と、それを行う理由もしくは動機について述べなさい (日本語で 50 字程度)。

問題2 次の英文の記事を読み、設問に答えなさい。

In the early 2000s, two projects were conducted to produce cultured tissue for food purposes: one by a NASA-funded college-based group, and another by a team of bio-artists. Both projects produced small quantities of tissue, with the NASA group performing sniff-tests to assess *palatability, while the bio-arts team conducting taste-tests as part of an arts performance piece. Professor Mark Post, Maastricht University, produced the world's first cultured beef burger, which was cooked and eaten in London in 2013. The technology involves expanding *stem cells then *differentiating them into muscle cells.

One leading team produced the world's first cultured burger with primary *bovine skeletal muscle cells. Another is a US-based start-up company who have produced demonstration cultured products in the form of a meatball and so on. US-based start-up also produced demonstration 'steak chips' - dehydrated, edible, high-protein food products formed of cultured muscle cells that were combined with a *hydrogel. Another more recently established US start-up is working on cultured fish, although they describe their work as early stage.

Cultured meat was best described as an “as-yet undefined object”, to capture the way in which (1) this new type of thing, with little in the way of history or precedent, had entered our world to disrupt and sit uncomfortably within the existing ways we categorize and understand what meat is. Little framework existed to make sense of this new type of tissue presented as meat outside of science fiction narratives, and many did not know how to *rationalize it. As part of the promotional work of the 2013 cultured burger event, one definition of cultured meat was given some visibility. In this definition, (2) cultured meat is meat as we know it, an identical product just produced “not in a cow”, and it is to be consumed by people who like meat but are concerned about the environmental and animal welfare impacts of *livestock production methods.

This *contestation extends to what it (㊦) be called, even within the community of people working to produce and support the technology. Around 2011, (3) the term cultured meat became used more as the word 'cultured' captured cell culturing techniques, emphasized similarities to *fermentation processes such as beer and cheese, and had an appealing resonance as artful and creative. Since 2015, some within the field have been advocating the term 'clean meat', primarily because it is believed to be more (㊧) to consumers. Outside of the community, there have been a number of *derogatory terms used in public debate, including lab meat, *synthetic meat, and Frankenstein meat.

*Terminology is important in framing how things are (⑦), and this contestation over what it is called reflects both the *ambiguity over what it is, and the political sensitivities of how different groups want it to be positioned.

Cellular agriculture encompasses a set of technologies to manufacture products typically obtained from livestock farming, using culturing techniques to manufacture the individual product. There is still debate as to exactly how cellular agriculture should be defined, and which products fit within or beyond this definition. However, within the community associated with cellular agriculture, there is some agreement that it can be divided into two types that here we term (4) tissue engineering-based and fermentation-based cellular agriculture, (⑧) by the production method used.

Tissue engineering-based cellular agriculture includes cultured meat and leather systems in which cells or cell lines taken from living animals are tissue engineered in an effort to produce useable tissue with minimal quantities of animal tissue input compared to livestock methods in which the cells themselves form the product. Starting material, i.e. the cells, can be taken from an animal using a *biopsy procedure, or a genetically-modified cell line could be produced that only requires animals from which to source the original cells.

Fermentation-based cellular agriculture contrasts to tissue engineering-based systems in that it does not use any tissue from a living animal. Instead, products are manufactured by fermentation using bacteria, *algae or *yeast that have typically been genetically modified, by adding *recombinant DNA, so they produce organic molecules. These molecules can be used to produce familiar animal products, e.g., gelatin, casein (used for milk), and collagen (used for leather). Fermentation-based cellular agriculture draws upon *commonplace industrial biotechnology and therefore may result in marketable products in a shorter timeframe compared to tissue engineering cellular agriculture that (⑨) on technology that has not been proven at large scales.

(5) A key feature of both forms of cellular agriculture products is the *aspiration to produce what we term ‘biologically *equivalent’ products to the livestock versions. It is the goal of biological equivalence that separates cellular agriculture from a new wave of plant-based protein analogue projects including meat and egg-like products that also seek (6) ‘viscerally equivalent’ experiences but absolutely avoid biological equivalence. Processed cultured meat products aspire to biological equivalence.

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palatability : おいしさ stem cells : 幹細胞
 differentiating : 分化させる bovine : 牛の
 hydrogel : (寒天などのような) 水を含んだゲル rationalize : 正当化する
 livestock : 家畜類 contestation : 論争 fermentation : 発酵
 derogatory : 軽蔑的な synthetic : 合成した terminology : 専門用語
 ambiguity : 曖昧さ biopsy : 生きた組織の採取
 algae : 藻類 yeast : 酵母菌
 recombinant DNA : 組換え DNA
 commonplace : ありふれた aspiration : 強い願望 equivalent : 同等の

問 1 下線部(1)、(2)、(3)を和訳しなさい。

問 2 カッコ㊶から㊸を埋める語句として適切なものを次の語群から 1 つずつ
 選びなさい (必要な場合には語形を変えて書くこと)。

appeal group rely shall understand

問 3 下線部(4)について、本文の内容をもとに両者の相違点を表にまとめなさい
 (下の例にならい英語で記載すること)。

	Tissue engineering-based agriculture	Fermentation-based cellular agriculture
1. Starting materials		
2. Products		
3.		
4.		

問 4 下線部(5)について、自分の意見を述べなさい (英語で 50 語程度)。

問 5 下線部(6)について、どのようなことが説明しなさい (日本語で 30 字以
 内)。



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小 作 文（午 前）

試験期日 令和2年2月10日（月）

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次の課題について30分以内に800字程度で記述してください。

課 題

日本の人口は約1億2600万人で、子供の人口が減り、高齢者の人口が増えています。この現状を踏まえ、日本の食料生産のあり方について、あなたの考えを述べてください。



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小 作 文（午 後）

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次の課題について30分以内に800字程度で記述してください。

課 題

「食」は特に子供たちの心身に大きな影響を及ぼすため、わが国では「食育基本法」が制定され、さまざまな取組みが行われてきました。農学は食育に対し、どのように貢献できるでしょうか。あなたの考えを述べてください。